FBT040-30-104005

~ 10.4” AIRGAP ASSEMBLY

Customer P/N: 82-L0006-021

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

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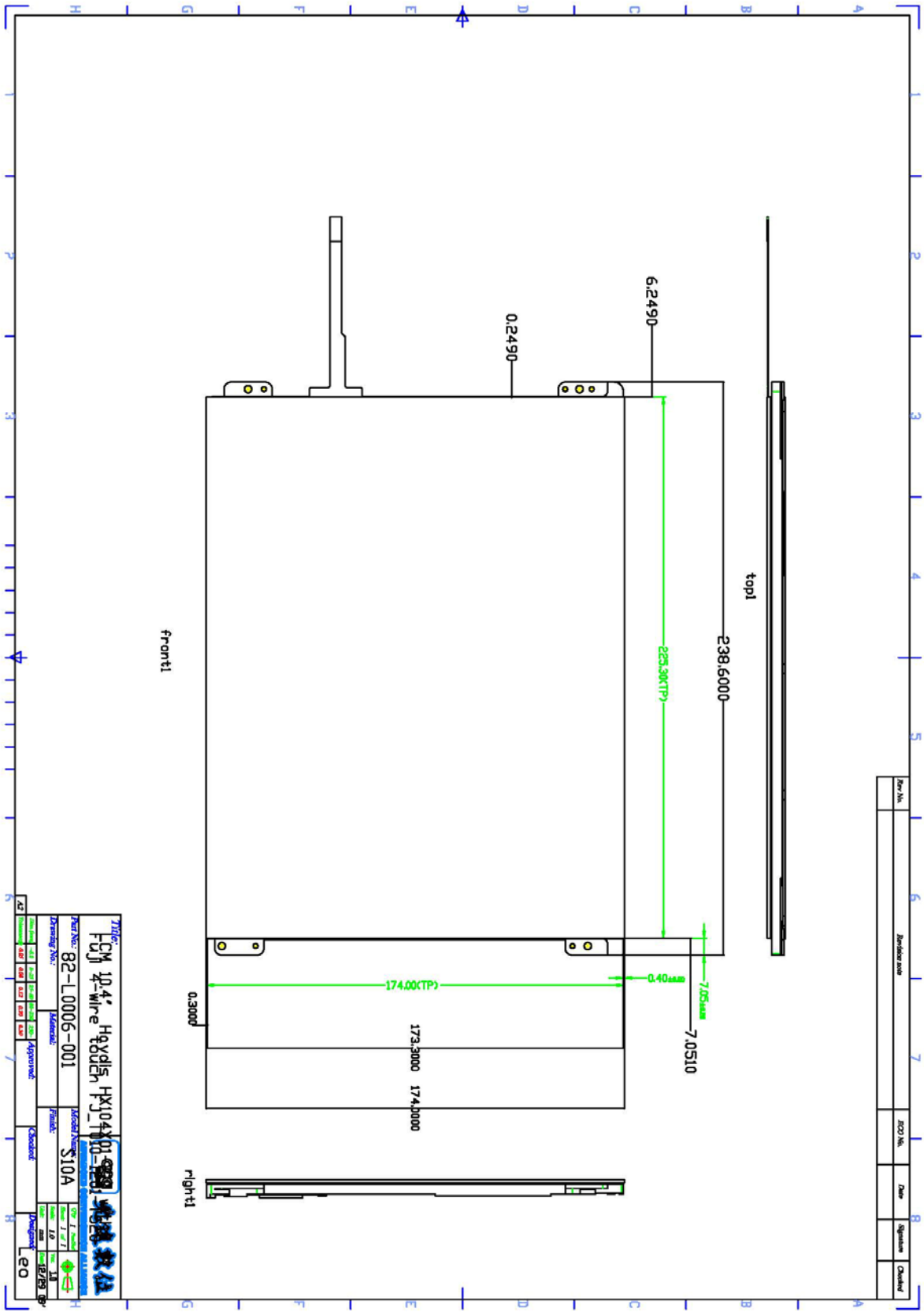
FBT040-30-104005

ENGINEERING SPECIFICATIONS

1 | GENERAL DESCRIPTION

Structure	Description
Touch Panel	ATP-104018-01-3 (TTI T010-1201-T520)
Tape	0.40mm
Display	ALC-104012-01-1 (Hydis HX104X01-212)

2\ | ASSEMBLY MECHANICAL DRAWING



3 | APPEARANCE SPECIFICATIONS

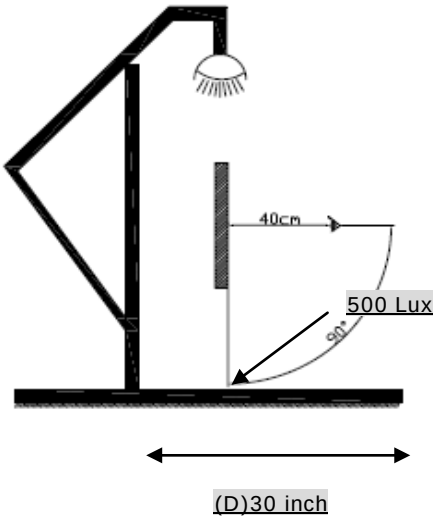
(1) Inspection Environment

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

Judge Area	Judge Item		Inspection Specification	
Viewing Area	Particles & Bubbles	Round	Diameter (D): mm	Quantity (N)
			D ≦ 0.2	Disregarded
			0.2 < D ≦ 0.35	N ≦ 5
			D > 0.35	NG
		Linear	Length (L): mm / Width (W): mm	Quantity (N)
			W ≦ 0.03	Disregarded

			0.03 < W ≦ 0.1 and L ≦ 10	N ≦ 5
			W > 0.1	NG
	Fish Eye	Round	**Diameter (D): mm**	**Quantity (N)**
			D < 0.2	Disregarded
			0.2 ≦ D < 0.5	Disregarded
			D ≧ 0.5	NG
	Pin Hole	Round	**Diameter (D): mm**	**Quantity (N)**
			D < 0.2	Disregarded
			0.2 ≦ D < 0.3	N ≦ 5
			D ≧ 0.3	NG

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.

4F-2, No. 609, Sec. 1, Wanshou Road

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Fax: +886-2-8200-6161

Email: sales@civueopto.com

PRODUCT SPECIFICATION

1. PRODUCT : TOUCH PANEL

2. PART NUMBER : **TTI : T010-1201-T520**

3. ATTACHED DRAWING : **Tech Bes TTI-07073**

SIGNATURE FOR YOUR RECEIPT

DATE:

TRANSTOUCH TECHNOLOGY INC. (TTI)
DOCUMENT No. : TTI PRODUCT TECHNOLOGY Dept.

MANAGER : DATE:

TTI PRODUCT TECHNOLOGY Dept.
3F No.50 Hwa-Ya 3rd Road ,Kwei-san Shian Tao-yuan ,Taiwan
TEL(03)3978800 FAX(03)3978855

ED	Date	Design	Check	Description
Des	20071012	Larry	Chk	App.

Title: Touch Panel Spec.

Draw No. Tech Bes TTI-07073

Cust

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Transtouch Technology Inc.

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觸控面板製品規格書

TOUCH PANEL SPECIFICATION

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TRANSTOUCH TECHNOLOGY INC.

原圖管理元

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ED	Date	Design	Check	Description
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觸控面板製品規格書
TOUCH PANEL SPECIFICATION

1. 適用範圍 Application

此規格書是適用富晶通科技股份有限公司所製作的觸控面板。
This specification is applied to TOUCH PANEL made by TRANSTOUCH TECHNOLOGY INC. (TTI)。

【製品圖號 Product No.】

品 名 Name	製 品 圖 號 P/No.	尺寸 Size	備 註 Remark
觸控面板 TOUCH PANEL	**T010-1201-T520**	10.4"	筆/指輸入兼用 for pen & finger input (RoHS)

2. 概要 Function

此製品是裝置在 LCD 等平面顯示器上使用電阻薄膜的觸控面板。以先端有小 R 的筆或是以手指按下觸控面板的表面，觸控面板的電壓會透過檢出迴路將座標值檢測出來。
TTI TOUCH PANEL is resistance type that customer uses with flat display like LCD. Once operator touches it by resin PEN with round end or FINGER, the circuit for TOUCH PANEL sends coordinate point to PC from voltage at contact point.

3. 製造者 Manufacturer

富晶通科技股份有限公司 TRANSTOUCH TECHNOLOGY INC. (TTI)
所在地:桃園縣龜山鄉(華亞科技園區)華亞三路 50 號 3 樓
Address:3F No.50 Hwa-Ya 3rd Road ,Kwei-san Shian Tao-yuan ,Taiwan

4. 外型 Outline

4.1 外型圖 Drawing

參考最後附加圖面
Please refer the last page of this spec.

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4.2 用語定義 Defines of words

用　　語 Words	定　　義 Defines
動作保證範圍 Guaranteed active area	觸控面板的特性保證範圍。 Area to be guaranteed all characteristics stated on this spec.
上蓋邊界 Boundary line of top enclosure	表示上蓋外框的建議位置。 Recommended boundary line of top enclosure
透明範圍 View (transparent) area	雙面膠或是從電極內側的透明範圍。 View area which is inside adhesive zone or electrode pattern . Top enclosure must not be fixed bye this area.
誤輸入防止範圍 Touch undetected	在透明絕緣的範圍上，防止上蓋邊緣的誤觸動區域 Area to protect miss-input when top enclosure edge touches the touch panel.

5. 特性 Characteristics

5.1 光學特性 Optical characteristics

	項　目 Item	規　格 Specification	備　註 Remarks
1	全光線透過率 TRANSPARENCY	81% Typ. (動作保證範圍內) (Inside of guaranteed active area)	JIS K-7105
2	HAZE	8% Typ.	JIS K-7105

5.2 環境特性 Environmental characteristics

	項　目 Item	規　格 Specification	備　註 Remarks
1	動作溫度 Operation temperature	-10°C ~ 60°C	Max. wet Temp. is 38°C(No dew)
2	保存溫度 Storage temperature	-30°C ~ 70°C	
3	動作濕度 Operation Humidity	20% ~ 90%RH	
4	保存濕度 Storage temperature	10% ~ 90%RH	

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					Title: Touch Panel Spec.
					Draw No. Tech Bes TTI-07073 Cust
ED	Date	Design	Check	Description	富晶通科技股份有限公司 Transtouch Technology Inc. SHEET 4/16
Des	20071012	Larry	Chk	App.	

5.3 機械特性 Mechanical characteristics

	項　　目 Item	規　　格 Specification		備　　註 Remarks
1	表面硬度 Hardness of surface	鉛筆硬度　3H Pencil hardness 3H.		JIS K-5600-5-4 150gf, 角度 45 度
2	FPC 剝離強度 FPC peeling strength	5N 以上 5N　min		向上垂直剝離 Peeling upward by 90°
3	FPC 彎曲 Bending	彎曲 3 回		R1.0mm
4	FPC 插拔	插拔 5 回		
5	最低入力荷重 Minimum input force	筆 Pen 指 Finger	Max: 80gf	動作保證範圍內,但不分布在邊緣及 Dot-Spacer 之上 Within" guaranteed active area", but not on the edge and Dot-Spacer.

5.4 電氣特性 Electrical characteristics

	項　　目 Item	規　　格 Specification	備　　註 Remarks
1	額定電壓 Rated Voltage	DC 7V max.	
2	電極間電阻 Resistance	X axis：200Ω ~ 1000Ω(GLASS 側) Y axis：100Ω ~ 800Ω(FILM 側)	FPC 連接端測量 At connector
3	直線性 Linearity	±2.0%以下「最初值」 max 「initial value」 ±3.5 %以下「環境及壽命試驗後」 max「after environmental & life test」	測定條件請參照註 1 Refer Note-1 測試力量: 250gf
4	Chattering	10ms Max At connector pin	
5	絕緣電阻 Insulation Resistance	10MΩ 以上(DC 25V) 10MΩ min(DC 25V)	

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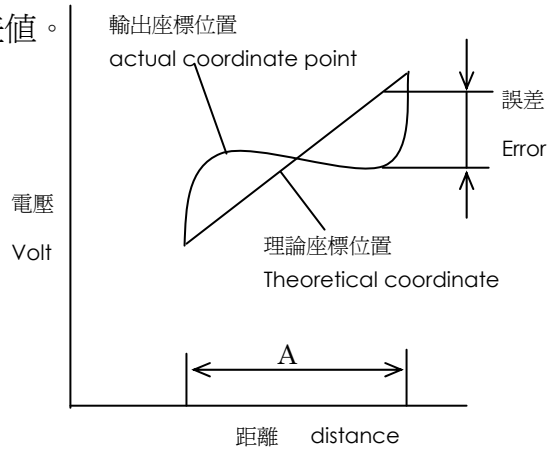
註 1： Note-1

直線性測定條件

Measurement condition of Linearity

在動作保證範圍內，沿著 X、Y 各軸的直線上任意複數點將最外端的點連結成一假想直線，相對於此線的偏差值。直線性是基準電壓分割值得最大偏差電壓。

Difference between actual voltage & Theoretical voltage is an error at any points. Linearity is the value max. error voltage divided by voltage difference on active area.



A: 動作保證範圍
Guaranteed active area

6. 耐久性 life test condition

6.1 機械特性 Mechanical characteristics

1	筆寫壽命 Notes life	10 萬字以上 10^5 words min	動作保證範圍內 Within" guaranteed active area"
2	打點壽命 Input life	100 萬次以上 10^6 times min	動作保證範圍內 Within" guaranteed active area"

※ 最低入力荷重測定條件

Measurement condition of minimum input force

按下 film 表面，X 軸 Y 軸間的電阻值在 2kΩ 以下時所測得的最低入力荷重。

Resistance between X & Y axis must be equal or lower than 2kΩ ($R_{on} \leq 2k\Omega$)。

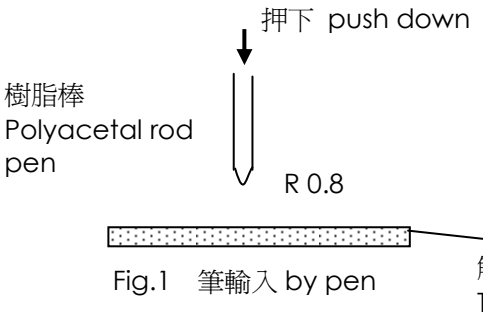


Fig.1 筆輸入 by pen

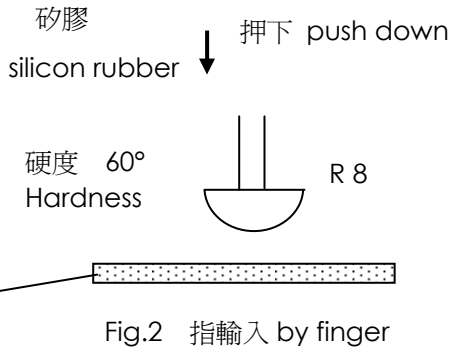


Fig.2 指輸入 by finger

ED	Date	Design	Check	Description							
Des	20071012	Larry	Chk			App.					

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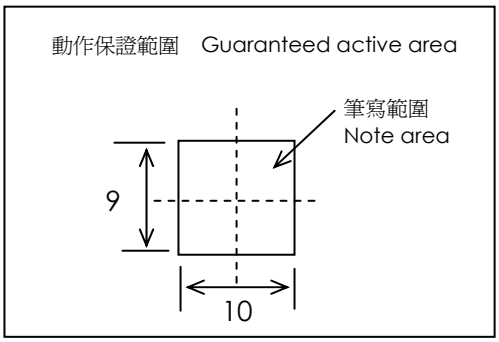
※ 筆寫壽命(耐久性)試驗條件 Notes life test condition (by pen)

在動作保證範圍內以任意 A.B.C…7.5 ×6.75mm 大小的文字在 10 ×9mm 大小區域中，以下記的筆連續書寫。

Notes area for pen notes life test is 10×9mm. Size of word is 7.5×6.75mm. Word is any A.B.C….. word. Center of each word is changed at random in notes area.

- 筆尖端 Shape of pen end : R 0.8 (Refer Fig.1)
- 筆材料 Materials of pen : Polyacetal
- 入力荷重 Load : 250g
- 速度 Speed : 60mm/s



【 判定基準 Judge base 】

關於最低入力荷重、絕緣電阻、電極間電阻需滿足 5.3,5.4 的特性

Minimum input force, Insulation resistance & Resistance stated before as 5.3 , 5.4 must be within spec.

※ 打點壽命(耐久性)試驗條件 Input life test condition(by finger)

使用矽膠在同一地方連續打點

By silicone rubber tapping at same point.

- 橡膠尖端 Sharp of rubber end : R8 硬度 Hardness 60°(Refer fig.2)
- 操作力 Load : 200g
- 操作頻率 Frequency : 5Hz

【 判定基準 Judge base 】

關於最低入力荷重、絕緣電阻、電極間電阻需滿足 5.3 , 5.4 的特性

Minimum input force , Insulation resistance & Resistance stated before as 5.3,5.4 must be within spec.

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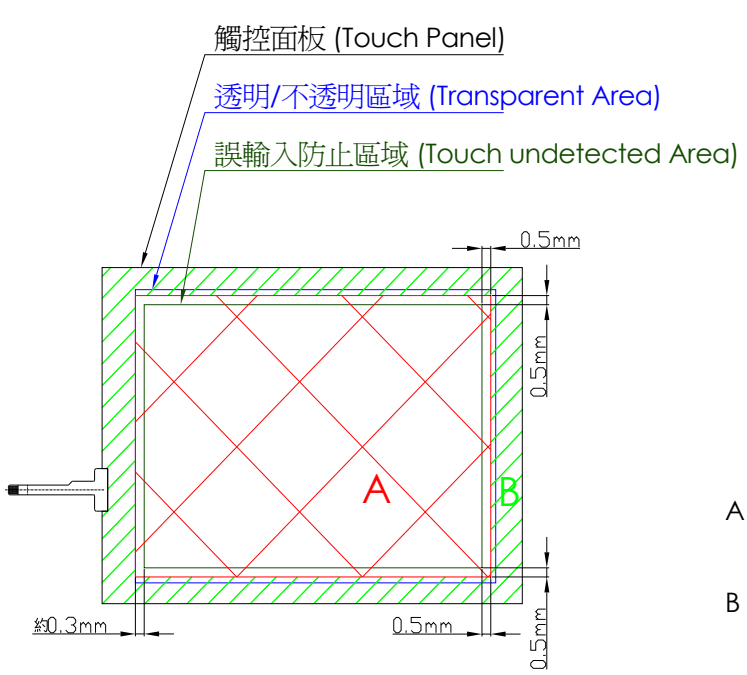
Des	20071012	Larry	Chk	App.			

6.2 環境測試條件 Environmental test condition

	項　目 Item	規　格 Specification	備　註 Remarks
1	高溫保存試驗 High temperature storage	70°C, 240 hr (After 1 hr room temp. and test)	關於最低入力荷重、絕緣電阻、電極間電阻需滿足 5.3 , 5.4 的特性 Minimum input force, Insulation resistance & Resistance stated before as 5.3, 5.4 must be within spec.
2	低溫保存試驗 Low temperature storage	-30°C, 240 hr (After 1 hr room temp. and test)	
3	高溫高濕保存試驗 High temperature high humidity storage	40°C, 95%RH, 240 hr (After 24 hr room temp. and test)	
4	溫度衝擊循環試驗 Temperature Cycling	-30°C ~ +70°C (0.5hr each), 50cycles	

7. 外觀規格 Appearance.

7.1 外觀基準適用領域(範圍) Scope of reject criteria.



領域 Area	外觀仕樣 Specification
A	使用上不會有可視的缺失而影響正常操作。檢查基準依據 7-2 項。 Without any defect point to effect on normal operation.
B	不檢查 None-specify.

A： 區域
Area

B： 領域 A 以外
Besides A area.

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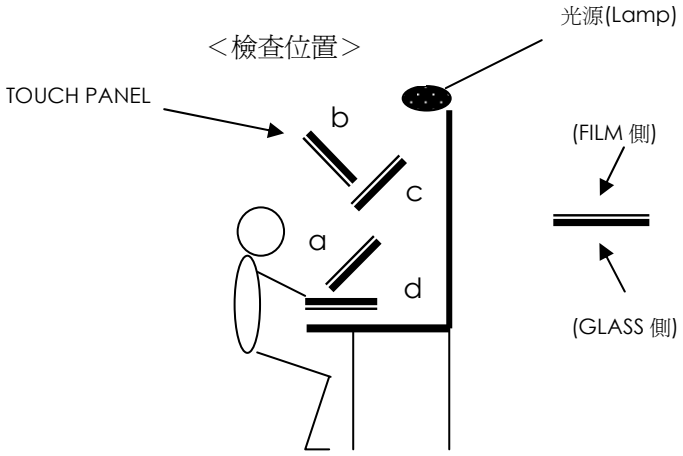
7.2 檢查基準 Reject criteria.

項　　目 Description	檢　查　基　準 Reject criteria
Film / 玻璃刮傷 Film / Glass Scratch Film /玻璃間 異物/髒污 Foreign material between glass & film	0.35mm<D : zero 0.2mm<D≤0.35mm : Max: 5 points D≤0.2mm : disregard
Film / 玻璃表面線狀刮傷 Film / Glass Scratch (Line type) FILM / 玻璃間線狀異物 Foreign material between glass & film(Line type)	0.1mm<W : zero 0.03mm<W≤0.1mm L≤10mm : Max: 5 points W≤0.03mm : disregard
Film 打痕(魚眼) Film fish eye	0.5mm ≤ D : zero 0.2mm ≤ D < 0.5mm : Max: 5 points D < 0.2mm : disregard
Pin Hole (亮點)	0.3mm≤D : zero 0.2mm≤D<0.3mm : Max: 5 points D<0.2mm : disregard
牛頓環, Newton ring	在螢光燈(700Lux 以上)下，目視（距 Touch Panel 20~30cm）判斷 5~10 秒無牛頓環/MORIE，但是在同一條件之下從玻璃面所見的牛頓環/MORIE 不在規範內。 Not seen from PANEL film side under fluorescent lamp, exclude from PANEL glass side. (Distance 20~30cm from eyes to Touch Panel)



※ D：直徑(Diameter), W：寬(Width), L：長(Length)

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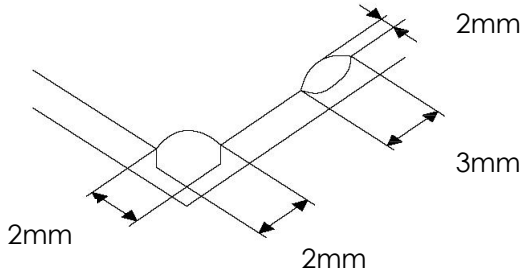
項　　目 Description	檢　查　基　準 Reject criteria
玻璃瑕疵 Glass flaw	不超過下述的規範值，數量不限。 厚度方向的瑕疵(缺角)最大到板厚爲止。 To be no flaw which size is over the drawing Specified as blow. Number of flaw is none-specify. Traveling flaw is none. Flaw of thickness direction size is max. 
Film 外形大小 Film size	Film 的大小不超出玻璃外形 (雙面膠除外)。 Film is in glass area (or size). (Exclude double-side adhesive tape)
FPC 異物/髒污 Foreign material for FPC	Cover Film 內層雜質不可跨越兩迴路。 Foreign material can not short two patterns.
FPC 刮傷 FPC Scratch	會造成製品電氣特性障礙的刮傷皆不可。 Scratch can not effect electrical characteristics
FPC 皺折 FPC Crumple	會造成製品電氣特性障礙的皺折皆不可及不可有死折變形 Crumples can not effect electrical characteristics and no line crumples are allowed.
雙面膠大小 Adhesive Tape size	雙面膠的露出不包括在尺寸規定中。 Adhesive Tape out of Panel Outline is excluded.

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8. 表示方法 Showing

Touch Panel 製造型格及製造年月份表示方法。

Showing to P/No., Production & Year/Month.

	表　示 Showing	意　思 Meaning	備　考 Notes
製品型格 Product No.	1201-520	T010 - 1201 – T520	
製造批號 Production Lot No.	雷射打印於 Film 面 07010001	前兩碼(1, 2 碼)爲年份(07: 2007 年); 年份後兩碼(3, 4 碼)爲月份(01: 1 月); 其他碼(5~8 碼)爲流水號	製造批號 Production Lot No.

9. 注意事項 Attention

(1) 本產品是使用玻璃所製，因爲玻璃的邊、角是銳利的，在使用觸控面板時請多注意。在使用觸控面版時請戴手套作業。

Since touch panel is consist of Glass, pls. be careful your hand and other part from injury at handling. You must wear gloves at handling.

(2) 本產品是使用玻璃所製，在使用觸控面板時，請注意不要施加強力衝擊。

Do not put a heavy shock or stress on touch panel.

(3) 拿起觸控面板時請勿從 FPC 拿取。

Do not lift Touch Panel by cable (FPC).

(4) 在 FILM 面處請勿施加重力。(例: 在組裝時從 FILM 吸取移動)

Do not add any stress only film face.

(Ex. Don't transfer the panel by film face with vacuum)

(5) 表面清潔時，請使用「乾的柔性布」或「浸泡過中性清潔液擰乾的布」或「沾有酒精的柔性布」。請勿使用有機溶劑、酸、鹼類溶劑。

Pls. use dry cloth or soft cloth with neutral detergent (after wring dry) or one with ethanol at cleaning. Do not use any organic solvent, acid or alkali solution.

原圖管理元

日付

ED	Date	Design	Check	Description							
Des	20071012	Larry	Chk			App.					

Title: Touch Panel Spec.

Draw No. Tech Bes TTI-07073

Cust

富晶通科技股份有限公司
Transtouch Technology Inc.

SHEET 11/16

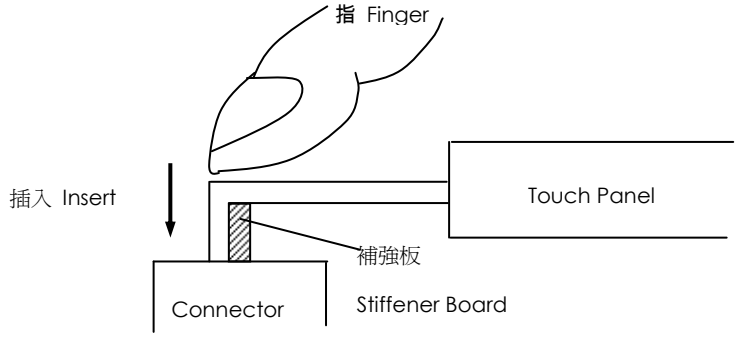
(6) 保存時請勿重疊放置。特別是請勿用重物壓著。

Do not pile Touch Panel. Do not put heavy goods on Touch Panel.

(7) FPC 請勿折彎，有可能使迴路線斷裂。特別是對於連結器的插入部分，因爲貼有補強板，在插入連結器時請勿施加過多的力量。請避免以下圖方式插入。

Do not bend a cable of Touch Panel for prevent happen to line cut failure.

Please don't use following method for insert the cable to connector.



(8) 在實際組裝設計時，請注意以下事項。

Please pay attention for the matter as stated below at mounting design of touch panel & enclosure

-1. 觸控面板的上蓋支撐物請設定在透明範圍的外側。
(上蓋請勿壓在透明範圍上，會有誤動作的情況發生)
Enclosure support to fix touch panel must be out of view (transparent) area.(Do not design enclosure presses the view area to protect from miss input)

-2. 上蓋的外框請設定在透明範圍的內側、動作保證範圍的外側。
(上蓋的外框請勿接觸到透明範圍)。
Enclosure edge must be between view area & Guaranteed active area.
(Enclosure edge must not touch with view area)

-3. 觸控面板上下部的壓合，請以橡膠等彈性材質。
We recommend the material of support to fix touch panel is elastic material.

原圖管理元

日付

										Title: Touch Panel Spec.	
										Draw No. Tech Bes TTI-07073	Cust
ED	Date	Design	Check	Description						富晶通科技股份有限公司 Transtouch Technology Inc.	SHEET 12/16
Des	20071012	Larry	Chk			App.					

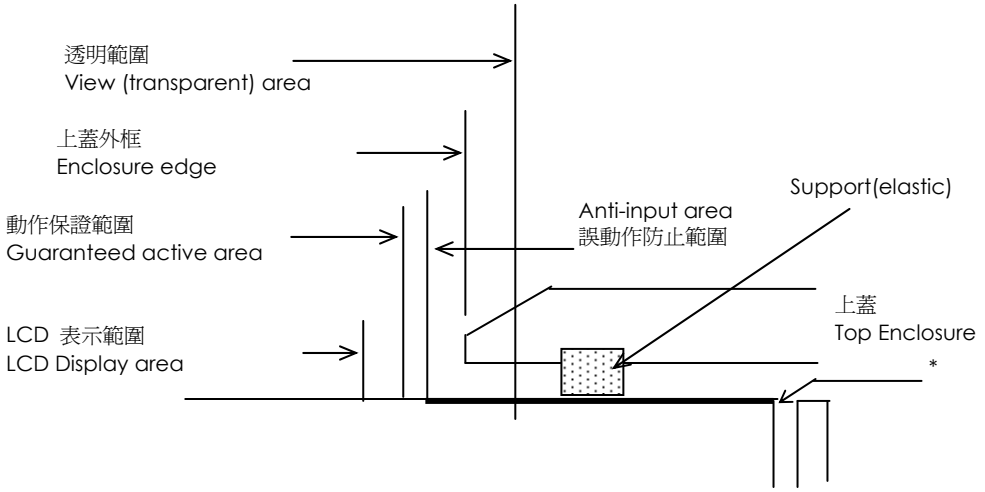
-4. 使用時，觸控面板的上面(FILM)請勿與上蓋黏著固定。
Do not bond top surface (film) of touch panel with enclosure.

-5. 觸控面板上部的邊角，因爲玻璃導電層有傳導性，在組裝設計時請注意不要與金屬材質接觸。
The corner parts (fig.*) has conductivity. Do not touch any metal part after mounting.

-6. 有防水需求時，請考慮用橡膠等材質對迴路週邊做防水。
Special design is required for water resistance use.

-7. 當使用 Air gun 向觸控面板吹氣時，建議 Air 壓力調整爲 2kg/cm^2 以下，並且勿從玻璃側朝 FPC 直接吹氣，以免 FPC 在強烈 Air 壓力下，造成脫落.
Cleaning Touch panel by Air gun, pressure 2kg/cm^2 below is suggested.
This is preventing FPC to peel off when air is blowing to FPC from glass side.

【實裝構造例　Mounting condition example】



原圖管理元

日付

ED	Date	Design	Check	Description
Des	20071012	Larry	Chk	App.

Title: Touch Panel Spec.

Draw No. Tech Bes TTI-07073

Cust

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Transtouch Technology Inc.

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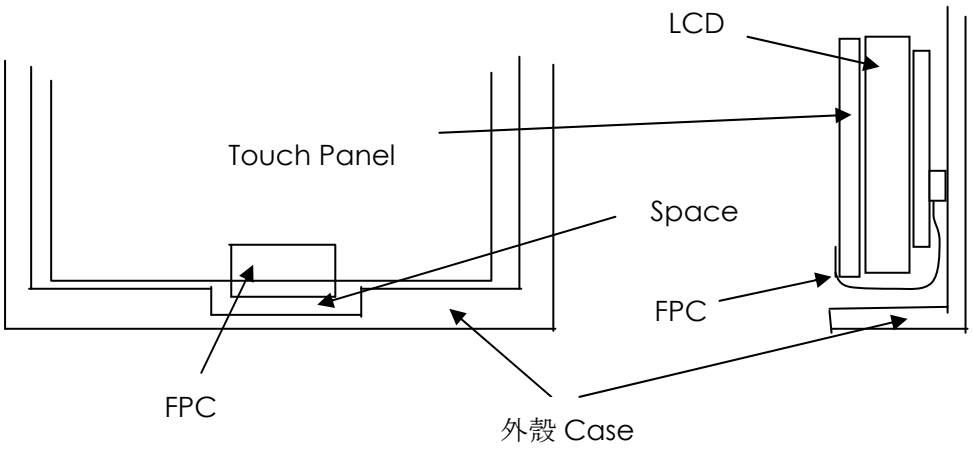
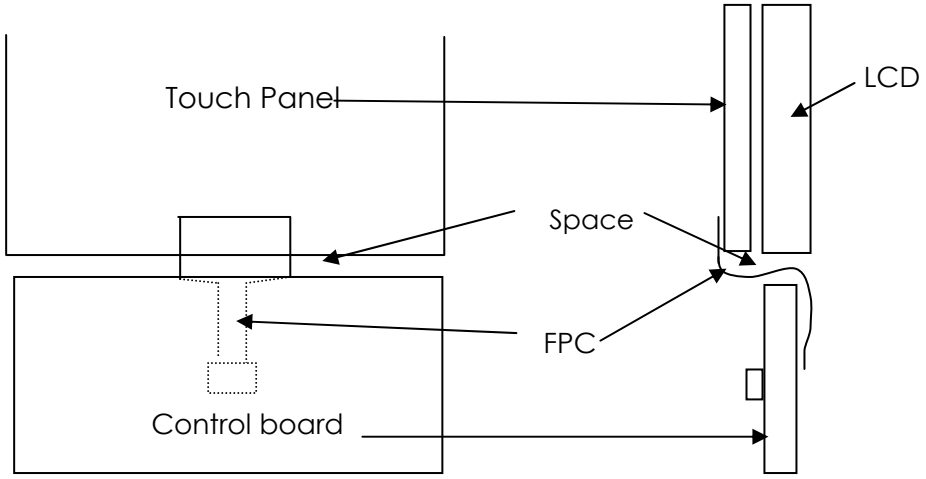
-8. 必須在靠近 FPC 位置處預留 FPC 線路空間, 絕對避免外殼或其他零件碰觸或擠壓 FPC, 造成 FPC 脫落.

The mounting structure must has a reserved space for the FPC tail and never touch or squeeze the FPC by case or another components preventing FPC to peel off.

【實裝構造例　Mounting condition example 2】



【實裝構造例　Mounting condition example 3】



原圖管理元

日付

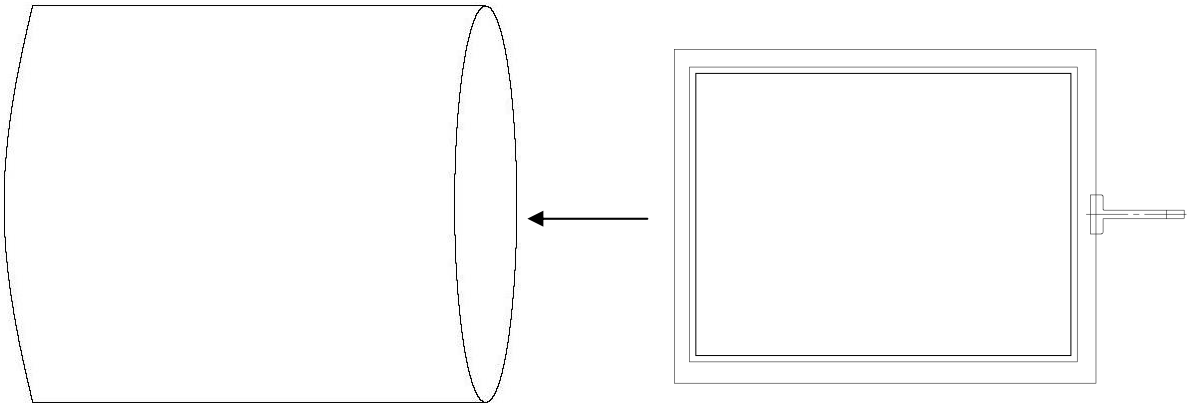
					Title: Touch Panel Spec.		
					Draw No. Tech Bes TTI-07073		Cust
ED	Date	Design	Check	Description	富晶通科技股份有限公司 Transtouch Technology Inc.	SHEET	14/16
Des	20071012	Larry	Chk	App.			

10. 包裝型式 Packing Method：

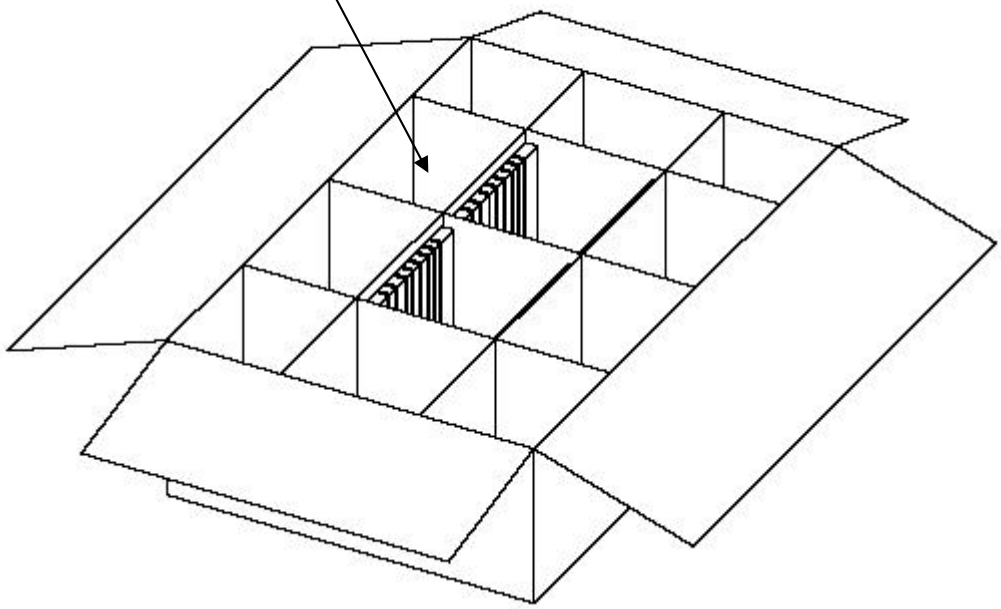
如圖 as drawing

觸控面板裝入清潔袋內

Touch panel in a clean bag



裝入包裝箱內(Put in carton)



1 個裝滿的包裝箱內含 30 片觸控面板

A full carton with 30 pieces of touch panels

原圖管理元

日付

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Des	20071012	Larry	Chk	App.

Title: Touch Panel Spec.

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Transtouch Technology Inc.

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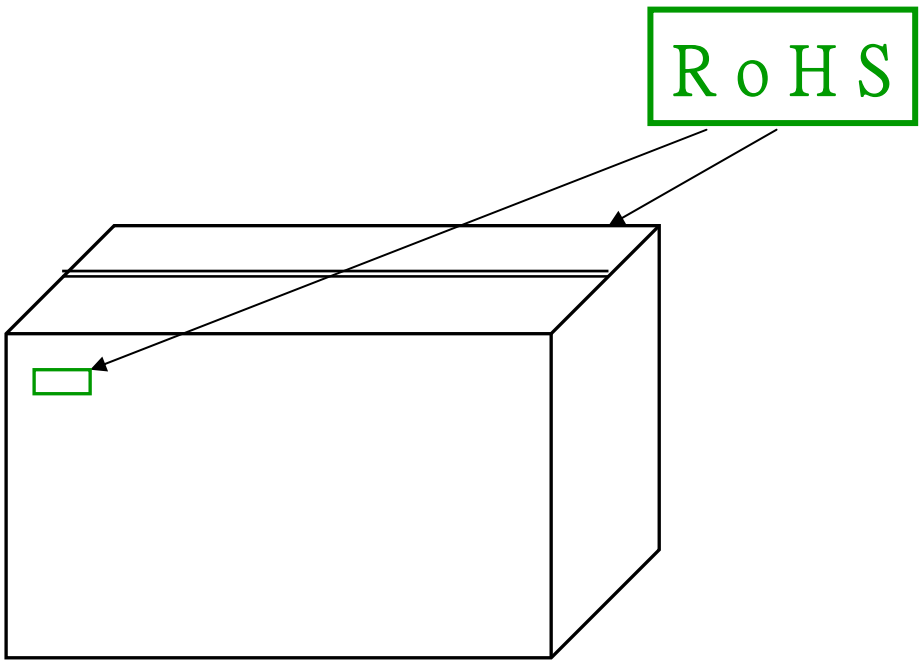
包裝箱外側兩邊以圖章打印綠色『RoHS』字樣

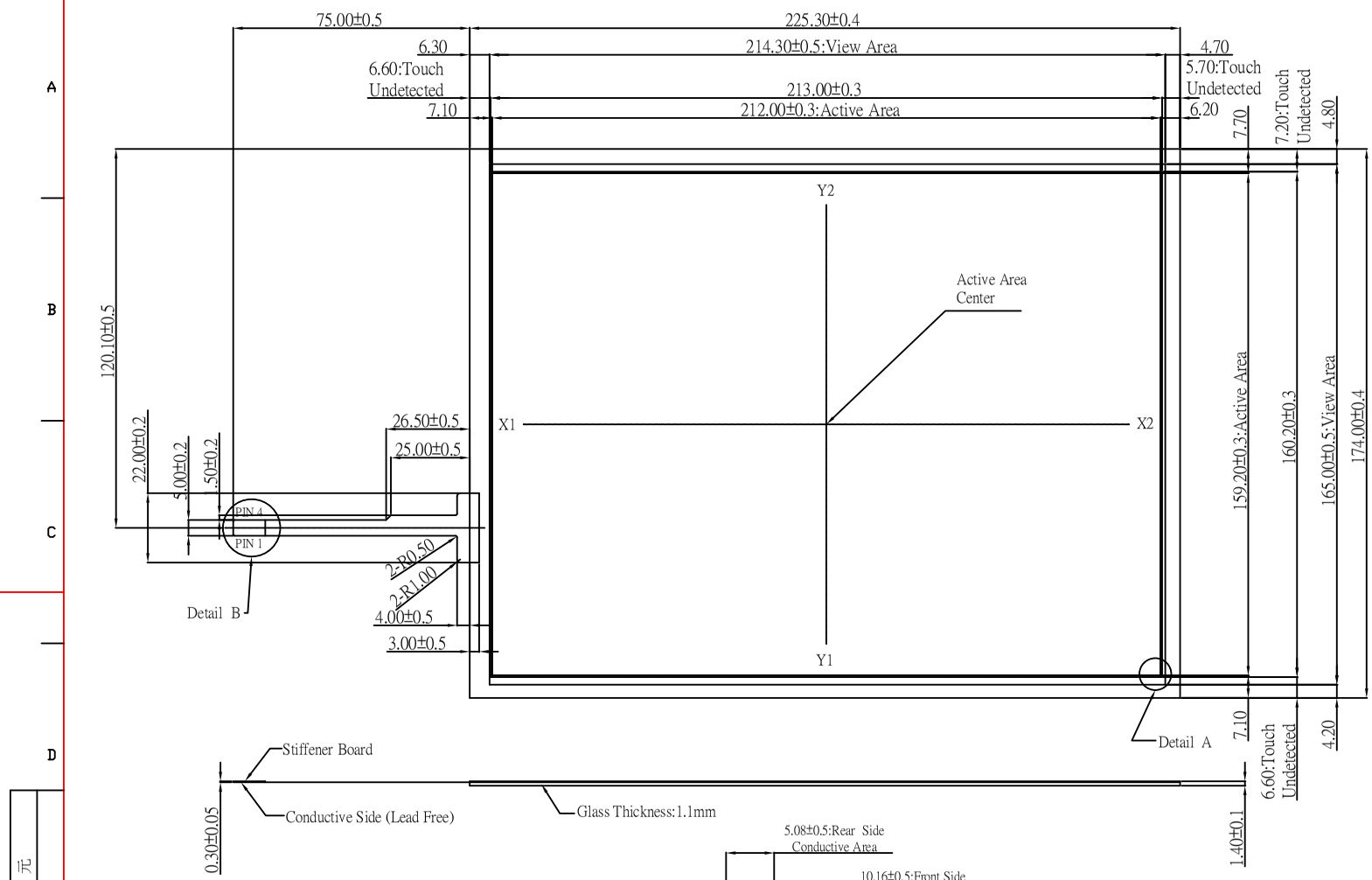
Two green RoHS marks stamped on both side of one full carton



					Title: Touch Panel Spec.		
					Draw No. Tech Bes TTI-07073		Cust
ED	Date	Design	Check	Description	富晶通科技股份有限公司 Transtouch Technology Inc.	SHEET	16/16
Des	20071012	Larry	Chk	App.			

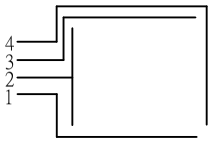
原圖管理元

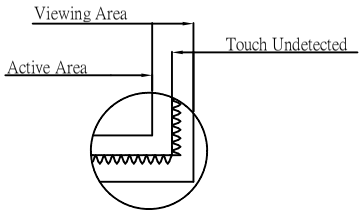
日付



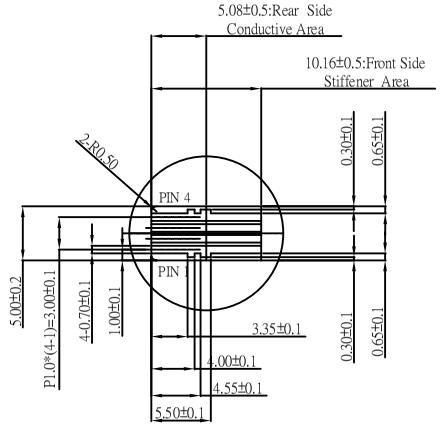
Connector Pin Assignment

Pin No.	Description
1	Y1
2	X1
3	Y2
4	X2





Detail A



Detail B

Note:
1. Tolerance : ±0.5
2. Pen&Finger Input Type
3. Surface Hardness: 3H
4. Transmittance: 81% Typ. (JIS-K7105)
5. Film: Non-Glare

材料					處理				
								名稱	TOUCH PANEL
								比例	1 : 1
								圖號	Tech Bes TTI-07073
								提出先	
版	年月日	設計	審查	變更內容				富晶通科技股份有限公司	
設計	2007/10/12	Larry	審查			承認		頁次	1/1

原圖管理元 日期

05.07 FDNC-3505-3

Transtouch Technologty Inc. List of Materials

Product Name : Touch Panel
Product No : T010-1201-T520

2007.10.04

PRODUCT :

Restrict substance contained: Cd<100ppm, Pb/Hg/Cr^{+6}/PBBs/PBDEs : <1000ppm

No.	Material Name	Parts No.	Supplier	Substance						Test Report	
				Cd	Pb	Hg	Cr^{+6}	PBBs	PBDEs	Date	Report No.
1	ITO Glass	N01L-0550-0076	AVCT	ND	ND	ND	ND	ND	ND	2007.04.14	CE/2007/41181
2	ITO PET Film	N01L-0550-0029	OIKE	ND	ND	ND	ND	ND	ND	2006.09.19	33909133-01M-001
3	Photo resistor	N01L-0550-0060	TOK	ND	ND	ND	ND	ND	ND	2007.01.19	CE/2007/13359
4	Resistor	N01L-0550-0066	ASAHI CHEMICAL	ND	ND	ND	ND	ND	ND	2006.10.23	CE/2006/A2840
5	Ag Paste	N01L-0550-0062	Toyobo	ND	ND	ND	ND	ND	ND	2007.03.06	THJ0040590
6	DSA Tape	N01L-0550-0038	3M	ND	ND	ND	ND	ND	ND	2006.11.09	CE/2006/93780A
7	FPC	N01L-0550-0041	Tech Wave	ND	ND	ND	ND	ND	ND	2007.06.28	CE/2007/64721

PACKING :

Restrict substance contained: : Cd + Pb + Hg + Cr^{+6} <100ppm

No.	Material Name	Parts No.	Supplier	Substance						Test Report	
				Cd	Pb	Hg	Cr^{+6}			Date	Report No.
1	Packing box	N01L-0550-0915	San-Do	ND	ND	ND	ND			2007.05.17	CE/2007/50314C
2	Clean bag	T01L-1100-0003	Yemchio	ND	ND	ND	ND			2007.03.29	CE/2007/36852

Approved by :

栗田 96.10.5 和行

Filled by:

96.10.4 翠如

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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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

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.

Test Report

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TU-CHEEN CITY, TAIPEI HSIEN, TAIWAN, R. O. C.

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

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.

Test Report

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TU-CHEEN CITY, TAIPEI HSIEN, TAIWAN, R. O. C.

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

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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No. : CE/2006/C3872
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.

Test Report

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TU-CHEEN CITY, TAIPEI HSIEN, TAIWAN, R. O. C.

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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TU-CHEEN CITY, TAIPEI HSIEN, TAIWAN, R. O. C.

No. : CE/2006/C3872
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.

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

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.

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

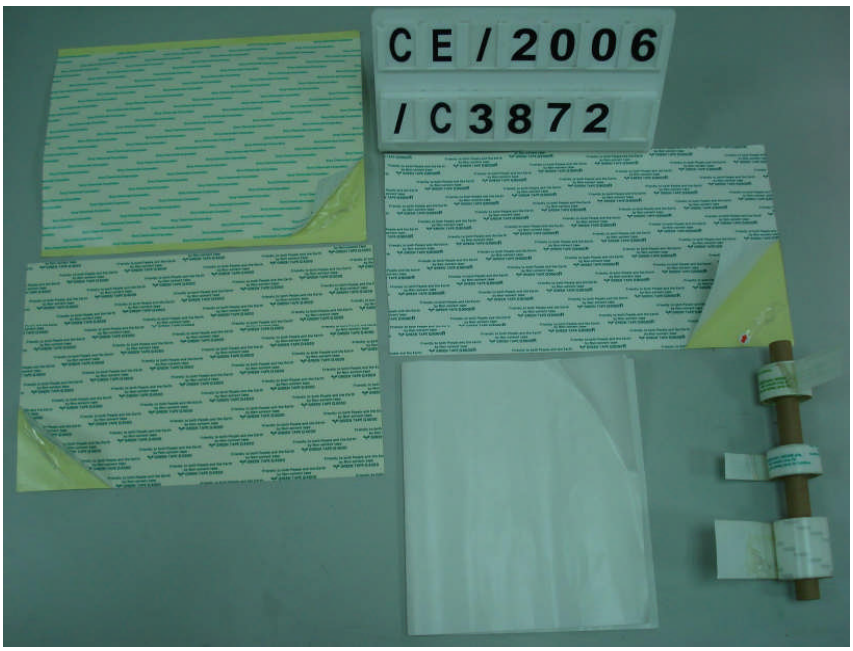
Test Item (s):	Unit	Method	MDL	Result
				No.1
Sum of PBDEs (Mono to Nona) (Note 4)	mg/kg	With reference to US EPA 3540C for PBBs/PBDEs Content. Analysis was performed by GC/MS.	-	n.d.
Monobromobiphenyl ether			5	n.d.
Dibromobiphenyl ether			5	n.d.
Tribromobiphenyl ether			5	n.d.
Tetrabromobiphenyl ether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

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



** End of Report **

TITLE : HX104X01-212

Product Specification

Rev. O

HYDIS Technologies

REVISION HISTORY

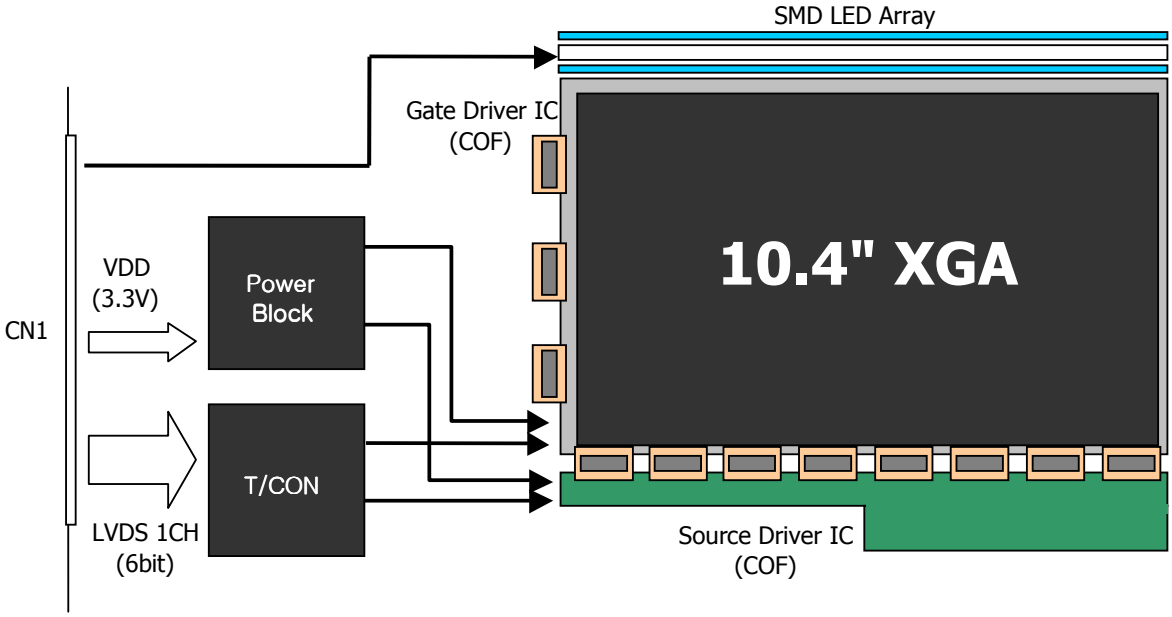
REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
O		Initial Release	10.04.08	H.J.Ahn

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

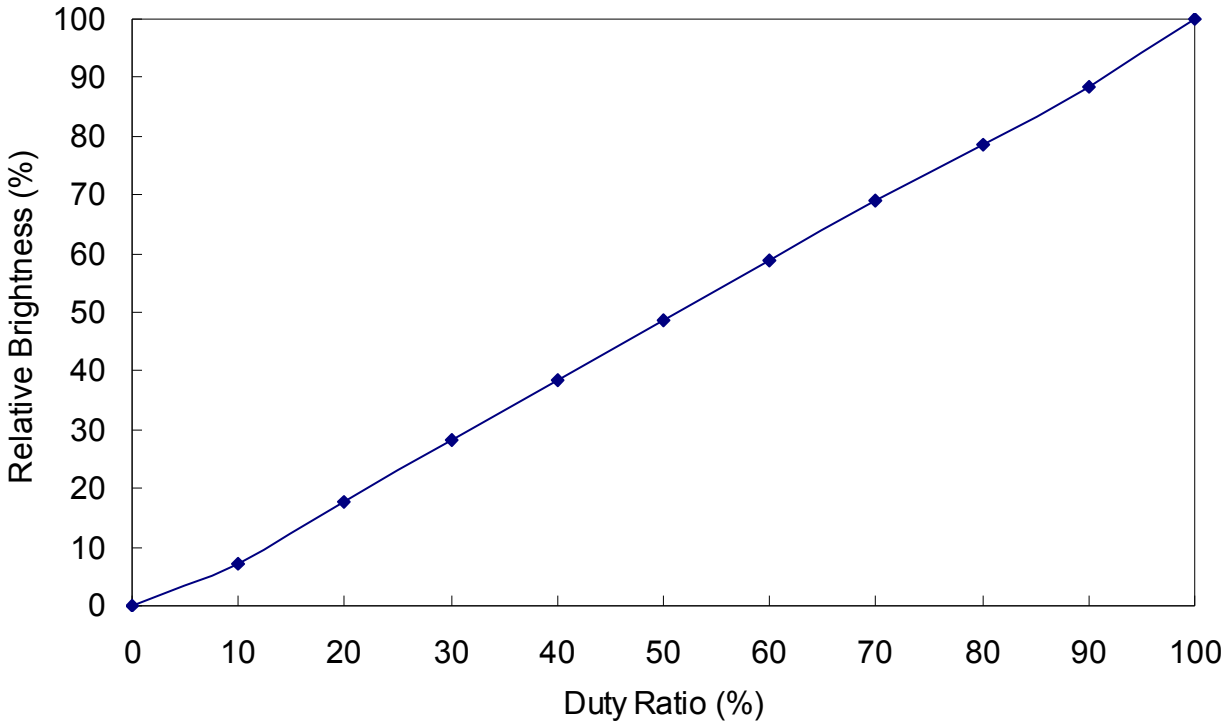
3.1 Electrical Specifications

< 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.

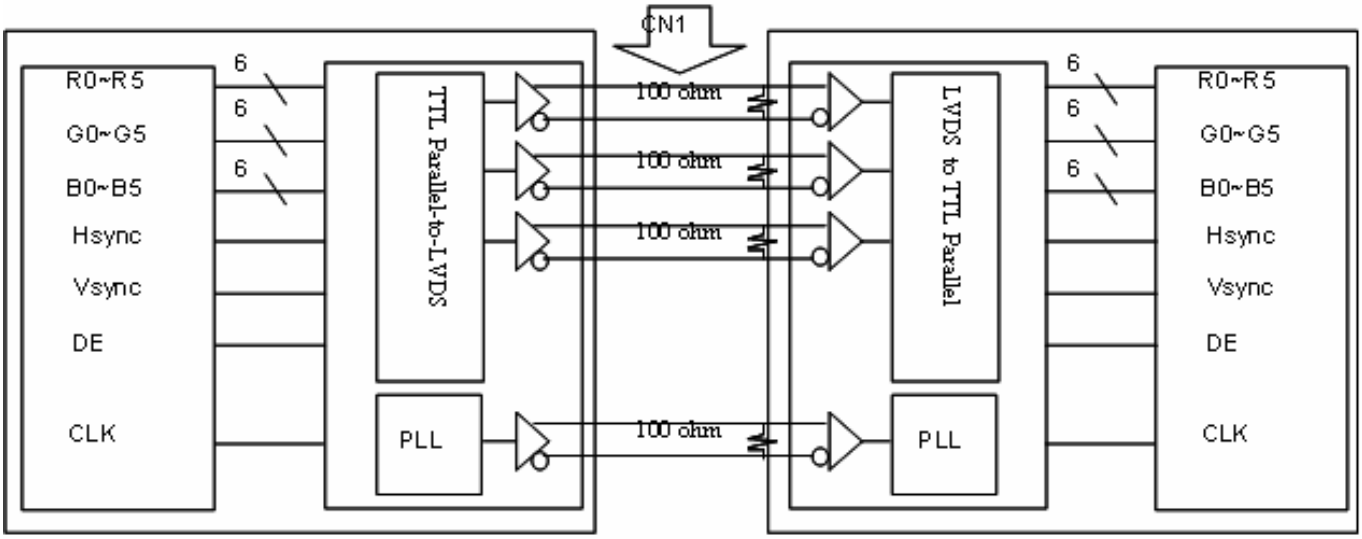
7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark. (See FIGURE 4).

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

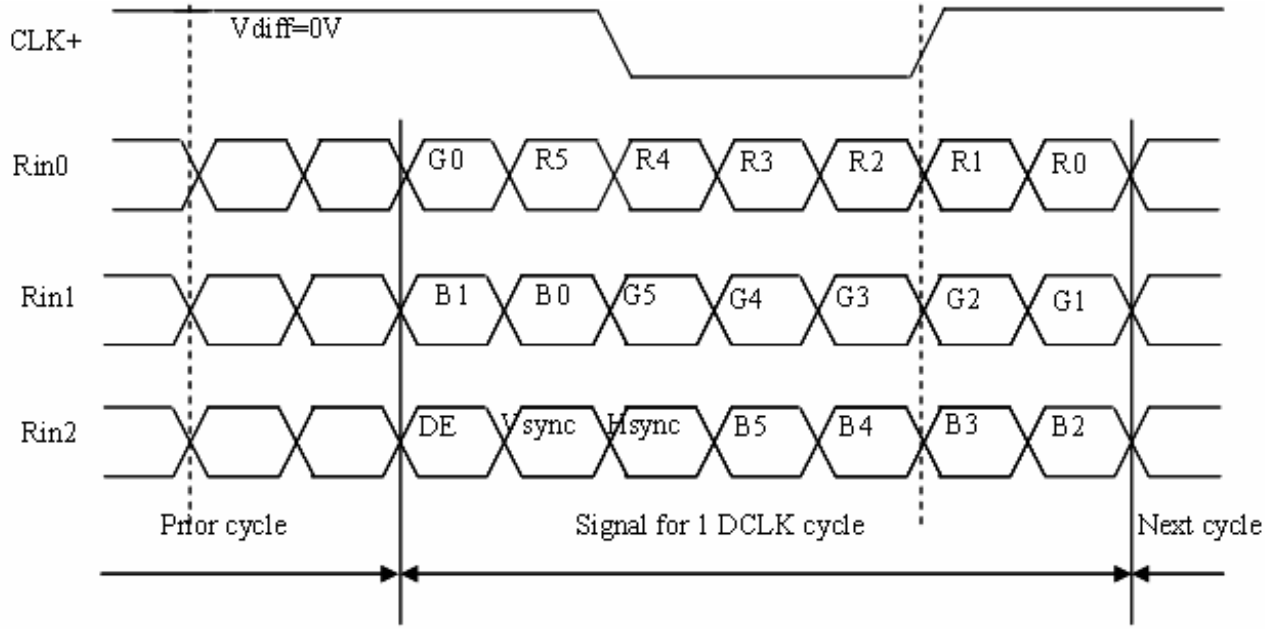
CN1 : Interface Connector : 20455-030E-02(I-PEX) or equivalent
User side Connector : 20453-030T (I-PEX) or equivalent

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.

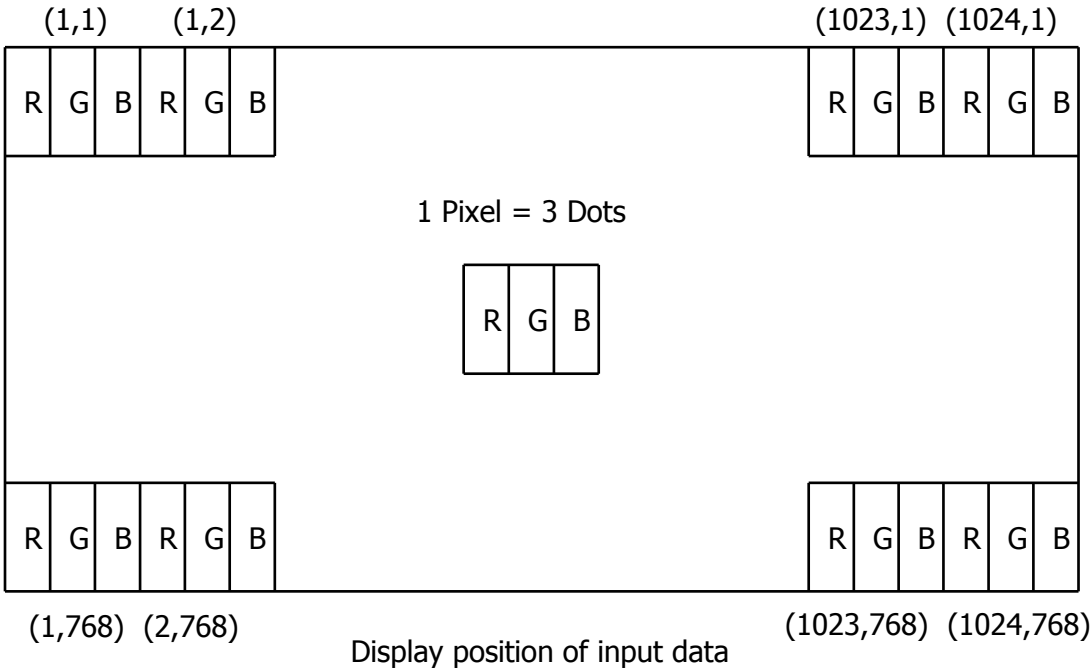
INPUT SIGNAL	TRANSMITTER		INTERFACE		FI-XB30S-HF10	REMARK
	PIN NO.	PIN NO.	SYSTEM (TX)	TFT-LCD (RX)	PIN NO.	
R0	51	48 47	OUT0- OUT0+	IN0- IN0+	8 9	
R1	52					
R2	54					
R3	55					
R4	56					
R5	3					
G0	4					
G1	6	46 45	OUT1- OUT1+	IN1- IN1+	11 12	
G2	7					
G3	11					
G4	12					
G5	14					
B0	15					
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

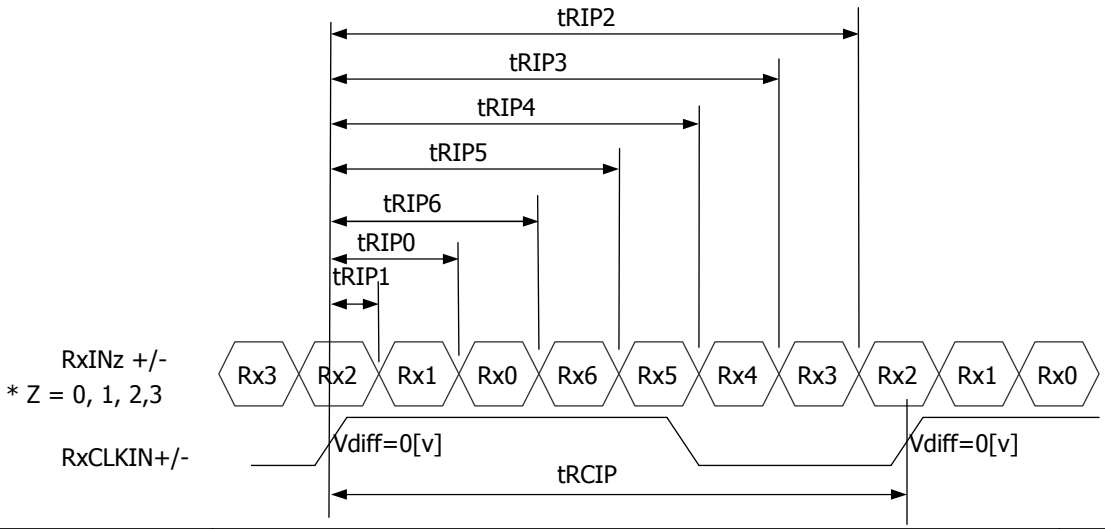
6.1 LVDS Transmitter Input

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

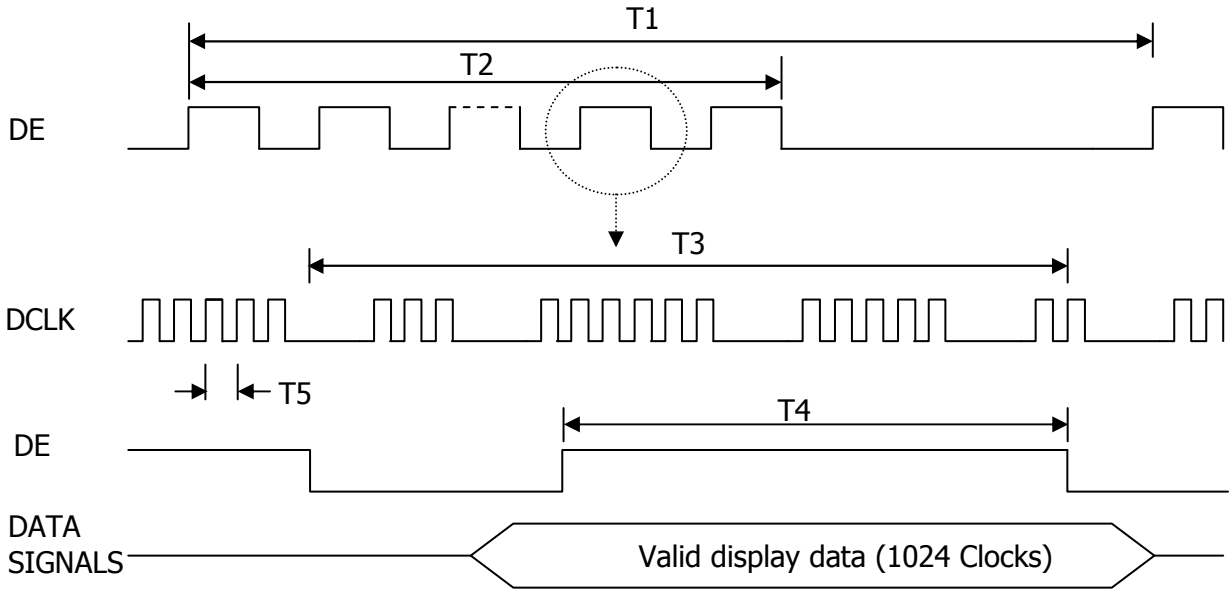
6.2. LVDS Rx interface timing parameter

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



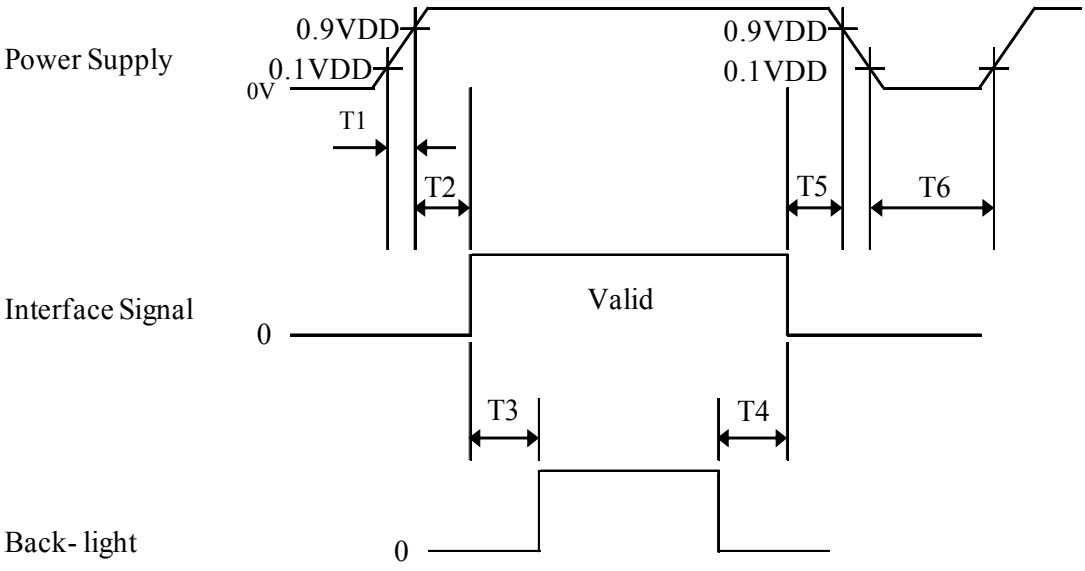
8.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

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.

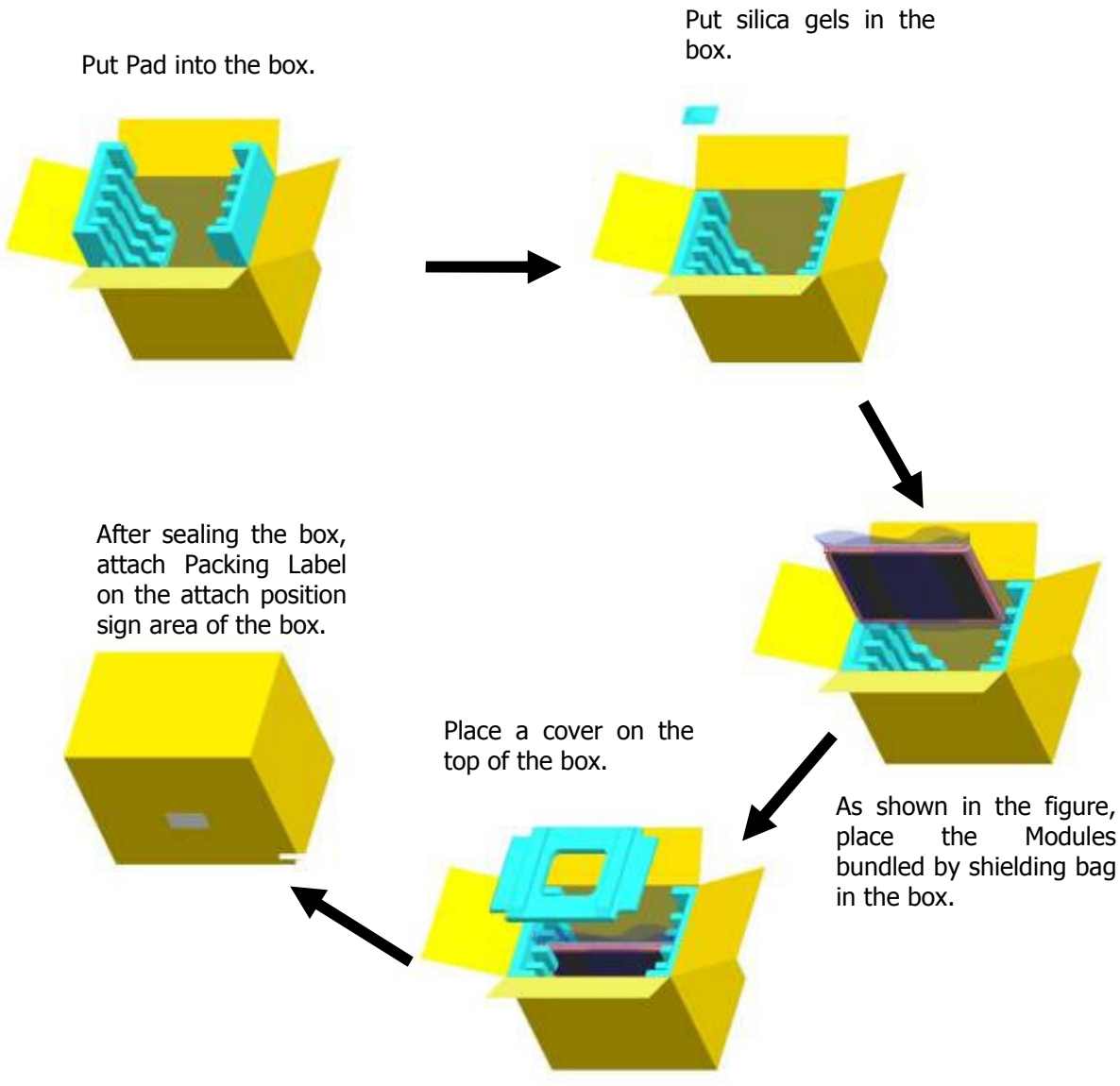
11.0 RELIABLITY TEST

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

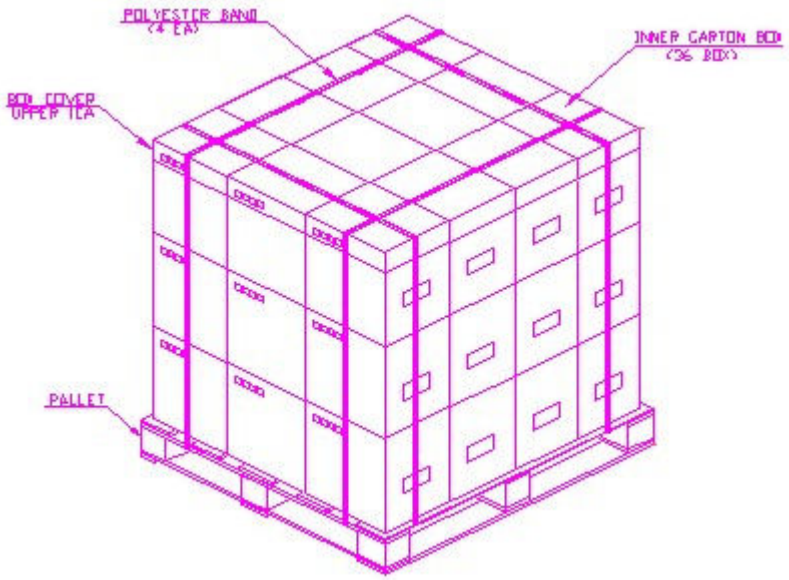
Hydis provides the standard shipping container for customers, unless customer specifies their packing information. The standard packing method is shown in below.

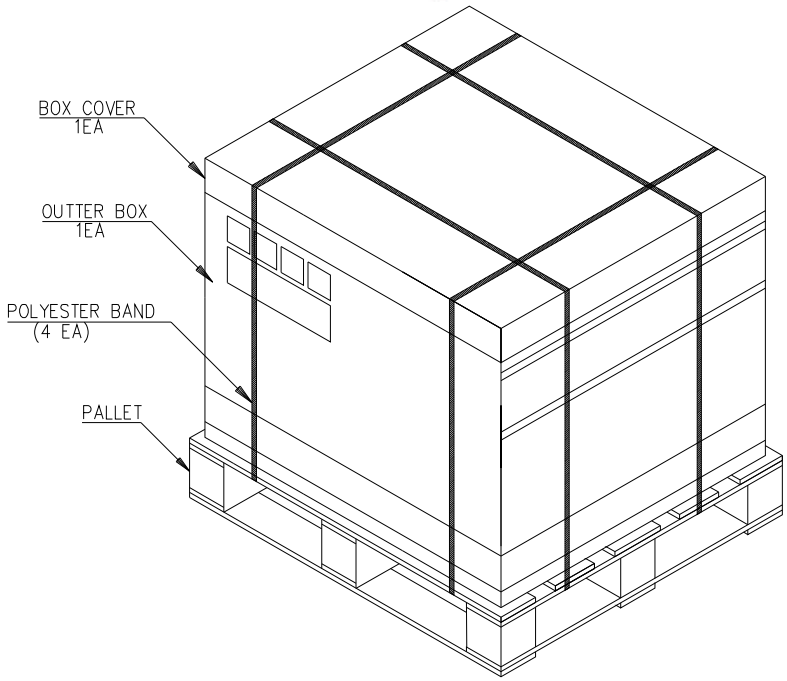


Notes

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

12.2 Pallet Packing



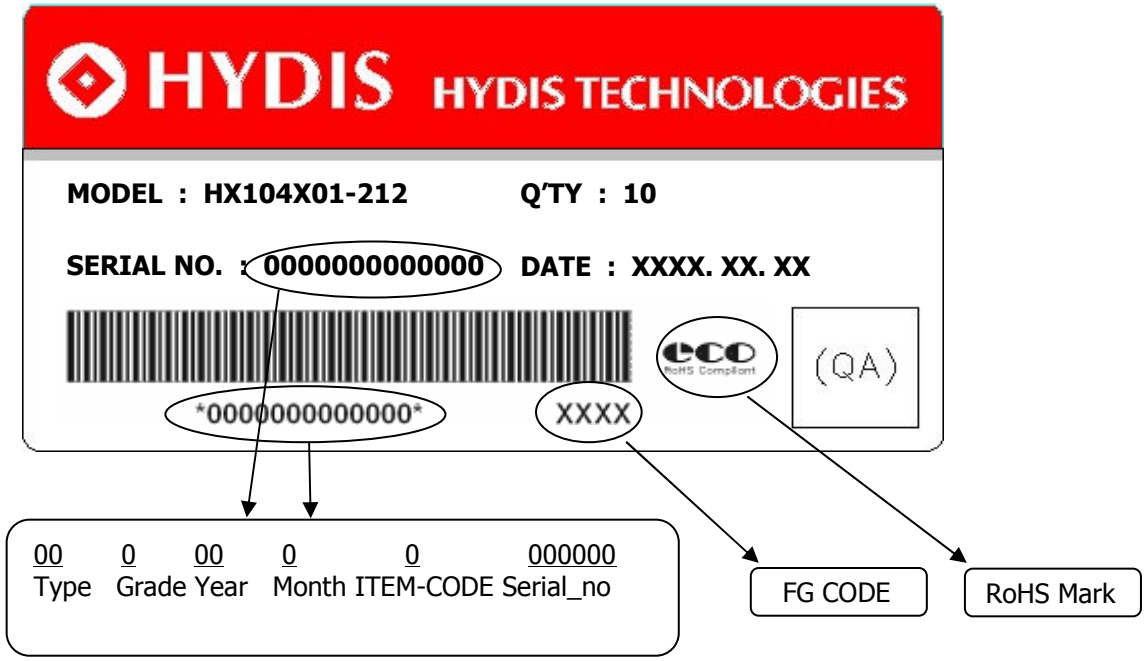


*** Note**

- 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	

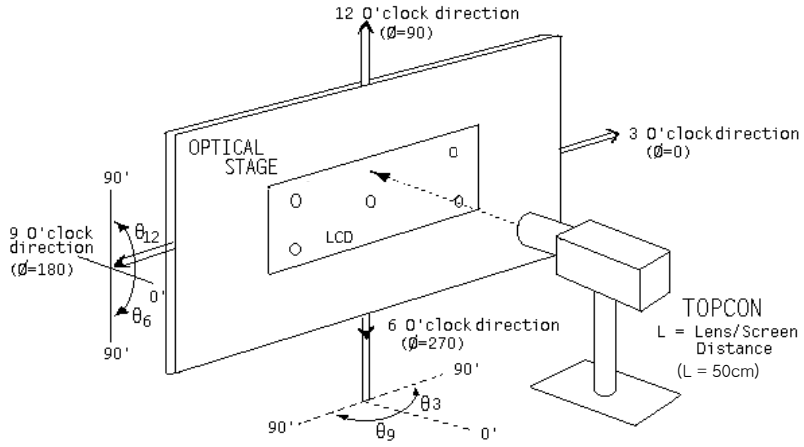
Add	Function	Hex	Input Value
20	BLue y high bits	21	
21	White x high bits	50	0.313
22	White y high bits	54	0.329
23	Established timing 1	21	
24	Established timing 2	08	
25	Established timing 3	00	
26	Standard timing #1	01	Not Used
27		01	
28	Standard timing #2	01	Not Used
29		01	
2A	Standard timing #3	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

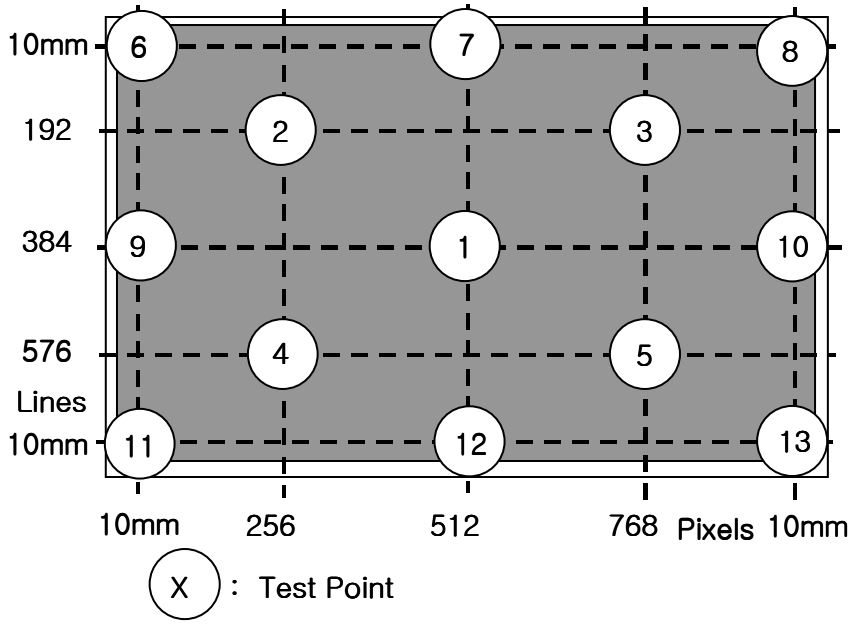


Figure 3. Response Time Testing

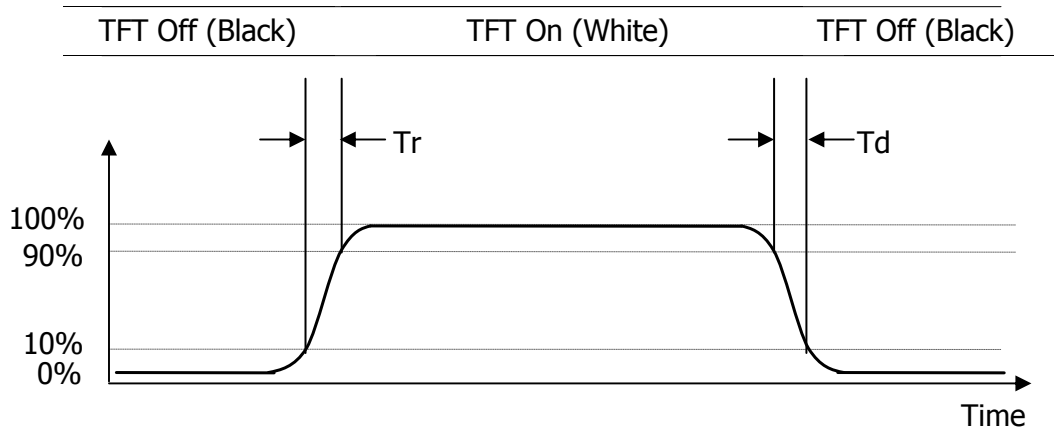
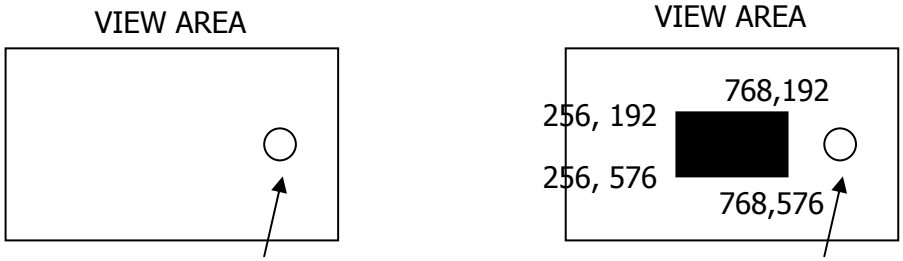


Figure 4. Cross Modulation Test Description



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

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)

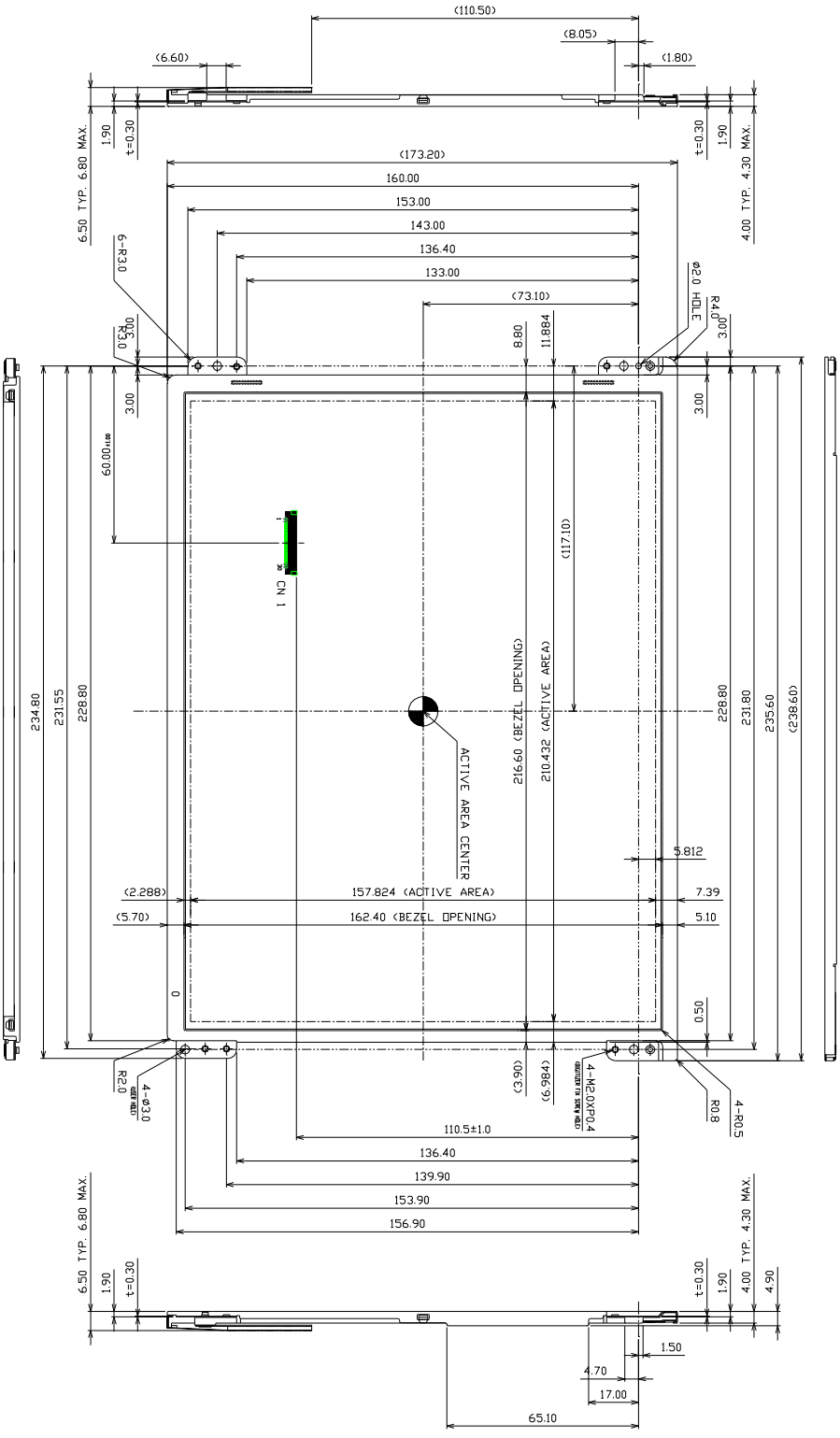
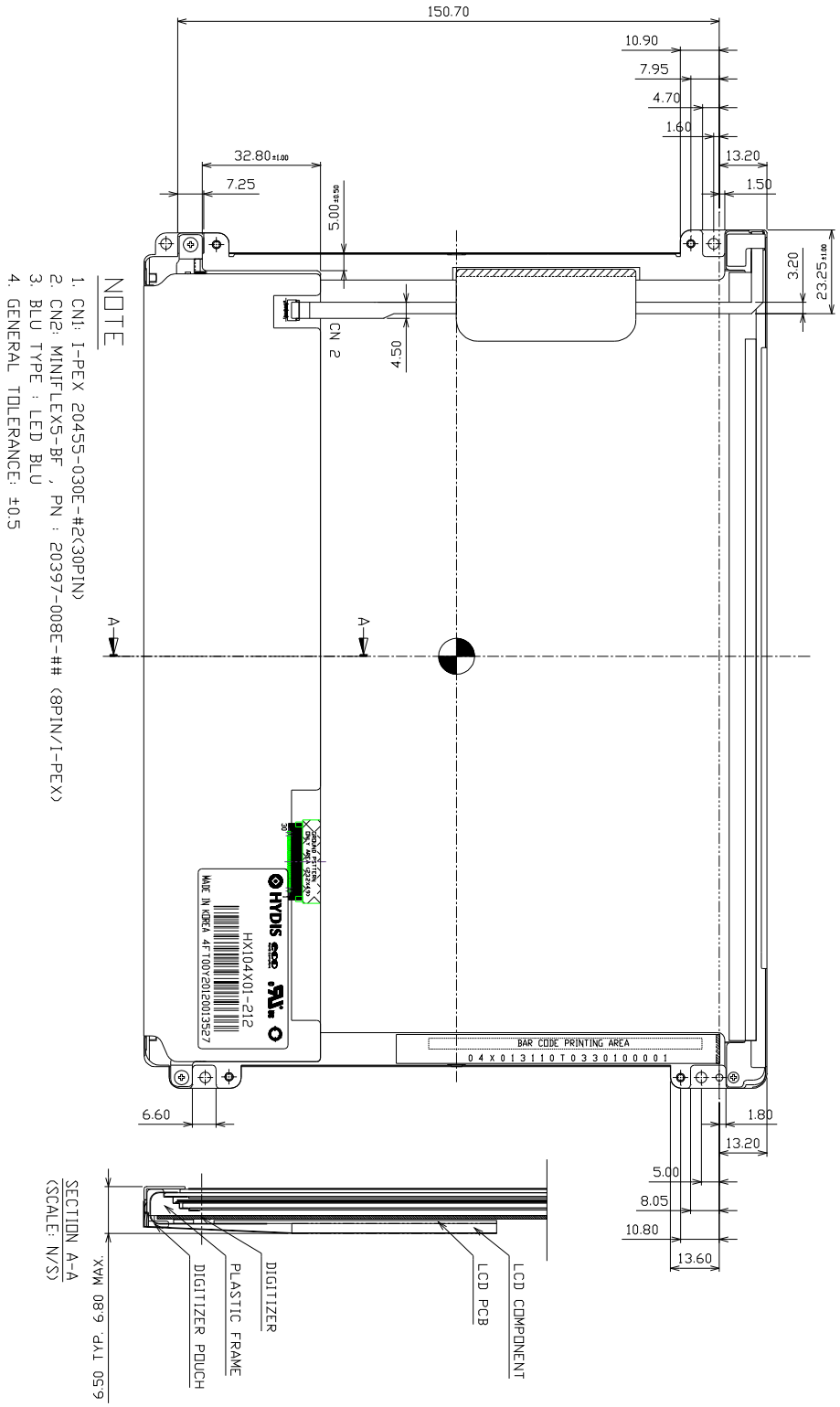


Figure 5. TFT-LCD Module Outline Dimensions (Rear View)



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

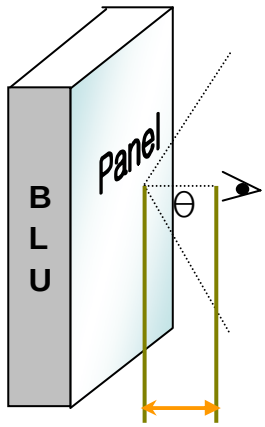
9.2 Inspction Condition

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.

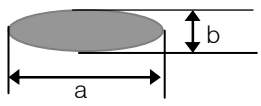
10.1 Visual Inspection Criteria

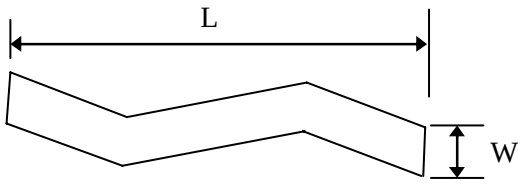
ITEMS	DETAILS		INSPECTION CRITERIA
Pixel Defects	Bright Dot Defect		N ≤ 2
	Dark Dot Defect		N ≤ 4
	Bright + Dark Dot Defect		N ≤ 5
	Defect Distance	Bright & Bright	≥ 20mm
		Dark & Dark	≥ 5㎜
	2 Adjacent Bright Dots Defect		N ≤ 1
	2 Adjacent Dark Dots Defect		N ≤ 1
	3 Adjacent Bright Dots Defect		N = 0
	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.

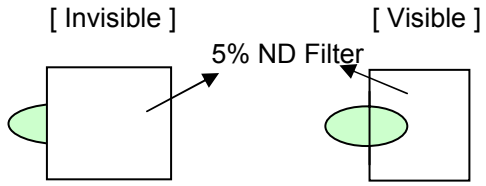
Note 2) D = Diameter, L = Length, W = Width, N = Number

D = (a + b) / 2





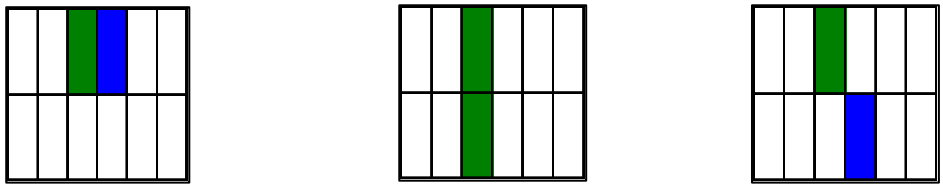
Note 3) Dot which is invisible through 5% ND filter will not counted as " 1 dot" defect.



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

"1 dot defect"
(=counted)

[2 adjacent dots defect]



Type 1 Type 2 Type 3