FBT040-30-104007

~ 10.4” AIRGAP ASSEMBLY

Customer P/N: 82-L0006-031

2010/10/7

Engineering Specifications v.1.0

(√) Preliminary Specifications

( ) Final Specifications

[This specification is subject to change without notice.]

Company Confidential

ROHS

Approved by	Checked by	Prepared by

Proprietary Notice

RECORD OF REVISION

Version	Date	Page	Original Description	New Description	ECN#
1.0	2010/10/7	All	First draft	All	N/A

TABLE OF CONTENTS

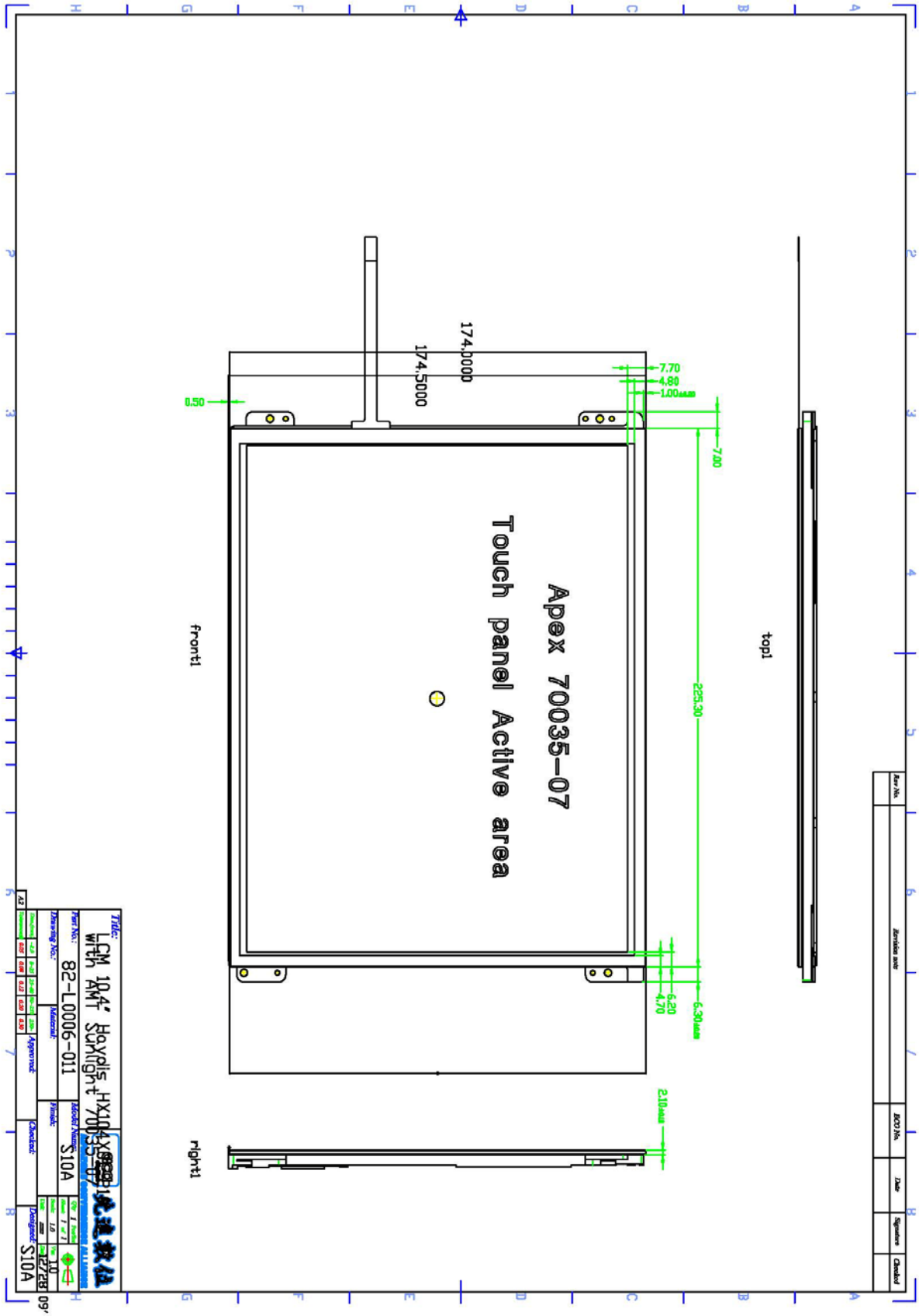
FBT040-30-104007

ENGINEERING SPECIFICATIONS

1 | GENERAL DESCRIPTION

Structure	Description
Touch Panel	ATP-104015-01-S (AMT 70035-09)
Tape	0.40mm
Display	ALC-104012-01-1(Hydis HX104X01-212)

2\ | ASSEMBLY MECHANICAL DRAWING



3 | APPEARANCE SPECIFICATIONS

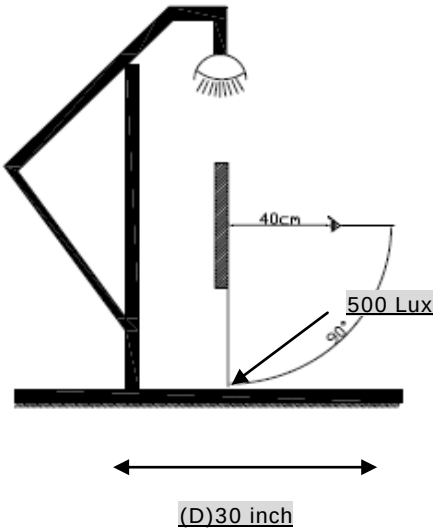
(1) Inspection Environment

It's necessary to set up an applicable visual environment for sensor cosmetic inspection per following materials request

Light booth H 24" X D 30" X 42" W

(Width≧42")

- Flat dark background
- Illumination on the surface of glass is 500 Lux
- 5 x eye loupe with reticule
- Position front of touch screen 40 cm from your eye



(2) Inspection Specification

<table>
<tr><th>Judge Area</th><th colspan="2">Judge Item</th><th colspan="2">Inspection Specification</th></tr>
<tr><td rowspan="8">Viewing Area</td><td rowspan="8">Particles & Bubbles</td><td rowspan="4">Round</td><td colspan="2">Diameter (D): mm</td><td>Quantity (N)</td></tr>
<tr><td colspan="2">D ≦ 0.25</td><td>Disregarded</td></tr>
<tr><td colspan="2">0.25 ＜ D ≦ 0.4</td><td>黑點, 亮點 NG
其他 允收</td></tr>
<tr><td colspan="2">D ＞ 0.4</td><td>NG</td></tr>
<tr><td rowspan="4">Linear</td><td>Length (L): mm</td><td>Width (W): mm</td><td>Quantity (N)</td></tr>
<tr><td colspan="2">W ≦ 0.025</td><td>Disregarded</td></tr>
<tr><td colspan="2">0.025 ＜ W ≦ 0.05 and L ≦ 20</td><td>Disregarded</td></tr>
<tr><td colspan="2">0.05 ＜ W ≦ 0.1 and L ≦ 10</td><td>Disregarded</td></tr>
<tr><td colspan="2">W ＞ 0.1</td><td>NG</td></tr>
</table>

4 | Agency Approval

Agency/Test Standard	Description
RoHS	RoHS compliance

5.| STORAGE

- Temperature of -10℃~70℃ is recommended for the storage when it is stored in the in the original container. (Relative humidity up to 90% is for 0℃~35℃; RH lower than 50% is suggested when the temperature is higher than 60℃)
- Do not store the touch screen in the place condensation may form.

6 | HANDLING PRECAUTIONS

1. Wear gloves at all times during handling; hold only on the edges of panels.
2. Do not pile up panels or place heavy substance on panels. (Excess force applied on the surface of panel may crack the top lens.)
3. Do not touch surface of panels with sharp objects, which may cause scratches on the top lens.
4. Warranty void if module is dissembled without CiVUE permission.
5. Do not twist or bend the module.

7 | WARRANTY

CiVUE warrants that the product described in this specification shall be free of defects in materials and workmanship for one (1) year from the date of delivery at CiVUE, and that such product shall substantially conform to the specifications provided by CiVUE. Should the product be delivered through a third party, the warranty period shall commence on the date that such third party receives the product. This Warranty shall be effective only if CiVUE receives notice of such defects in materials and workmanship during the period of the Warranty stated above. This warranty is between CiVUE and the buyer only, and does not extend to buyer's customers or users of buyer's products. CiVUE reserves the sole discretion in determining the causes and the responsibilities of any defects or damages.

CiVUE shall not be liable for any direct, indirect, special incidental, or consequential damages including, but not limited to, loss of profits and/or destruction of other property, caused by any application of the product(s) and/or its integration with other components. CiVUE's liability shall be limited to the amount paid for the product(s).

Excluded from this Warranty are all problems or failures resulting from:

- Improper or inadequate maintenance of the product.
- Unauthorized modification and disassembly of the product by any means.
- Operation of the product outside its environmental specifications.
- Neglect, misuse, or abuse of the product.
- Modification or integration with other components not covered by a CiVUE warranty when such integration increases the likelihood of problems, failures, or damage.
- Damages caused by disasters, either by natural causes or human factors after the delivery of products.

For details and RMA procedures, please refer to CiVUE's "Product Warranty Policy."

CIVUE OPTOTECH INC.

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鹽光股份有限公司

SALT INTERNATIONAL CORP.

承 認 書

Approval Sheet

客戶名稱 Customer	先進數位科技股份有限公司
品名 Description	AMT 10.4" 4 Wire 低反射Resistive Touch Screen
日期 Date	Dec-1st, 2009
製造商料號 Vendor P/N	70035-09
客戶料號 Customer P/N	

RoHS COMPLIANT

Customer Approved
Signature Date:

敬請於30天內確認簽回，逾期視同確認

Salt International Corp.
7F-1, No. 92, Bao-Jhong Road, Shin-Dian City, Taipei 231, Taiwan.
Tel: +886 2 2914-6684 Fax: +886 2 2911-5345 Web: www.salt.com.tw

Index

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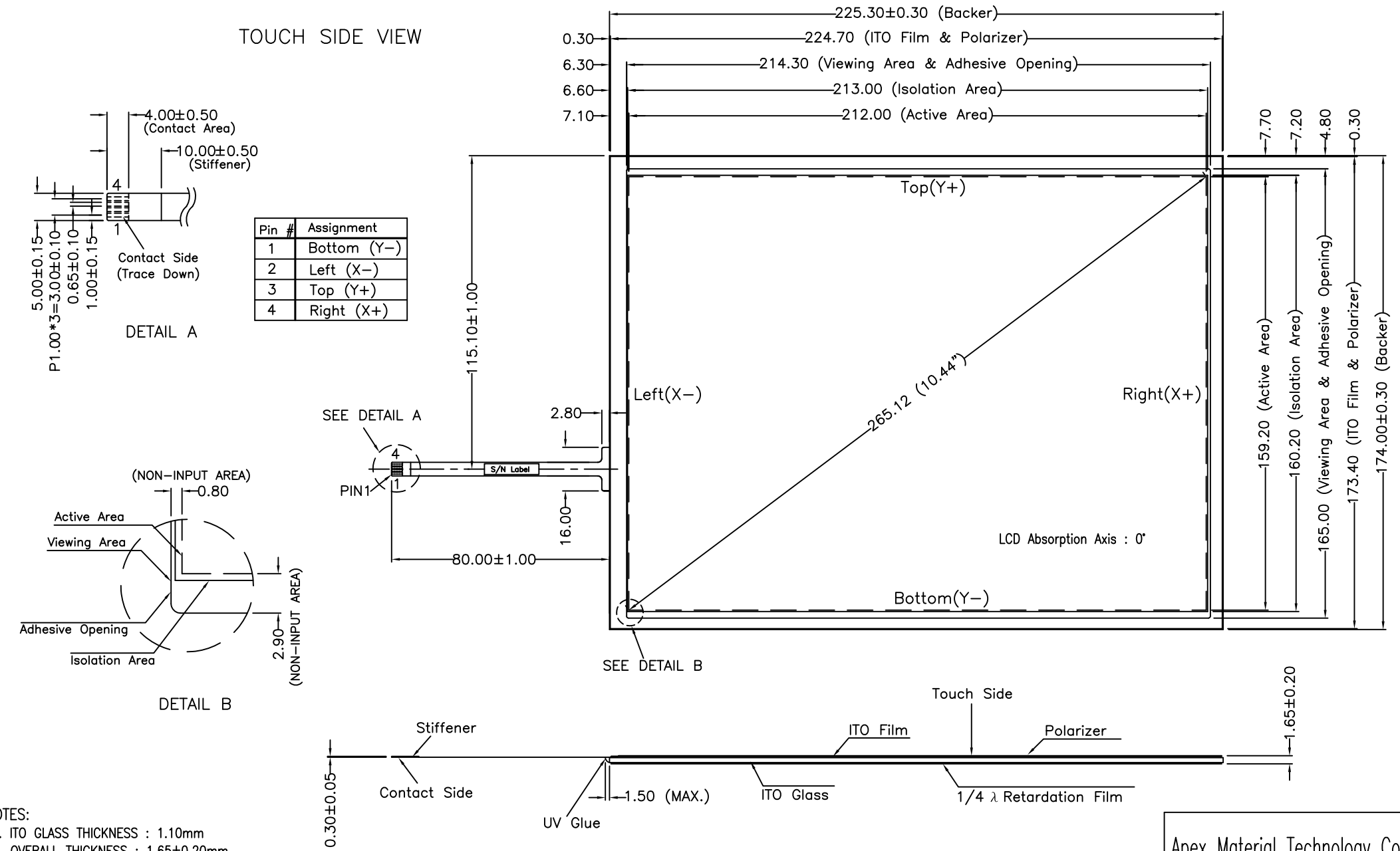
Tel: +886 2 2914-6684 Fax: +886 2 2911-5345 Web: www.salt.com.tw

MODEL NAME :	Rev.
70035-09	



Pin #	Assignment
1	Bottom (Y-)
2	Left (X-)
3	Top (Y+)
4	Right (X+)

NOTES:
1. ITO GLASS THICKNESS : 1.10mm
2. OVERALL THICKNESS : 1.65±0.20mm
3. CONNECTOR AND PINOUT AS INDICATED
4. FRONT SURFACE : ANTI-GLARE HARDCOAT
5. TAIL TYPE : IMMERSION GOLD PLATED FPC , ZIF
6. CONSTRUCTION: CR TYPE WITH 1/4λ RETARDATION FILM ON GLASS SIDE
7. OTHER SPEC : SEE APPROVAL SHEET

RoHS COMPLIANT

NO.	DATE	DESCRIPTION	CHK
REVISION			

CHIEF OF DESIGN		APPROVED	Alex
ENGINEER		PROJECT MANAGER	
DRAWN BY	Denise	DATE	NOV. 20, 2009
SHT 1 OF 1		REV.	

Apex Material Technology Corp.

TOLERANCES UNLESS SPECIFIED	
.X	± 0.50
.XX	± 0.50
.XXX	± 0.30
ANGULAR	.

MODEL NAME :70035-09
DWG NO : 70035-09-0-01
SCALE: 1:1 UNIT: mm

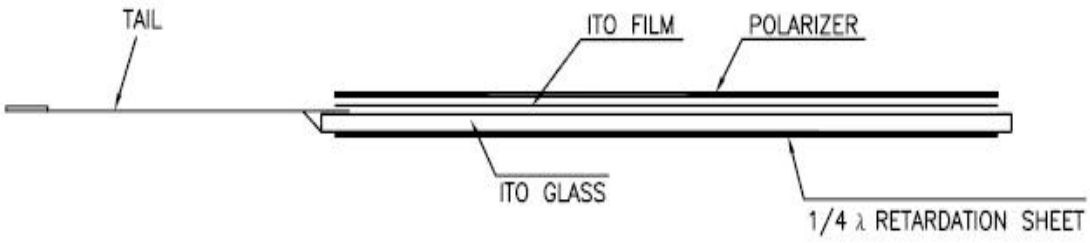
Doc No:	AS-70035-09-01	Doc Rev: 1.0
Title:	SPECIFICATIONS OF ANALOG RESISTIVE TOUCH SCREEN Model Name: 70035-09 Size: 10.44”	Date Released: Dec. 01, 2009 Page.1 of 7

Low Reflective Touch Panel Specification
Manufacturer: Apex Material Technology Corp.
Model Name: 70035-09

1. Mechanical Dimensions and Construction
   1.1 General: Analog resistive low reflective touch panel is laminated by polarizer to ITO film side.
   1.2 Mechanical Performance:
      1.2.1 Surface Hardness: 3H
      1.2.2 ITO Glass Thickness: 1.10mm
      1.2.3 Tail Type: FPC
      1.2.4 Surface Finish Type: Anti-glare
   1.3 Input Method and Activation Force

Input Method	Average Activation Force
1.6mm dia. Delrin stylus	0.10~0.70N
16mm dia. Silicone "finger"	0.10~0.80N

Touch screen side view:



Remarks: This Model is with Anti-Newton Ring design.

2. Typical Optical Characteristics
   2.1 Visible Light Transmission: 76 ± 2%
   2.2 Reflectivity: 1.0 ± 0.6%
   2.3 Haze: 14 ± 4%

3. Electrical Specifications
   3.1 Operating Voltage: 5.5V or less
   3.2 Contact current: 30mA (maximum)
   3.3 Circuit close resistance: X-Axis (Between pin2 & pin4) : 300~1000Ω
   Y-Axis (Between pin1 & pin3): 200~700Ω
   3.4 Circuit open resistance: > 10MΩ at 25VDC
   3.5 Contact bounce: < 10ms
   3.6 Linear Test : <1.5 %
   3.7 Capacitance: 100Nf (maximum)
   3.8 Electrostatic Discharge Protection: (per EN 61000-4-2)
   The touch screen can withstand 15KV air discharge and 8KV contact discharge.

4. Linearity
   4.1 Linear Test Specification
   Direction X: <1.5 %
   Direction Y: <1.5 %
   4.2 Linearity Test
   Apply voltage (DC5V) to upper (or lower) electrodes, output voltage Vx (see Fig.4-1) or Vy (see Fig.4-2) on the other electrodes is measured at every regular intervals.
   Linearity is the value of max. error voltage (see Fig. 4-3).

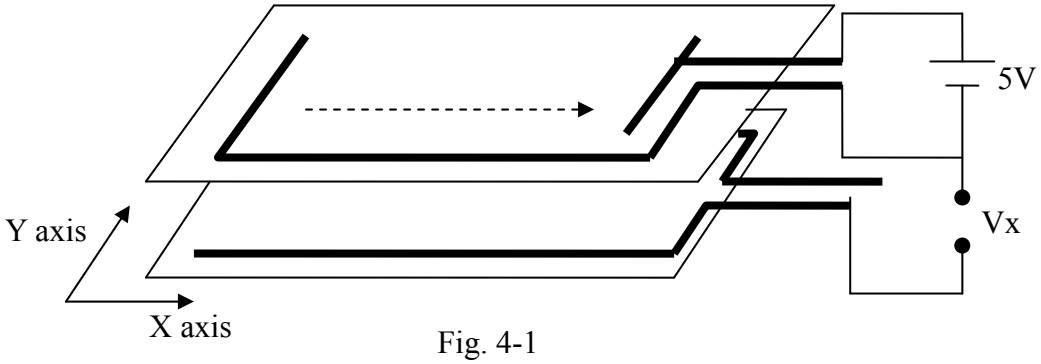


Fig. 4-1

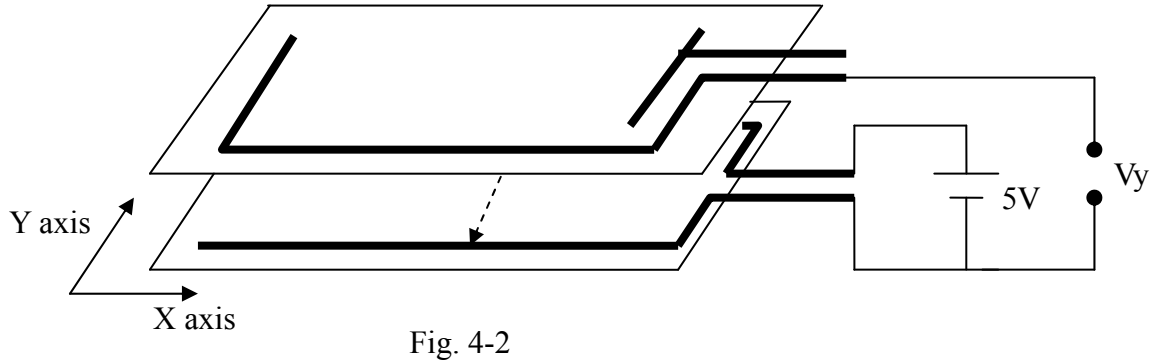
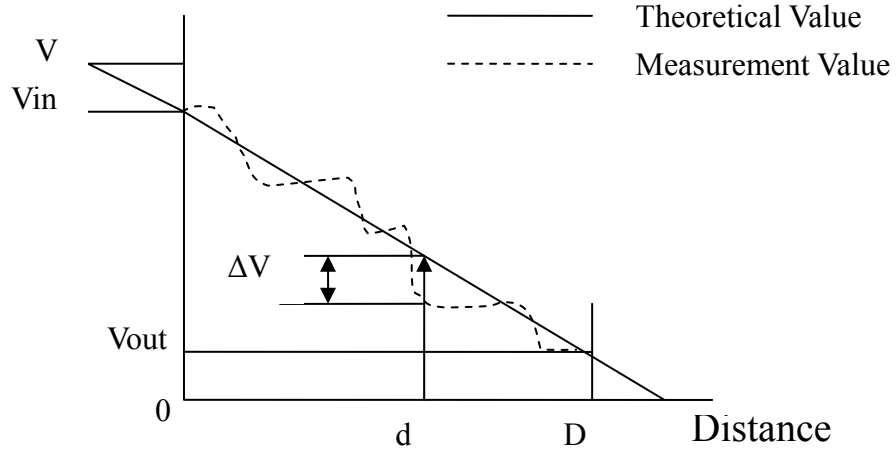


Fig. 4-2



Error voltage= ｜ ΔV ｜ / (Vin-Vout)

Max. error voltage= ｜ ΔVmax ｜ / (Vin-Vout)

Fig. 4-3

Doc No:	AS-70035-09-01	Doc Rev: 1.0
Title:	SPECIFICATIONS OF ANALOG RESISTIVE TOUCH SCREEN Model Name: 70035-09 Size: 10.44”	Date Released: Dec. 01, 2009 Page.4 of 7

5. Environmental Specifications

5.1 Operating Temperature: -10° C ~ + 50° C

5.2 Storage Temperature: -20° C ~ + 70° C

5.3 Humidity: if temp. ≧ 20° C, See Fig. 5 below

if temp. < 20° C, humidity less than 90% RH

No dew condensation

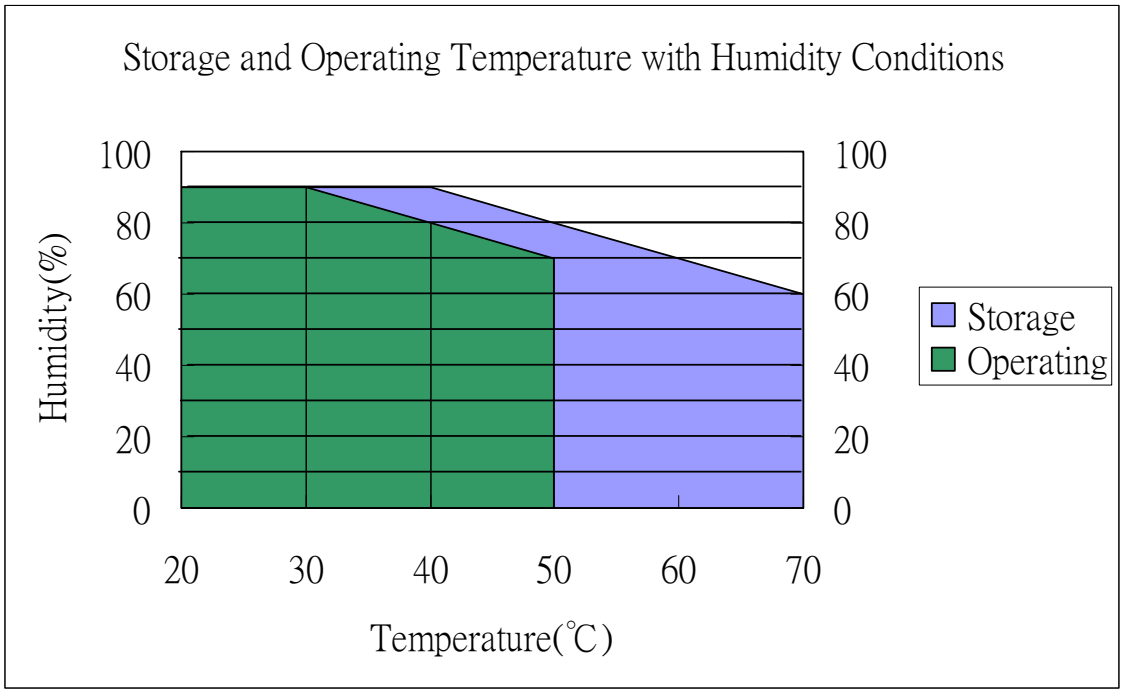


Fig. 5 Storage and Operating Temperature with Humidity Conditions

6. Reliability Test

6.1 Exposure to high temperature

Touch panel is put into a test machine at the condition of 80℃ for 288 hours. Then it is left at room temperature for 24 hours or more. The measurement must satisfy the following:

- Circuit close resistance: as Sec. 3.3
- Circuit open resistance: as Sec. 3.4
- Contact bounce: as Sec. 3.5
- Linearity test: as Sec. 3.6

6.2 Exposure to low temperature

Touch panel is put into a test machine at the condition of -40℃ for 288 hours. Then it is left at room temperature for 24 hours or more. The measurement must satisfy the following:

- Circuit close resistance: as Sec. 3.3
- Circuit open resistance: as Sec. 3.4
- Contact bounce: as Sec. 3.5
- Linearity test: as Sec. 3.6

6.3 Exposure to high temperature and high humidity

Touch panel is put into a test machine at the condition of 60℃, 90%RH for 120 hours. Then it is left at room temperature for 24 hours or more. The measurement must satisfy the following:

- Circuit close resistance: as Sec. 3.3
- Circuit open resistance: as Sec. 3.4
- Contact bounce: as Sec. 3.5
- Linearity test: as Sec. 3.6

6.4 Thermal Shock

Touch panel is put into a test machine at the condition of -40℃ for 30 minutes, and then 80℃ for 30 minutes. The process is repeated by 10 cycles. Then it is left at room temperature for 24 hours or more. The measurement must satisfy the following:

- Circuit close resistance: as Sec. 3.3
- Circuit open resistance: as Sec. 3.4
- Contact bounce: as Sec. 3.5
- Linearity test: as Sec. 3.6

Doc No:	AS-70035-09-01	Doc Rev: 1.0
Title:	SPECIFICATIONS OF ANALOG RESISTIVE TOUCH SCREEN Model Name: 70035-09 Size: 10.44”	Date Released: Dec. 01, 2009 Page.6 of 7

7. Durability test:

7.1 Finger touches

Touch panel is hit 2 million times with a silicone rubber of R8 finger(see Fig.7-1), hitting rate is by 250g at 2 times per second. The measurement must satisfy the following:

- Circuit close resistance: as Sec. 3.3
- Circuit open resistance: as Sec. 3.4
- Contact bounce: as Sec. 3.5
- Linearity test: as Sec. 3.6

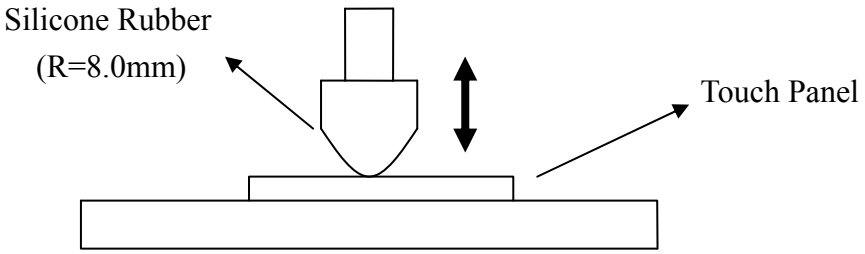


Fig. 7-1

7.2 Stylus writing

Touch panel is drawn by R0.8 Derlin stylus pen, at 250g forces, repeat one inch by 100K times (see Fig.7-2). The measurement must satisfy the following:

- Circuit close resistance: as Sec. 3.3
- Circuit open resistance: as Sec. 3.4
- Contact bounce: as Sec. 3.5
- Linearity test: as Sec. 3.6

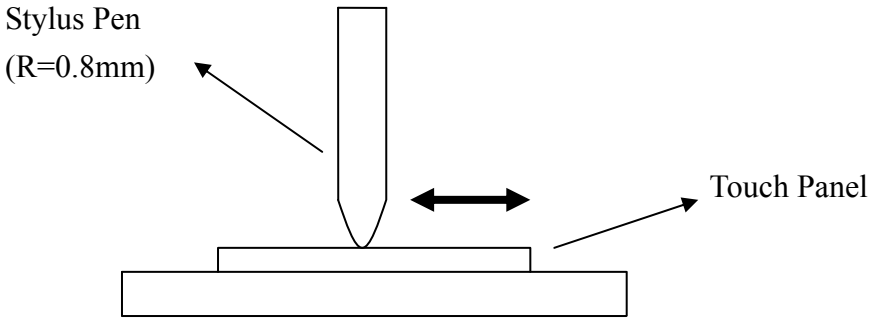


Fig. 7-2

8. Optical Performance

8.1 Optical inspection method and optical defect standards refer to AMT document A002 updated version ; 〝Touch Screen Optical Quality Standard.〞

8.2 Outside to Viewing Area: any optical defects in this area need to be ignored if no touch screen function is affected.

9. Others

9.1 Always store the touch screen in its original shipping container under normal conditions (Temperature 20~25℃; Humidity ≦65%RH).

9.2 This Model is RoHS compliant.

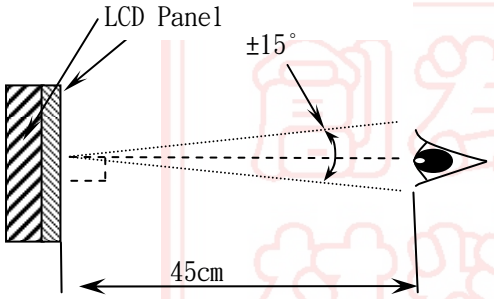
制訂單位：品保部 文件編號：A002-1 版　　次：B	低反射觸控螢幕 外觀檢驗標準	制訂日期：2006/12/13 修訂日期：2007/10/2 頁　　數： 1 of 3

1.0 範圍:

本標準適用於 AMT 低反射觸控螢幕尺寸小於 12 吋(含)以下之產品，適用於產品客戶之進料檢驗作業規範，若在個別產品的承認圖面上另有聲明者除外。

2.0 檢驗方式及檢驗範圍說明：

2.1 Touch Panel 貼在 LCD 前，點亮或不點亮 LCD，以 90°±15°正視檢驗(如圖一)，眼睛距離 Touch Panel 45cm。



圖一

A	B	C
D	E	F
G	H	I

圖二

2.2 檢驗環境：本產品最佳使用環境是在週圍燈光比 LCD Panel 亮的環境；檢驗環境燈光應大於 1200LUX，產品後面 LCD Panel 輝度（Brightness）應小於 800 Nits，以符合產品實際使用需求。

2.3 將產品由銀線邊緣 4mm 起算將垂直與水平各均分為 3 等份(如圖二)，其中編號 E 區域定義為中央區，其餘(編號 A、B、C、D、F、G、H、I)則定義為邊緣區。

3.0 動作領域標準：

3.1 外觀檢驗－正面動作區(ACTIVE AREA)

項目	規格定義	允許範圍	
		中央區	邊緣區
點狀不良 氣泡或凸點	D≦0.25	忽略不計	
	0.25<D≦0.4	黑點、亮點 拒收 其它 允收	允收（備註）
	D>0.4	拒收	
正面刮傷 毛屑(含纖維,毛髮)	W≦0.025	任何長度忽略不計	
	0.025<W≦0.05	L≦10 允收	L≦20 允收（備註）
	0.05<W≦0.1	拒收	L≦10 允收（備註）
	W>0.1	拒收	

D:直徑 ； W:寬度 ； L:長度 單位:mm

3.2 瑕疵的定義:

3.2.1 在點亮和不點亮的 LCD Panel 襯底下，點狀不良的點是在 Film 內或在 Touch screen 中間的亮點、異物或氣泡。

3.2.2 表面上的凸點在一般的燈光下呈霧狀，在光源下呈透明可以量測， 其大小以實際量測為準，若凸點內有異物則分別依凸點或氣泡規格量測。

3.2.3 刮傷是線狀，長度要大於寬度的六倍。

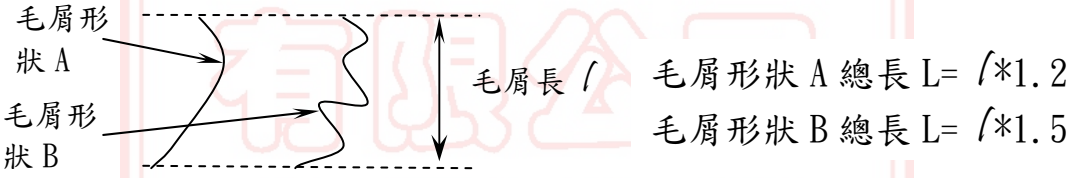
3.2.4 毛屑纖維或頭髮，長度要大於寬度的六倍。

3.3 注意事項:

3.3.1 每片 Touch Panel 允許 4 個瑕疵範圍內的缺點(含氣泡凸點），中央區僅容許 1 個缺點，邊緣區每區不可超過（含）3 個缺點，且各缺點間必需相距大於 10mm 以上。

3.3.2 不規則的瑕疵直徑（D）尺寸是按瑕疵之最大範圍與最小範圍相加後除以 2 後之平均值計算。

不規則毛屑長度計算



3.3.3 異物瑕疵檢驗方法必須以目視距離 45cm 檢驗，Touch Panel 正面面對檢查者，以點亮和不點亮的 LCD Panel，檢視時間為 10 秒，同時檢驗環境的亮度建議於 1200LUX 以上。

3.3.4 若瑕疵無法用 10 倍放大 ocular 實際量測，這個瑕疵應是被允收的。

3.3.5 Touch Panel 在非檢查角度檢視時，若看到表面有亮點、色差或顏色不均現象或有大面積或條狀顏色不均勻現象，不論大小均不計瑕疵。

4.0 外觀檢驗：

4.1 非關鍵性視覺區 (Non Critical Visual Areas)

此檢驗標準適用於 Touch Screen 的周圍,如邊緣和出線。

- 周圍的膠帶之皺褶或 Film 邊緣有毛邊，或 Film 歪斜但未超過玻璃，四週黏合膠帶若無明顯縫隙可直接導入液體或其他污染到可視區，此種情形皆可接受。
- 出線不能被摺死，但表層輕微的摺痕可接受。
- 此區的刮傷、毛屑和污點可接受，除非影響作用功能。

4.2 產品背面

產品背面有任何氣泡或刮傷，若於裝上 LCD 後以 LCD Panel 正面 90°正視檢驗(如圖一)，將 LCD 點亮，距離 45cm 看不到有氣泡或刮傷，不論大小均不計瑕疵。

4.3 其他動作領域標準:

4.3.1Touch Panel 間柱(Separator dots):

一片觸控螢幕上最多允許 8 個間柱脫落，若有間柱脫落，兩個脫落的間柱距離必須＞0.5”　(1.25cm)。

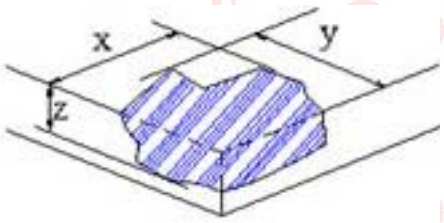
4.3.2 銀線(Conductive silver ink):

- 銀線的空隙需小於銀線寬度的 25%。
- 銀線上的暇疵在不影響產品功能時，則為允收。

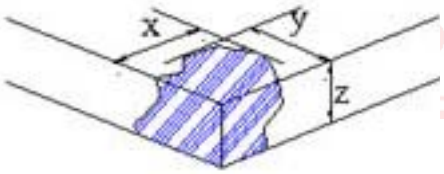
4.3.3 上下層偏差(Alignment):

- 上層 Film 不能超過下層玻璃。

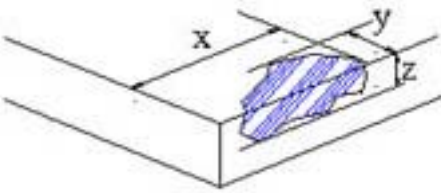
5.0 玻璃邊緣缺損規格：



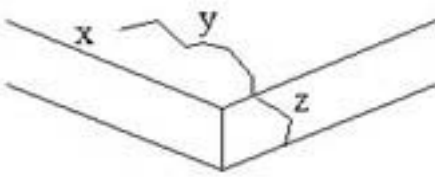
缺角 :
X≦4.0mm and
Y≦4.0mm and
Z<Glass Thickness



缺角 :
X≦2.0mm and
Y≦2.0mm and
Z=Glass Thickness



邊緣 :
X≦6.0mm and
Y≦2.0mm and
Z<Glass Thickness



破裂 : 用裸視顯而易見的玻璃破裂則不能接受。

Test Report

JA SUN CO., LTD.
23665, NO. 9, ALLEY 27, LANE 365, SEC. 1, CHUNG YANG RD.,
TU-CHEEN CITY, TAIPEI HSIEN, TAIWAN, R. O. C.

No. : CE/2006/C3872
Date : 2006/12/25

The following sample(s) was/were submitted and identified by/on behalf of the client as :

Sample Description	:	工業用膠帶 INDUSTRIAL ADHESIVE TAPE
Style/Item No	:	SONY NP-605, T-4000, G9000SY, G-9900, G-9000R, G-4000, G-9303S
Sample Receiving Date	:	2006/12/18
Testing Period	:	2006/12/18 TO 2006/12/25

==========

Test Result(s) : Please refer to next page(s).

Daniel Yeh, M.R. / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.

Test Report

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No. : CE/2006/C3872
Date : 2006/12/25

Test Result(s)

PART NAME NO.1 : MIXED TRANSPARENT TWIN ADHESIVE TAPE & TRANSLUCENT-WHITE SHEET (EXCLUDING THE RELEASE PAPER)

Test Item (s):	Unit	Method	MDL	Result
				No.1
Cadmium (Cd)	mg/kg	With reference to BS EN 1122:2001, Method B for Cadmium Content. Analysis was performed by ICP-AES.	2	n.d.
Lead (Pb)	mg/kg	With reference to US EPA Method 3050B for Lead Content. Analysis was performed by ICP-AES.	2	n.d.
Mercury (Hg)	mg/kg	With reference to US EPA Method 3052 for Mercury Content. Analysis was performed by ICP-AES.	2	n.d.
Hexavalent Chromium (CrVI) by alkaline extraction	mg/kg	With reference to IEC 62321, Ed.1 111/54/CDV. Determination of Hexavalent Chromium for non-metallic samples by UV/Vis Spectrometry.	2	n.d.
Polychlorinated Biphenyls (PCBs) (CAS NO:001336-36-3)	mg/kg	With reference to US EPA 8082A. Analysis was performed by GC/MS.	0.5	n.d.
Polychlorinated Terphenyls (PCTs)	mg/kg	With reference to US EPA 8082A. Analysis was performed by GC/MS.	0.5	n.d.
Chlorinated Paraffin (C10~C13) (CAS NO:010871-26-2)	%	With reference to US EPA3540C. Analysis was performed by GC/MS.	0.01	n.d.
Polychlorinated Naphthalene (PCNs)	mg/kg	With reference to US EPA 8270D. Analysis was performed by GC/MS.	5	n.d.
1,1,1-trichoroethane	mg/kg	With reference to US EPA 8260. Analysis was performed by GC/MS.	1	n.d.

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Test Item (s):	Unit	Method	MDL	Result
				No.1
Carbon tetrachloride	mg/kg	With reference to US EPA 5021. Analysis was performed by GC/MS linked Headspace.	1	n.d.
PVC (CAS No:9002-86-2)	%	Analysis was performed by FTIR/ATR and Pyrolyzer-GC/MS.	1	Negative
CFC's (Chlorofluorocarbons)	---	With reference to US EPA 8260.	---	---
Group I	---	---	---	---
Chlorofluorocarbon-11 (CAS No:000075-69-4)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-12 (CAS No:000075-71-8)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-113 (CAS No:000076-13-1)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-114 (CAS No:000076-14-2)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-115 (CAS No:000076-15-3)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Group III	---	---	---	---
Chlorofluorocarbon-13 (CAS No:000075-72-9)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-111 (CAS No:000354-56-3)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-112 (CAS No:000076-12-0)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-211 (CAS No:135401-87-5)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-212 (CAS No:076564-99-3)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.

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Test Item (s):	Unit	Method	MDL	Result No.1
Chlorofluorocarbon-213 (CAS No:060285-54-3)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-214 (CAS No:002268-46-4)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-215 (CAS No:000076-17-5)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-216 (CAS No:001652-80-8)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
Chlorofluorocarbon-217 (CAS No:000422-86-6)	mg/kg	Analysis was performed by GC/MS. [CFC's (Chlorofluorocarbons)]	1	n.d.
HCFC's (Hydrogenated chlorofluorocarbons)	---	With reference to US EPA 8260.	---	---
Hydrochlorofluorocarbon-21 (CAS No.:000075-43-4)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-22 (CAS No.:000075-45-6)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-31 (CAS No.:000593-70-4)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-121(CAS No.:000354-14-3)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-122 (CAS No.:000354-21-2)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-123 (CAS No.:000306-83-1)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.

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Date : 2006/12/25

Test Item (s):	Unit	Method	MDL	Result
				No.1
Hydrochlorofluorocarbon-124 (CAS No.:002837-89-0)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-131(CAS No.:000359-28-4)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-132b (CAS No.:000471-43-2)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-133a (CAS No.:000075-88-7)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-141b (CAS No.:001717-00-6)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-221	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-222 (CAS No.:000422-30-0)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-223	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-224	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-225ca (CAS No.:000422-56-0)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.

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No. : CE/2006/C3872
Date : 2006/12/25

Test Item (s):	Unit	Method	MDL	Result
				No.1
Hydrochlorofluorocarbon-225cb (CAS No.:000507-55-1)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-226 (CAS No.:000431-87-8)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-231	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-232	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-233	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-234	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-235 (CAS No.:013838-16-9)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-241	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-242	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-243 (CAS No.:000338-75-0)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.

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Date : 2006/12/25

Test Item (s):	Unit	Method	MDL	Result
				No.1
Hydrochlorofluorocarbon-244	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-251	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-252	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-253 (CAS No.:000354-06-1)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-261 (CAS No.:000420-97-3)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-262 (CAS No.:000420-97-3)	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Hydrochlorofluorocarbon-271	mg/kg	Analysis was performed by GC/MS. [HCFC's (Hydrogenated chlorofluorocarbons)]	1	n.d.
Halon	---	With reference to US EPA	---	---
Halon-1211(CAS No:000353-59-3)	mg/kg	Analysis was performed by GC/MS.	1	n.d.
Halon-1301(CAS No:000075-63-8)	mg/kg	Analysis was performed by GC/MS.	1	n.d.
Halon-2402(CAS No:000124-73-1)	mg/kg	Analysis was performed by GC/MS.	1	n.d.

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Date : 2006/12/25

Test Item (s):	Unit	Method	MDL	Result No.1
Halogen	---	With reference to prEN14582 method B. Analysis was performed by IC method for F , Cl , Br, I content.	---	---
Halogen-Chlorine (Cl) (CAS No:007782-50-5)	mg/kg	With reference to prEN14582 method B. Analysis was performed by IC method for Chlorine content.	50	n.d.
Halogen-Fluorine (F) (CAS No:007782-41-4)	mg/kg	With reference to prEN14582 method B. Analysis was performed by IC method for Fluorine content.	50	n.d.
Halogen-Bromine (Br) (CAS No:007726-95-6)	mg/kg	With reference to prEN14582 method B. Analysis was performed by IC method for Bromine content.	50	n.d.
Halogen-Iodine (I) (CAS No:007553-56-2)	mg/kg	With reference to prEN14582 method B. Analysis was performed by IC method for Iodine content.	50	n.d.
Sum of PBBs	mg/kg	With reference to US EPA 3540C for PBBs/PBDEs Content. Analysis was performed by GC/MS.	-	n.d.
Monobromobiphenyl			5	n.d.
Dibromobiphenyl			5	n.d.
Tribromobiphenyl			5	n.d.
Tetrabromobiphenyl			5	n.d.
Pentabromobiphenyl			5	n.d.
Hexabromobiphenyl			5	n.d.
Heptabromobiphenyl			5	n.d.
Octabromobiphenyl			5	n.d.
Nonabromobiphenyl			5	n.d.
Decabromobiphenyl			5	n.d.

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Test Item (s):	Unit	Method	MDL	Result
				No.1
Sum of PBDEs (Mono to Nona) (Note 4)	mg/kg	With reference to US EPA 3540C for PBBs/PBDEs Content. Analysis was performed by GC/MS.	-	n.d.
Monobromobiphenyl ether			5	n.d.
Dibromobiphenyl ether			5	n.d.
Tribromobiphenyl ether			5	n.d.
Tetrabromobiphenyl ether			5	n.d.
Pentabromobiphenyl ether			5	n.d.
Hexabromobiphenyl ether			5	n.d.
Heptabromobiphenyl ether			5	n.d.
Octabromobiphenyl ether			5	n.d.
Nonabromobiphenyl ether			5	n.d.
Decabromobiphenyl ether			5	n.d.
Sum of PBDEs (Mono to Deca)			-	n.d.

Note： 1. mg/kg = ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. Sum of Mono to NonaBDE & according to 2005/717/EC DecaBDE is exempt.
5. "---" = Not Conducted
6. " - " = Not Regulated
7. The MDL is 5ppm for the single compound of CP

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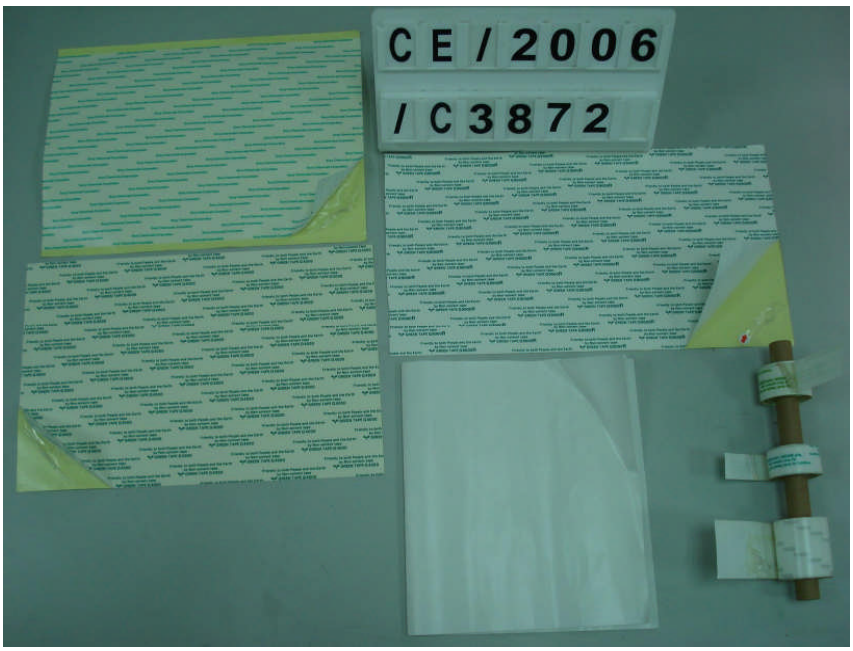


** End of Report **

TITLE : HX104X01-212

Product Specification

Rev. O

HYDIS Technologies

REVISION HISTORY

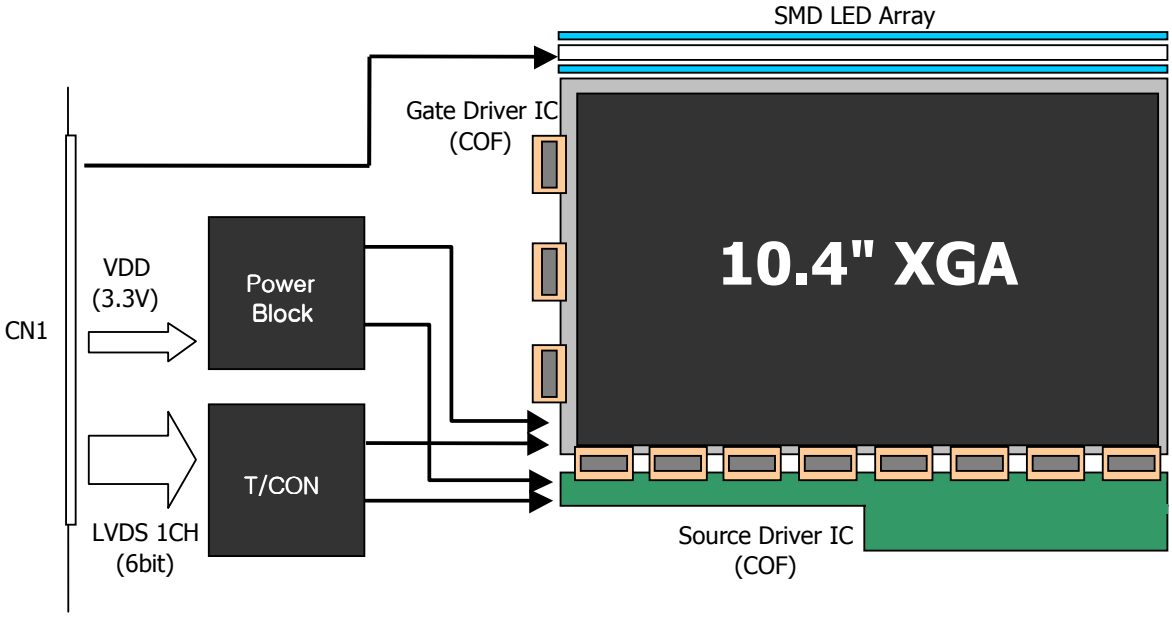
REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
O		Initial Release	10.04.08	H.J.Ahn

CONTENS

1.0 GENERAL DESCRIPTION

1.1 Introduction

10.4" AFFS+ TFT-LCD is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as active switching devices. This module has a 10.4 inch diagonally measured active area with XGA resolutions (1024 horizontal by 768 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 262,144 colors. The TFT-LCD panel used for this module is a low reflection and higher color type.



1.2 Features

- 1Ch LVDS Interface with 1 pixel / clock
- 6-bit color depth, Display 262,144 colors
- High luminance and contrast ratio, low reflection and wide viewing angle
- Front Mounting Frame
- DE (Data Enable) mode only
- SLG (Single Level Gate) function use
- RoHS Product
- SMD LED Array
- On board EDID

1.3 Application

- Pen type & Tablet PC

1.3 General Specifications

PARAMETER	SPECIFICATION	UNIT	REMARK
Active area	210.432 X 157.824	mm	
Number of pixels	1024(H) × 768(V)	pixels	
Pixel pitch	0.2055(H) × 0.2055(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	262,144	colors	
Display mode	Normally Black		
Dimensional outline	238.6±0.5(H) X 173.2±0.5(V) X 4.3max	mm	Note 1
Weight	210 Typ. / 220 Max.	gram	
Back-light	SMD LED Array		
Surface treatment	Anti-Glare		

Note : 1. LCM Height : 4.3mm max. (LED), 6.8mm max. (Component)

2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

PARAMETER		SYMBOL	MIN.	MAX.	UNIT	REMARK
Logic Power Supply		V_{DD}	VSS-0.3	4.0	V	Ta = 25 ±2 ℃
Logic Input Voltage		V_{IN}	VSS-0.3	V_{DD}+0.3	V	
Back-light Power Supply Voltage		HV_{DD}	-0.3	40	V	
Back-light LED Current	25℃	I_{LED}	-	30	mA	
	50℃	I_{LED}	-	20	mA	
Back-light LED Reverse Voltage		V_R	-	5	V	
Operating Temperature		T_{OP}	-20	+70	℃	Note1

Note1. As compromised, T-Con and D-IC are excluded within the range of guarantee for Operating Temperature.

*T-CON : 0~70℃ / D-IC : -10 ~ 75℃(Source) / -20 ~ 75℃(Gate)

3.0 ELECTRICAL SPECIFICATIONS

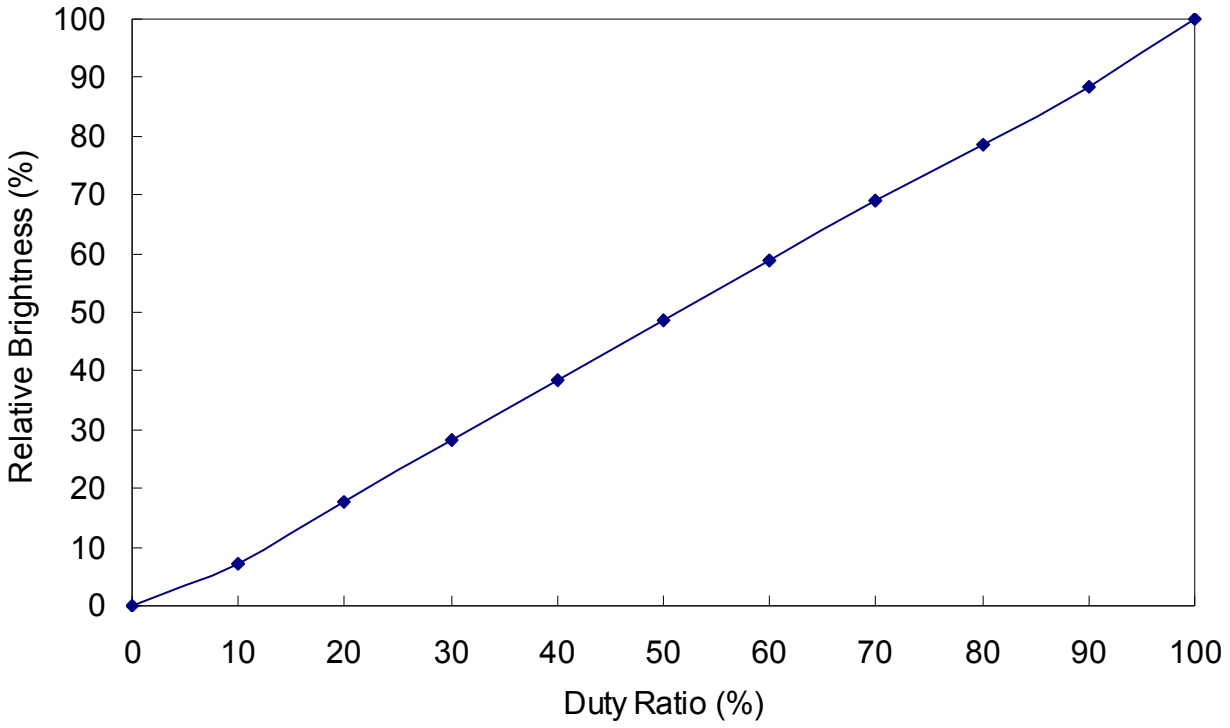
3.1 Electrical Specifications

< Table 3. Electrical Specifications >

Parameter		Min.	Typ.	Max.	Unit	Remarks
Logic Power Supply Voltage	V_{DD}	3.0	3.3	3.6	V	Note 1
Logic Power Supply Current	I_{DD}	-	270	300	mA	Note 1
Back-light Power Supply Voltage	HV_{DD}	7.0	12.0	20	V	Note 2
Back-light Power Supply Current	I_{HVDD}	-	246	283	mA	Note 2, 3
Back-light Power Consumption	P_{BL}	-	2.95	3.39	W	Note 2, 3
LED Driver's Efficiency	η	-	82	-	%	Note 2, 3
Back-light PWM Frequency	F_{PWM}	200	320	350	Hz	
High Level PWM Signal Voltage	V_{PWMH}	2.1	3.3	5.0	V	
Low Level PWM Signal Voltage	V_{PWML}	-	0	0.6	V	
High Level Differential Input Signal Voltage	V_{IH}	-	-	+100	mV	V_{CM} = 1.2V
Low Level Differential Input Signal Voltage	V_{IL}	-100	-	-	mV	
Back-light LED Voltage / Back-light LED Total Voltage	V_{LED} /V_{BL}	-	3.2 / 22.4	3.4 / 23.8	V	Note 4
Back-light LED Current / Back-light LED Total Current	I_{LED} /I_{BL}	-	19.0 /114.0	20.0 / 120.0	mA	Note 4
Life Time		12,000	-	-	Hrs	Note 6
Power Consumption	P_D	-	0.90	1.00	W	Note 1
	P_{LED}	-	2.55	2.85	W	Note 4
	P_{total}	-	3.45	3.85	W	Note 1, 4

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25℃.
a) Typ : Window XP pattern, b) Max : Vertical Sub line pattern
2. The power supply voltage and current is measured and specified at the interface connector of LCM including LED Driver.
3. Reference value, which is measured with LED Driver for 12V.
4. Reference value, which is measured without LED Driver.
5. Calculated value for reference (V_{LED} × I_{LED} × # of LEDs (42EA)).
6. End of Life shall be determined by the time when any of the following is satisfied under continuous lighting at 25℃ and I_{LED} = 19.0mA.
- Intensity drops to 50% of the Initial Value (Luminance Spec.)
- Based on LED

3.2 PWM Duty Ratio vs Brightness



4.0 OPTICAL SPECIFICATION

The test of Optical specifications shall be measured in a dark room (ambient luminance 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCONE BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of Θ and Φ equal to 0°. We refer to $\Theta_{Ø=0}$ (=Θ_3) as the 3 o'clock direction (the right"), $\Theta_{Ø=90}$ (= Θ_{12}) as the 12 o'clock direction ("upward"), $\Theta_{Ø=180}$ (= Θ_9) as the 9 o'clock direction ("left") and $\Theta_{Ø=270}$(= Θ_6) as the 6 o'clock direction ("bottom"). While scanning Θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement. VDD shall be 3.3+/- 0.3V at 25°C. Optimum viewing angle direction is 6 o'clock.

PARAMETER		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Viewing Angle Range	Horizontal	Θ_3	CR > 10	-	89	90	Deg.	Note 1
		Θ_9		-	89	90	Deg.	
	Vertical	Θ_{12}		-	89	90	Deg.	
		Θ_6		-	89	90	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	400	600	-		Note 2
Luminance of White	Center	Y_w	Θ = 0°	290	340	-	cd/m^2	Note 3
White Luminance Uniformity	5 Points	ΔY5		80	-	-		Note 4
	13 Points	ΔY13		65	-	-		
White Chromaticity		x_w	Θ = 0°	0.273	0.313	0.353		Note 5
		y_w		0.289	0.329	0.369		
Reproduction of Color	Red	x_R	Θ = 0°	0.521	0.561	0.601		
		y_R		0.282	0.322	0.362		
	Green	x_G		0.317	0.357	0.397		
		y_G		0.516	0.556	0.596		
	Blue	x_B		0.117	0.157	0.197		
		y_B		0.093	0.133	0.173		
Color Reproduction				-	40	-	%	
Response Time		T_r+T_d	Ta= 25° C Θ = 0°	-	36	-	ms	Note 6
Cross Talk		CT	Θ = 0°	-	-	2.0	%	Note 7

Note : 1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface . (see FIGURE 1)

2. Contrast measurements shall be made at viewing angle of $\Theta = 0°$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIGURE 1)
Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Luminance of white is defined as a luminance value of a point across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

4. The White luminance uniformity on LCD surface is then expressed. (See FIGURE 2)

$$\text{Uniformity } \Delta Y = \frac{\text{Minimum Luminance of 5(or 13) points}}{\text{Maximum Luminance of 5(or 13) points}} \times 100\ (\%)$$

5. The color chromaticity coordinates specified in Table 4 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

6. The electro-optical response time measurements shall be made as FIGURE 3 by switching the data input signal OFF and ON. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

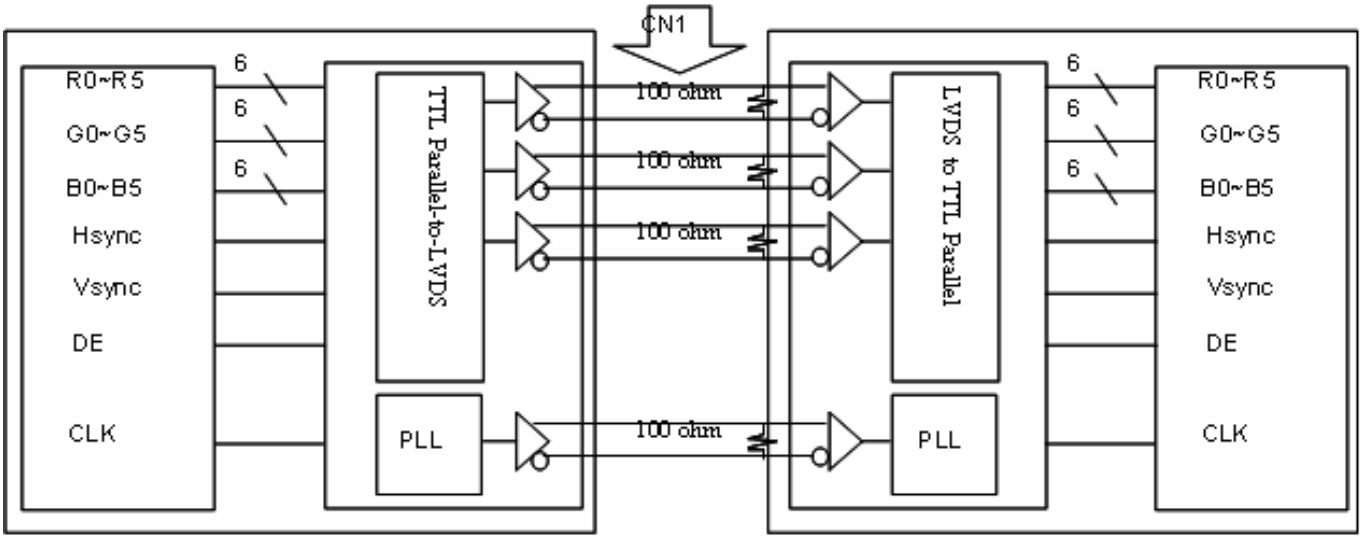
7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark. (See FIGURE 4).

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

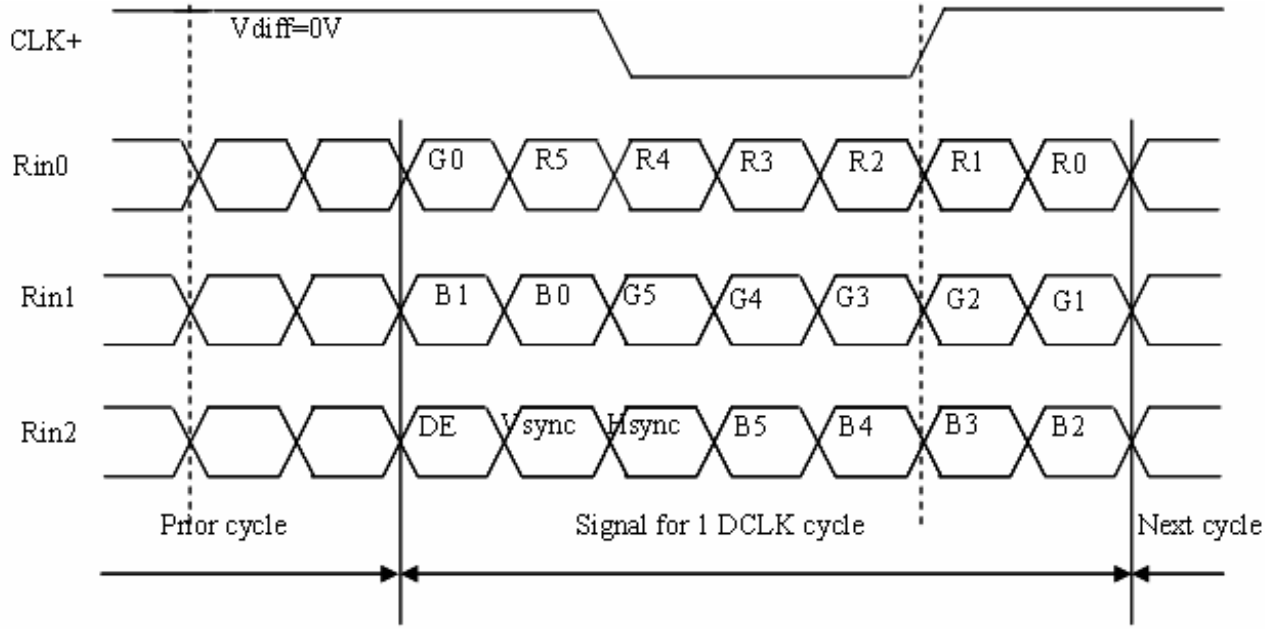
CN1 : Interface Connector : 20455-030E-02(I-PEX) or equivalent
User side Connector : 20453-030T (I-PEX) or equivalent

Pin No	Symbol	Function	Remark
1	VSS	Ground	
2	VDD1	Power Supply: +3.3V	
3	VDD2	Power Supply: +3.3V	
4	EDID 3.3V	EDID +3.3V	
5	NC	Reserved	
6	EDID CLK	EDID CLK	
7	EDID DATA	EDID DATA	
8	RIN0-	LVDS Negative data signal (-)	Tx pin # 48
9	RIN0+	LVDS Positive data signal (+)	Tx pin # 47
10	VSS	Ground	
11	RIN1-	LVDS Negative data signal (-)	Tx pin # 46
12	RIN1+	LVDS Positive data signal (+)	Tx pin # 45
13	VSS	Ground	
14	RIN2-	LVDS Negative data signal (-)	Tx pin # 42
15	RIN2+	LVDS Positive data signal (+)	Tx pin # 41
16	VSS	Ground	
17	RCLKIN-	LVDS Negative clock signal (-)	Tx pin # 40
18	RCLKIN+	LVDS Positive clock signal (+)	Tx pin # 39
19	VSS	Ground	
20	VDIM	PWM Brightness Control	
21	VSW	LED On/Off Control	
22	VSS	Ground	
23	VSS	Ground	
24	VSS	Ground	
25	VSS	Ground	
26	VCD1	Back-light Power Supply: +12V	HVDD: 7~20V
27	VCD2	Back-light Power Supply: +12V	
28	VCD3	Back-light Power Supply: +12V	
29	VCD4	Back-light Power Supply: +12V	
30	VSS	Ground	



[LVDS Block Diagram]

5.1.1 INTERFACE CONNECTION



5.2. LVDS Interface

LVDS Transmitter: THC63LVDM83A or equivalent.

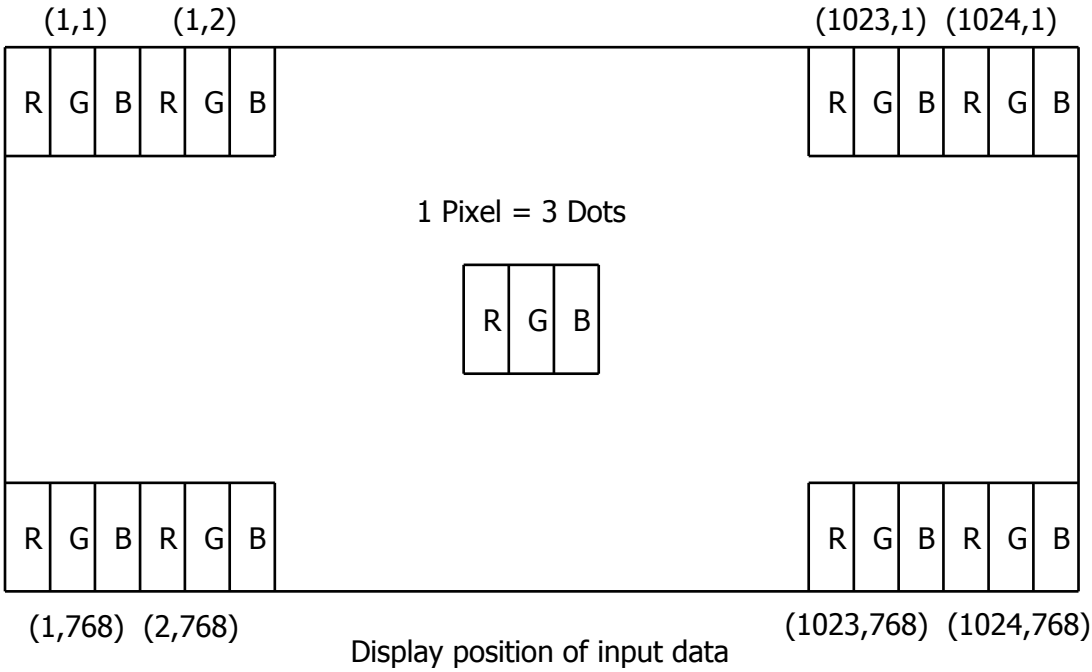
INPUT SIGNAL	TRANSMITTER		INTERFACE		FI-XB30S-HF10	REMARK
	PIN NO.	PIN NO.	SYSTEM (TX)	TFT-LCD (RX)	PIN NO.	
R0	51	48 47	OUT0- OUT0+	IN0- IN0+	8 9	
R1	52					
R2	54					
R3	55					
R4	56					
R5	3					
G0	4					
G1	6	46 45	OUT1- OUT1+	IN1- IN1+	11 12	
G2	7					
G3	11					
G4	12					
G5	14					
B0	15					
B1	19					
B2	20	42 41	OUT2- OUT2+	IN2- IN2+	14 15	
B3	22					
B4	23					
B5	24					
HSYNC	27					
VSYNC	28					
DE	30					
MCLK	31	40	CLKOUT-	CLKIN-	17	
		39	CLKOUT+	CLKIN+	18	

5.3 Back-light Interface

CN2 LED FPC Connector (20397-008E, Manufactured by I-PEX)

Pin No.	Symbol	Function	Remark
1	Anode1	LED Anode Power Supply	LED Anode Power Supply (3.2V X 7 EA = 22.4V)
2	NC	Non-Connection	
3	Cathode1	LED Cathode Power Supply	LED Cathode Power Supply
4	Cathode2	LED Cathode Power Supply	
5	Cathode3	LED Cathode Power Supply	
6	Cathode4	LED Cathode Power Supply	
7	Cathode5	LED Cathode Power Supply	
8	Cathode6	LED Cathode Power Supply	

5.4. Data Input Format



Display position of input data

6.0. SIGNAL TIMING SPECIFICATIONS

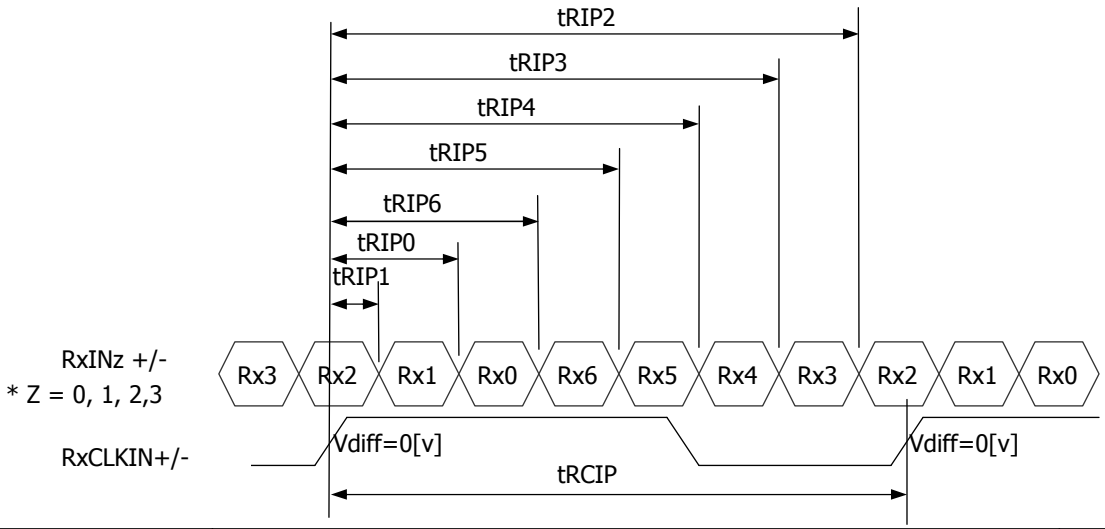
6.1 LVDS Transmitter Input

The 10.4" XGA LCM is operated by the only DE (Data enable) mode (LVDS Transmitter Input)

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Frame Period	T1	772	806	-	lines
Vertical Display Period	T2	-	768	-	lines
One Line Scanning Period	T3	1100	1344	-	clocks
Horizontal Display Period	T4	-	1024	-	clocks
Clock Frequency	1/T5	-	65	80	MHz

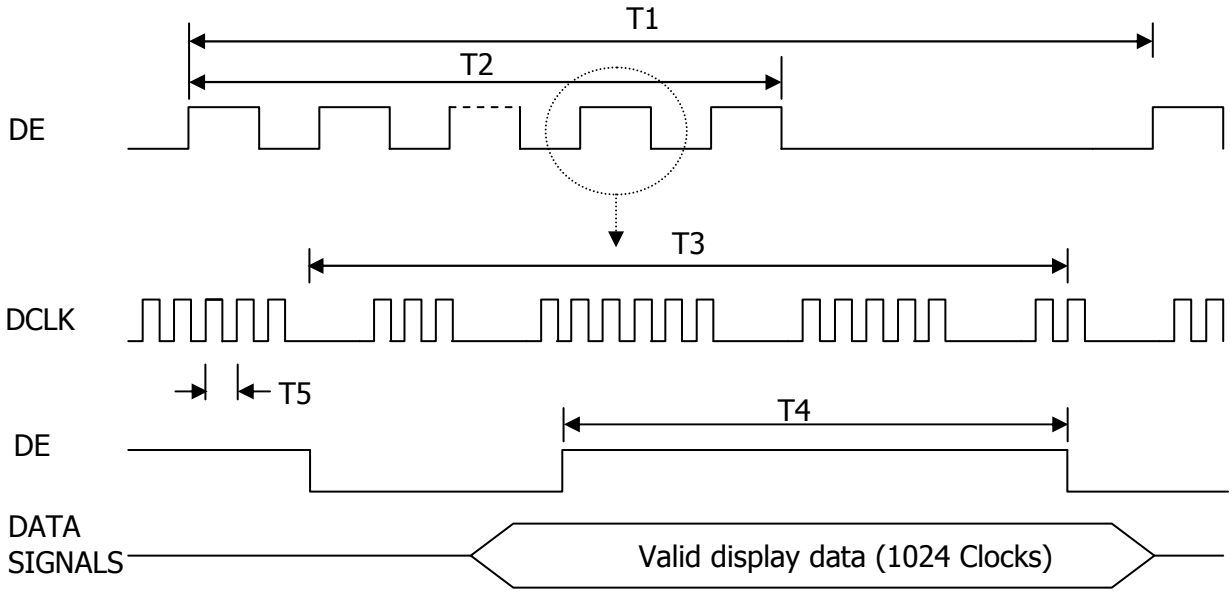
6.2. LVDS Rx interface timing parameter

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
CLKIN Period	tRCIP	12.5	15.38	-	nsec	
Input Data 0	tRIP1	-0.4	0.0	+0.4	nsec	
Input Data 1	tRIP0	tRICP/7-0.4	tRICP/7	tRICP/7+0.4	nsec	
Input Data 2	tRIP6	2 ×tRICP/7-0.4	2 ×tRICP/7	2 ×tRICP/7+0.4	nsec	
Input Data 3	tRIP5	3 ×tRICP/7-0.4	3 ×tRICP/7	3 ×tRICP/7+0.4	nsec	
Input Data 4	tRIP4	4 ×tRICP/7-0.4	4 ×tRICP/7	4 ×tRICP/7+0.4	nsec	
Input Data 5	tRIP3	5 ×tRICP/7-0.4	5 ×tRICP/7	5 ×tRICP/7+0.4	nsec	
Input Data 6	tRIP2	6 ×tRICP/7-0.4	6 ×tRICP/7	6 ×tRICP/7+0.4	nsec	



7.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL (DE MODE)

7.1 Timing Waveforms of Interface Signal



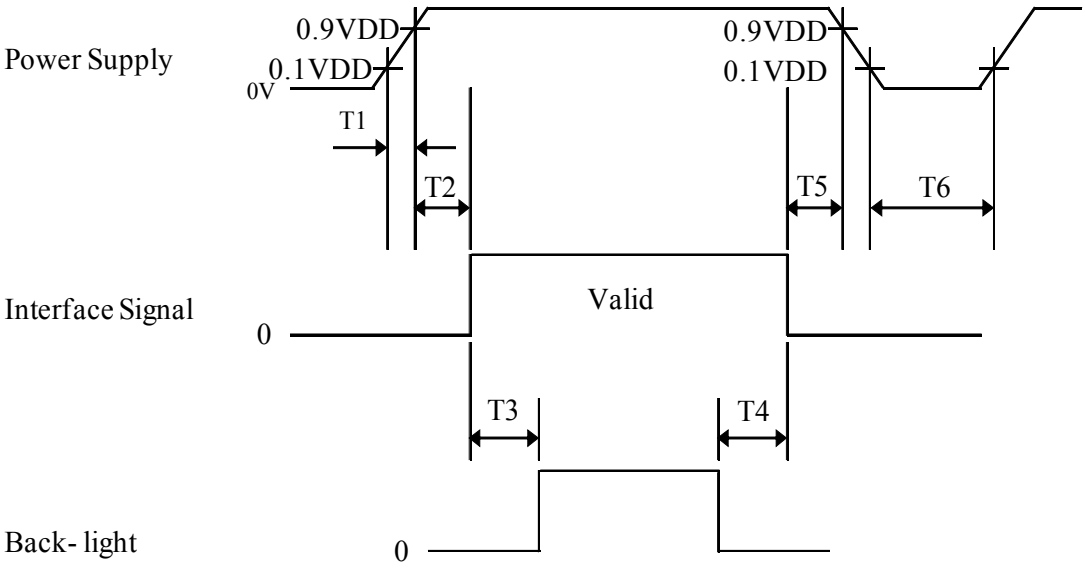
8.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

Each color is displayed in sixty-four gray scales from a 6 bit data signal input. A total of 262,144 colors are derived from the resultant 18 bit data.

COLORS & GRAY SCALE		RED DATA						GREEN DATA						BLUE DATA					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↓						↓						↓					
	▽	↓						↓						↓					
	Brighter	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	△	↓						↓						↓					
	▽	↓						↓						↓					
	Brighter	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	▽	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale Of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↓						↓						↓					
	▽	↓						↓						↓					
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Gray Scale Of White & Black	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1
	Darker	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0
	△	↓						↓						↓					
	▽	↓						↓						↓					
	Brighter	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1
	▽	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

9.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



Parameter	Values			Units
	Min	Typ	Max	
T1	0	-	10	ms
T2	0	-	50	ms
T3	100	-	-	ms
T4	100	-	-	ms
T5	0	-	50	ms
T6	1	-	-	Sec

Notes:

1. When the power supply VDD is 0V, Keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on.
3. Back Light must be turn on after power for logic and interface signal are valid.

10.0 MECHANICAL CHARACTERISTICS

10.1 Dimensional Requirements

FIGURE 5, 6 shown in appendix shows mechanical outlines for the model.

PARAMETER	SPECIFICATION	UNIT
Active area	210.432 (H) × 157.824 (V)	mm
Number of pixels	1024 (H) × 768 (V) (1 pixel = R + G + B dots)	pixels
Pixel pitch	0.2055 (H) × 0.2055 (V)	mm
Pixel arrangement	RGB Vertical stripe	
Display colors	262,144	colors
Display mode	Normally Black	
Dimensional outline	238.6±0.5 (W) X 173.2±0.5 (V) X 4.3 Max. (LED), 6.8 Max. (Component)	mm
Weight	210 Typ. / 220 Max.	g
Back-light	SMD LED Arrary	

10.2 Mounting

See FIGURE 5. (shown in Appendix)

10.3 Anti-Glare Polarizer.

The surface of the LCD has an anti-glare coating to minimize reflection and a coating to reduce scratching.

10.4 Light Leakage

There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50 cm from the screen with an overhead light level of 150lux. The manufacture shall furnish limit samples of the panel showing the light leakage acceptable.

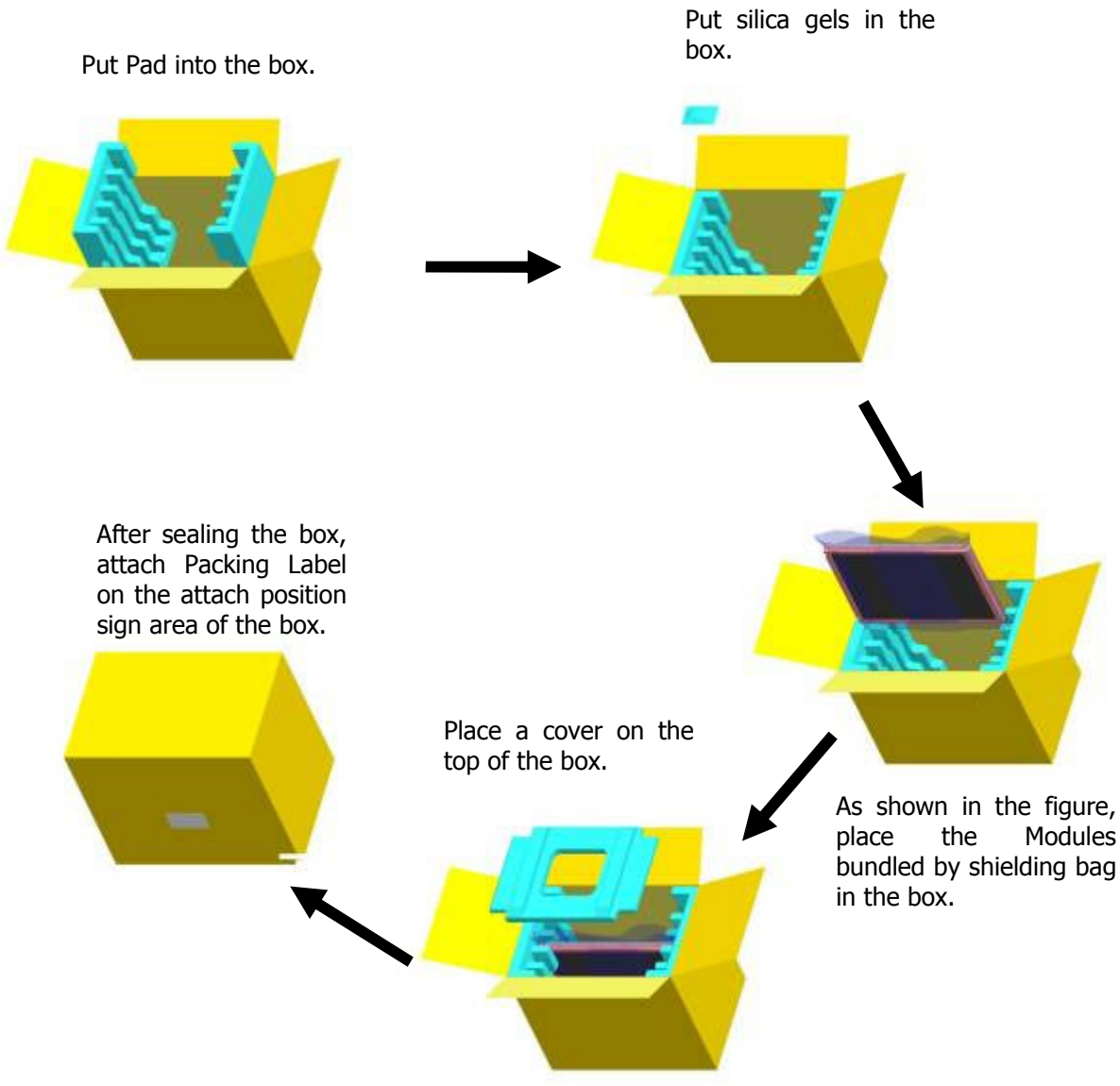
11.0 RELIABLITY TEST

NO	TEST ITEMS	CONDITIONS
1	High temperature storage test	Ta = 80 °C, 240 hrs
2	Low temperature storage test	Ta = -20 °C, 240 hrs
3	High temperature & high humidity operation test	Ta = 50 ℃, 80%RH, 240hrs
4	High temperature operation test	Ta = 70 °C, 240 hrs
5	Low temperature operation test	Ta = 0 °C, 240 hrs
6	Thermal shock	Ta = -20 °C ~ 80 °C (0.5H), 100 cycle
7	Vibration test (non-operating)	Frequency : 10~500Hz Gravity/AMP : 1.5G Period : X,Y,Z 30min
8	Shock test (non-operating)	Gravity : 220G Pulse width : 2ms, half sine wave ±X, ±Y, ±Z Once for each direction
9	Electro-Static Discharge Test (non-operating)	Air : 150pF, 330ohm, 15KV Contact : 150pF, 330ohm, 8KV

12.0 PACKING SPECIFICATION

12.1 Packing Order

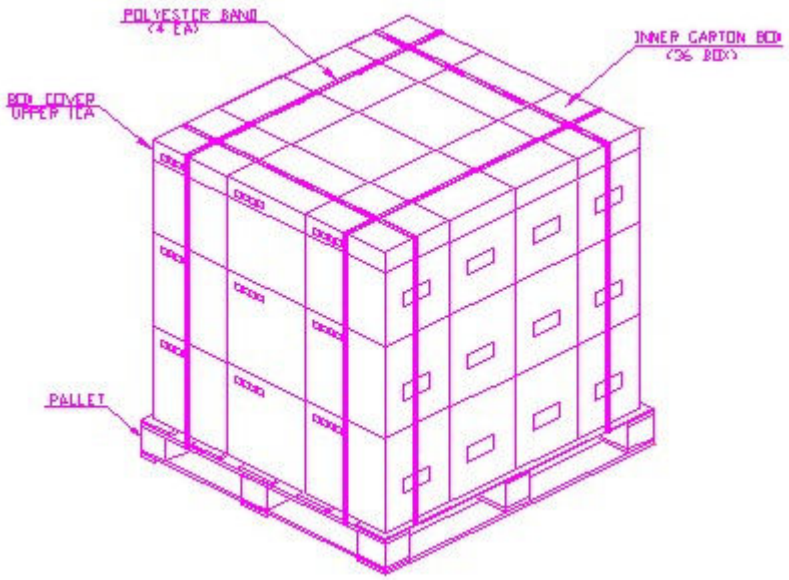
Hydis provides the standard shipping container for customers, unless customer specifies their packing information. The standard packing method is shown in below.

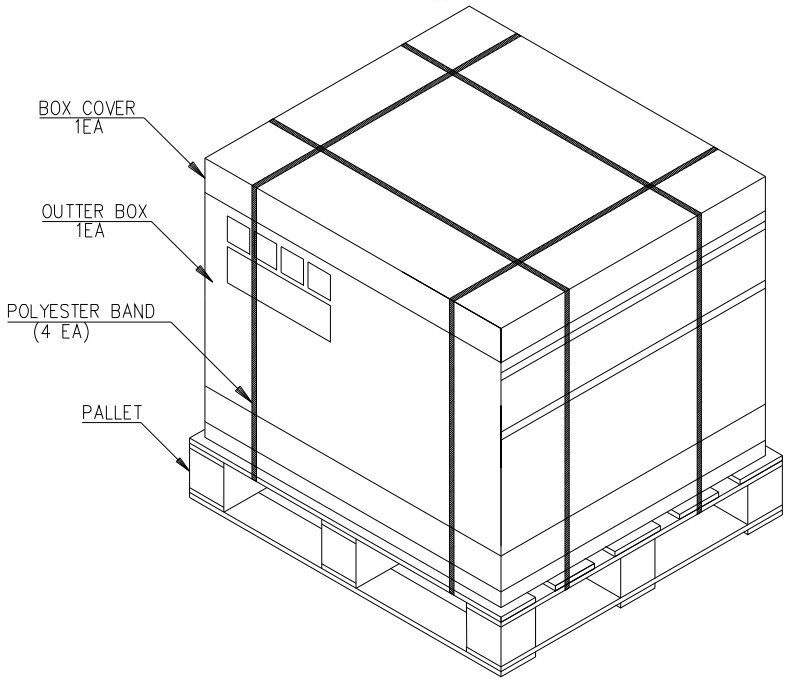


Notes

- Box Dimension: 349.0mm(W) X 261.0mm(D) X 311.0mm(H)
- Package Quantity in one Box: 10pcs

12.2 Pallet Packing



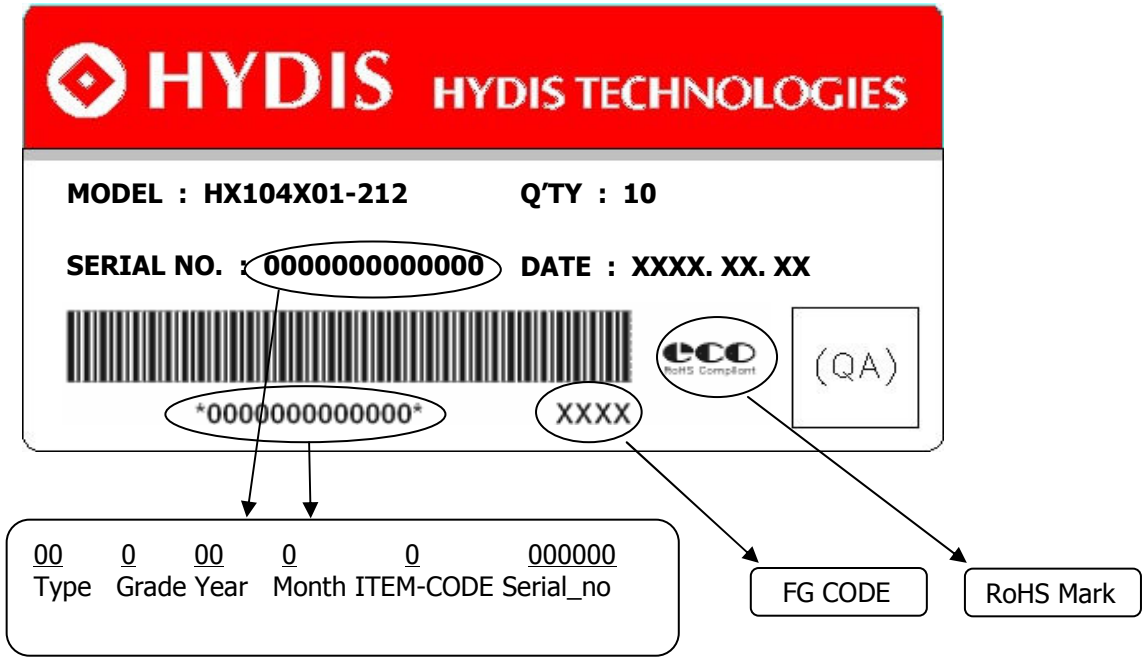


*** Note**

- Pallet Dimension : : 1100 mm (L) × 1100 mm (W) × 120 mm (H)
- Package Quantity in one Box : 10pcs
- Box Quantity in one Pallet : 36 box

12.3 Packing Label

Label Size: 108 mm (L) × 56 mm (W)
Contents
Model: HX104X01-212
Q`ty: Module Q`ty in one box
Serial No.: Box Serial No. See next figure for detail description.
Date: Packing Date
FG Code: FG Code of Product



12.3 Product Label

HYDIS Barcode

1	2	3	4	5	6	7
X X	X	X	X X	X	X X X X	X X X X X X

No 1. Control Number

No 2. Rank / Grade

No 3. Line Classification (HYDIS : H)

No 4. Year (8 : 2008, 9 : 2009, …)

No 5. Month (1, 2, 3,…, 9, X, Y, Z)

No 6. FG Code

No 7. Serial Number

13.0 HANDLING & CAUTIONS

13.1 Cautions when taking out the module

- Pick the pouch only, when taking out module from a shipping package.

13.2 Cautions for handling the module

- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

13.3 Cautions for the operation

- When the module is operating, do not lose MCLK, DE signals. If any one of these signals were lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence were applied, the module would be damaged.

13.4 Cautions for the atmosphere

- Dewdrop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer-packing pouch and under relatively low temperature atmosphere is recommended.

13.5 Cautions for the module characteristics

- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

13.6 Other cautions

- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc, please pack the module not to be broken. We recommend using the original shipping packages.

14.0 EDID Data

Add	Function	Hex	Input Value
00	Header	00	EDID
01		FF	
02		FF	
03		FF	
04		FF	
05		FF	
06		FF	
07		00	
08	ID Manufacturer Name	09	ID
09		E5	
0A	ID Product Code	34	10.4XGA
0B		08	
0C	32-bit serial No.	00	
0D		00	
0E		00	
0F		00	
10	Week of manufacture	00	0
11	Year of Manufacture	14	2010
12	EDID Structure Ver.	01	1
13	EDID revision #	03	3
14	Video input definition	80	
15	Max H image size	15	21
16	Max V image size	10	16
17	Display Gamma	78	2.2
18	Feature support	EA	RGB mode
19	Red/Green low bits	BD	
1A	Blue/White low bits	30	
1B	Red x high bits	91	
1C	Red y high bits	54	
1D	Green x high bits	4F	
1E	Green y high bits	8B	
1F	Blue x high bits	26	

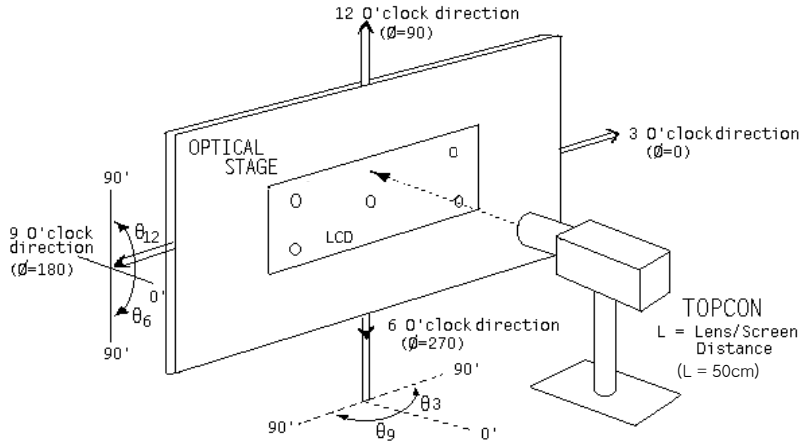
Add	Function	Hex	Input Value
20	BLue y high bits	21	
21	White x high bits	50	0.313
22	White y high bits	54	0.329
23	Established timing 1	21	
24	Established timing 2	08	
25	Established timing 3	00	
26	Standard timing #1	01	Not Used
27		01	
28	Standard timing #2	01	Not Used
29		01	
2A	Standard timing #3	01	Not Used
2B		01	
2C	Standard timing #4	01	Not Used
2D		01	
2E	Standard timing #5	01	Not Used
2F		01	
30	Standard timing #6	01	Not Used
31		01	
32	Standard timing #7	01	Not Used
33		01	
34	Standard timing #8	01	Not Used
35		01	
36	Detailed timing / monitor descriptor #1	64	. Main clock : 65.0MHz . Hor. Active : 1024 . Hor. Blanking : 320 . 4 bits of Hor. Active + 4 bits of Hor. Blanking . Ver. Active : 768 . Ver. Blanking : 38 . 4 bits of Ver. Active + 4 bits of Ver. Blanking . Hor. Sync Offset : 24 . H sync Pulse Width:136 . V sync Offset : 1 line . V Sync Pulse width : 3 line
37		19	
38		00	
39		40	
3A		41	
3B		00	
3C		26	
3D		30	
3E		18	
3F		88	

Add	Function	Hex	Input Value
40	Detailed timing / monitor descriptor #1	36	. Horizontal Image Size : 210 mm (Low 8 bits) . Vertical Image Size : 158 mm (Low 8 bits) . 4 bits of Hor. Image Size + 4 bits of Ver. Image Size . Hor. Border : 0 pixel . Vertical Border : 0 line
41		00	
42		D2	
43		9E	
44		00	
45		00	
46		00	
47		18	
48	Detailed timing / monitor descriptor #2	28	
49		15	
4A		00	
4B		40	
4C		41	
4D		00	
4E		26	
4F		30	
50		18	
51		88	
52		36	
53		00	
54		D2	
55		9E	
56		00	
57		00	
58		00	
59		18	
5A	Detailed timing / monitor descriptor #3	00	
5B		00	
5C		00	
5D		FE	
5E		00	
5F		48	

Add	Function	Hex	Input Value
60	Detailed timing / monitor descriptor #3	59	Company name : HYDIS
61		44	
62		49	
63		53	
64		0A	
65		20	
66		20	
67		20	
68		20	
69		20	
6A		20	
6B		20	
6C	Detailed timing / monitor descriptor #4	00	Model name : HX104X01-212
6D		00	
6E		00	
6F		FE	
70		00	
71		48	
72		58	
73		31	
74		30	
75		34	
76		58	
77		30	
78		31	
79		2D	
7A		32	
7B		31	
7C		32	
7D		0A	
7E	Extension flag	00	
7F	Checksum	A8	

15.0 APPENDIX

Figure 1. Measurement Set Up



<Indoor>

Figure 2. Average Luminance Measurement Locations & Uniformity Measurement Locations

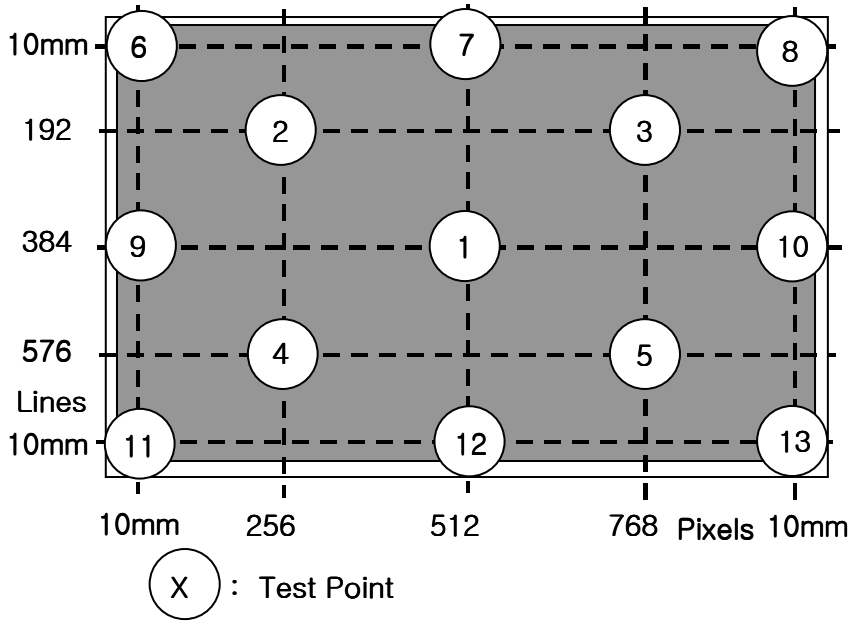


Figure 3. Response Time Testing

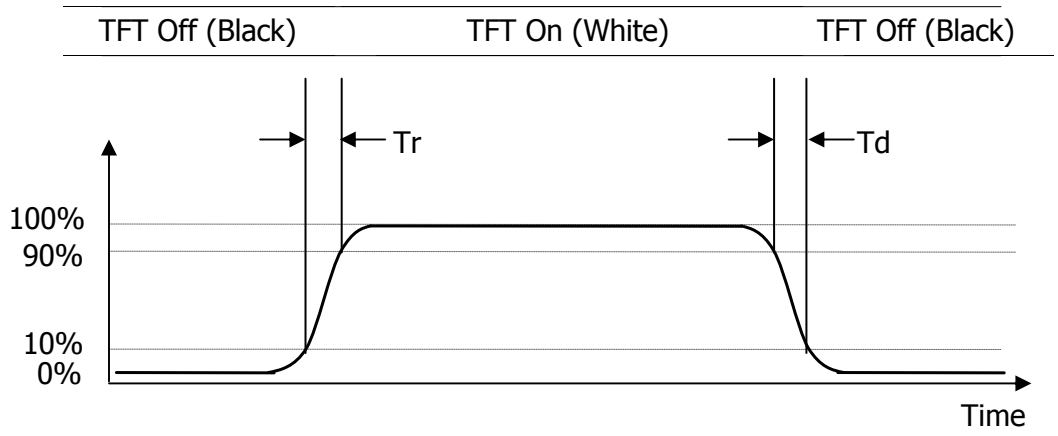
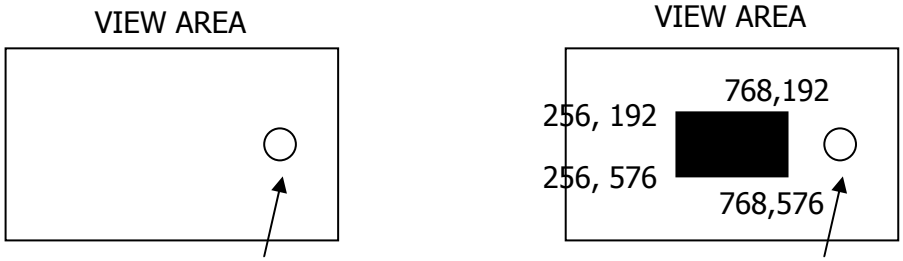


Figure 4. Cross Modulation Test Description



$$\text{Cross-Talk} = \left| \frac{YB - YA}{YA} \right| \times 100$$

Where:
Y_A = Initial luminance of measured area (cd/m^2)
Y_B = Subsequent luminance of measured area (cd/m^2)
The location measured will be exactly the same in both patterns.

Figure 5. TFT-LCD Module Outline Dimensions (Front View)

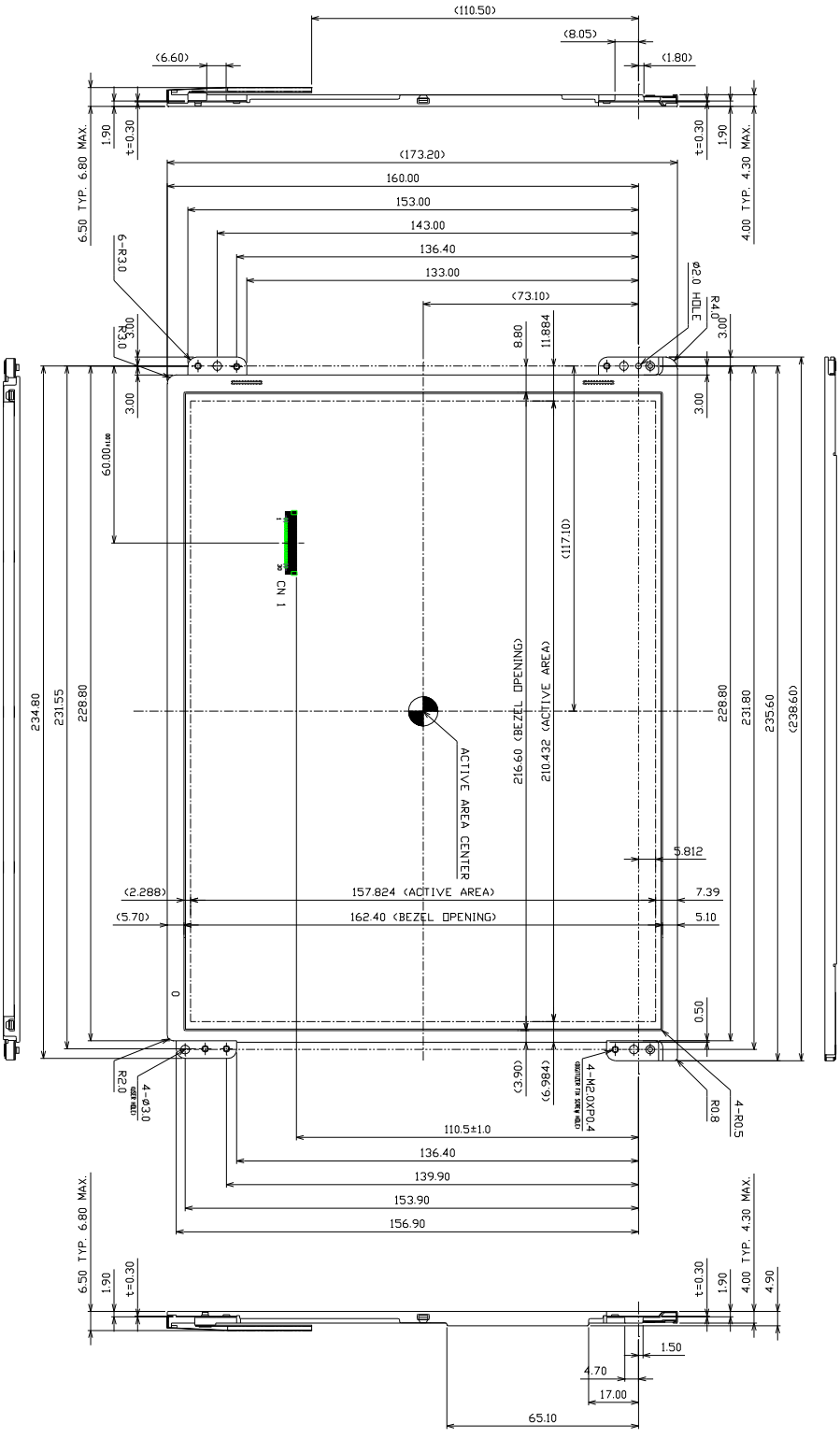
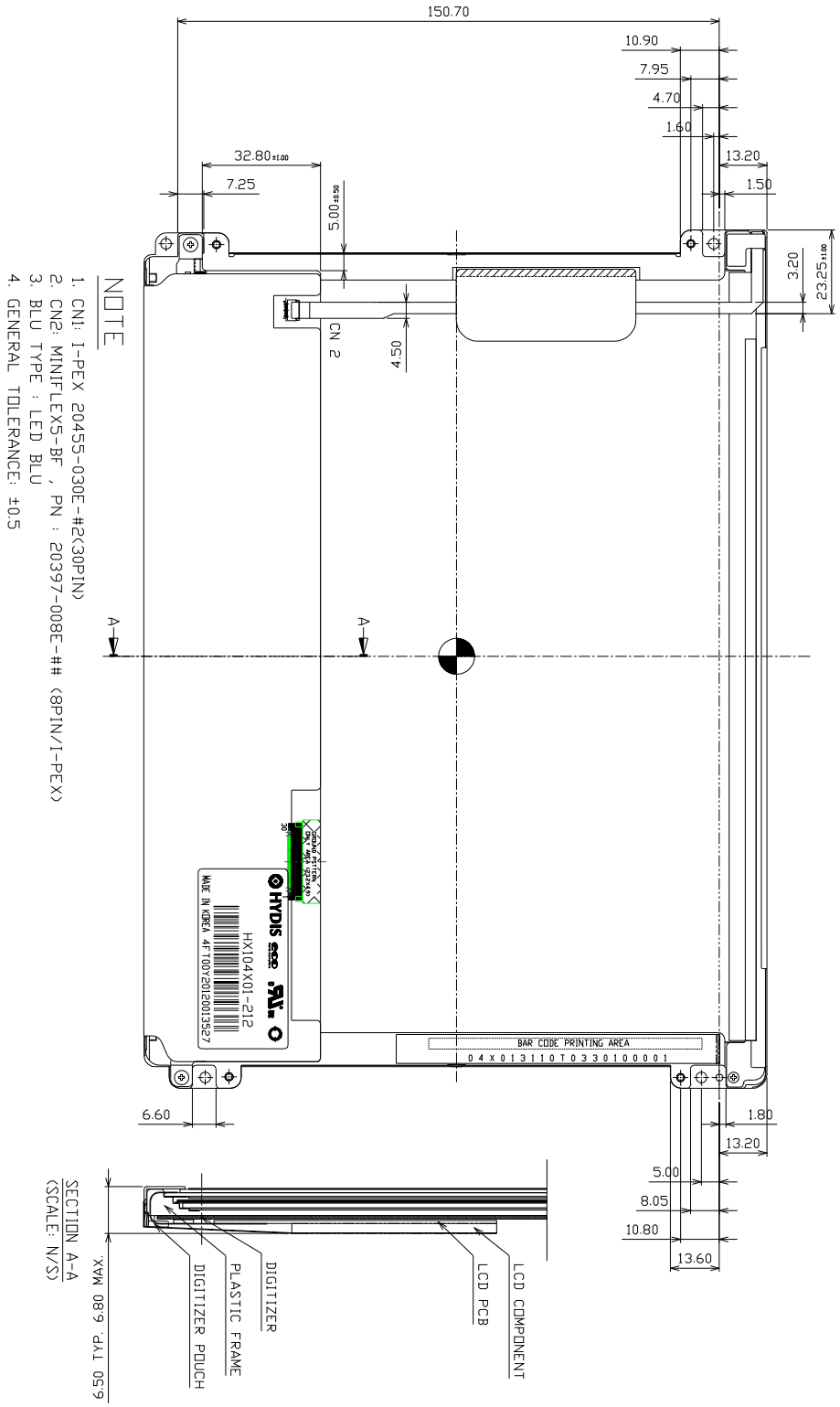


Figure 5. TFT-LCD Module Outline Dimensions (Rear View)



Visual Inspection Criteria for Customer

10.4" - XGA (AFFS+)

HYDIS Technologies

REVISION HISTORY

REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
0	-	Initial Release	2007.10.02	Y.H. Cho

1.0 PURPOSE

The purpose of this specification is to define and documentize the visual inspection criteria and external inspection for the TFT LCD panel product.

2.0 SCOPE

This specification shall be applied to 10.4" AFFS+ Model by HYDIS Technology Co., Ltd. to Customer.

3.0 REFERNCE DOCUMENT

3.1 Final Inspection
3.2 Product Control Specification
3.3 Product Specification For TFT LCD panel

4.0 EQUIPMENT & MATERIALS

4.1 Visual Inspection M/C
4.2 Visual/External inspection : ND filter(5%), Dot gauge

5.0 CALIBRATION

Refer to the documents for calibration.

6.0 RECORDS & FORMS

None

7.0 SAFETY

Refer to Product Specification For TFT LCD

8.0 DEFINITIONS

8.1 Bright Dot Defects
Dots(sub-pixels) on display which appear bright in the display area and visible through the 5%ND filter at Black Pattern.

8.2 Dark Dot Defects
Dots(sub-pixels) on display which appear dark in the display area at R,G,B Color Pattern.

8.3 Black / Bright Lines
Lines on display which appear dark/bright and usually result from the contamination.

8.4 Black / Bright Spots

Points on display which appear dark/bright and usually result from the contamination.

These defects do not vary in size or intensity (contrast) when contrast is varied.

8.5 Polarizer Scratch

Lines on display which are seen across a darker background and do not vary in size.

8.6 Polarizer Dent

White spots on display which appear against a darker backgound and do not vary in size

8.7 Line Defects

All line defects on display which appear brigh/dark such as vertical, horizontal, or cross lines.

8.8 Mura

Mura on display which appears darker / brighter against background brightness on parts of display area.

8.9 BM Defects

Bright(white) Points on display which are off BM(Black Matrix).

8.10 Visual Inspection

Inspection for LCD panel when the unit turns on.

8.11 Appearance Inspection

External inspection for LCD panel when the unit turns off.

8.12 Others

Defects which cannot be classified into the above defect definitions.

Note) Bright & Dark dots are larger than half of a sub-pixel.

(Dots smaller than half of a sub-pixel are not counted as defect dots)

9.0 PROCEDURE

9.1 Inspection Environment

Ambient Temperature : 25 ± 3 ℃

Humidity : 65 ± 20%RH

Ambient Illumination : 300 ~ 700 LUX

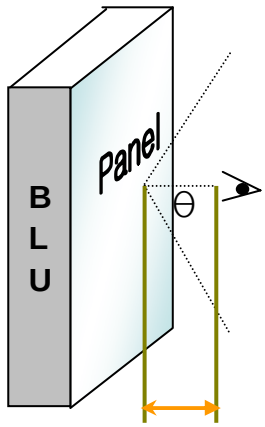
9.2 Inspction Condition

9.2.1 Viewing Distance : 30cm from the surface of the module.

9.2.2 Viewing Angle : performing in front of the panel

[±45 degrees in vertical direction, ±45 degrees in horizontal direction]

9.2.3 Inspection Area : Display Area (Active Area)



More than 30cm

10. Inspection Spec.

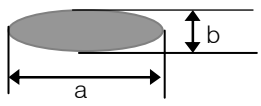
10.1 Visual Inspection Criteria

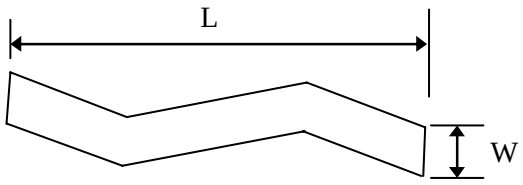
ITEMS	DETAILS		INSPECTION CRITERIA
Pixel Defects	Bright Dot Defect		N ≤ 2
	Dark Dot Defect		N ≤ 4
	Bright + Dark Dot Defect		N ≤ 5
	Defect Distance	Bright & Bright	≥ 20mm
		Dark & Dark	≥ 5㎜
	2 Adjacent Bright Dots Defect		N ≤ 1
	2 Adjacent Dark Dots Defect		N ≤ 1
	3 Adjacent Bright Dots Defect		N = 0
	3 Adjacent Dark Dots Defect		N = 0
Line Defects	Bright Line, Dark Line		N = 0
Others	Black/Bright Spot (Hair, Lint, Etc.)	Circular Type	0.2 < D ≤ 0.5, N ≤2 D ≤ 0.2 Ignore
		Linear Type (Bright)	0.03 < W ≤0.1 L ≤ 2.0, N ≤ 2 W ≤0.03 Ignore
	Circular White Mura, Lumination Mura, Black/White Mura, etc.		If needed, refer to Limit Sample. Settle the limit sample in agreement
	Appearance	Polarizer Dent/Bubble	0.2 < D ≤ 0.5, N ≤2 D ≤ 0.2 Ignore
		Polarizer Scratch	0.03 < W ≤0.1 L ≤ 2.0, N ≤ 2 W ≤0.03 Ignore
		BM Defect	Should be φ≤ 35㎛

Note 1) For pixel defect, dot means a sub-pixel.

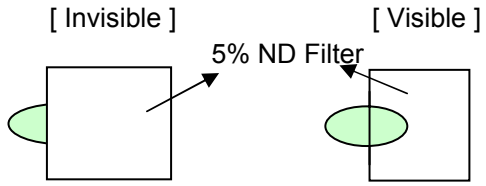
Note 2) D = Diameter, L = Length, W = Width, N = Number

D = (a + b) / 2





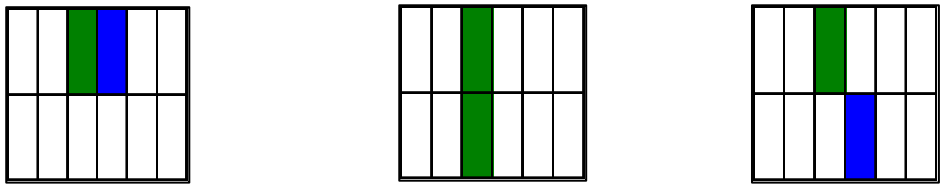
Note 3) Dot which is invisible through 5% ND filter will not counted as " 1 dot" defect.



"No dot defect"
(=ignored/not counted)

"1 dot defect"
(=counted)

[2 adjacent dots defect]



Type 1 Type 2 Type 3