

電容觸控式螢幕規格承認書  
Capacitive Touch Panel Specification

|                       |                |
|-----------------------|----------------|
| 品名<br>Product Name    | 23.6 寸電容式觸控式螢幕 |
| 機種名<br>Product Model  | GT-CTP-Y236A-1 |
| 客戶名稱<br>Customer Name |                |
| 製造商<br>Manufacturers  | 深圳市格林兴显示科技有限公司 |
| 版本號<br>Revision No    | Ver. 1.0       |
| 日期<br>Date            | 2017-11-14     |

|                   |  |                                   |  |
|-------------------|--|-----------------------------------|--|
| ATC 製作<br>Edit    |  | 客戶研發確認<br>Customer R&D<br>Approve |  |
| ATC 檢查<br>Check   |  | 客戶品管確認<br>Customer QC<br>Approve  |  |
| ATC 審核<br>Approve |  | 客戶承認<br>Customer<br>Approve       |  |

## Revision Sheet 變更單

| Revision No.<br>版本號 | Date<br>日期 | Content<br>變更內容 | Reason<br>變更原因 | Signature<br>簽名 |
|---------------------|------------|-----------------|----------------|-----------------|
| Ver.1               | 2017-11-14 | 初版發行            |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |
|                     |            |                 |                |                 |

Remark/備註：

# Contents

## 目錄

|          |                                           |           |
|----------|-------------------------------------------|-----------|
| <b>1</b> | <b>Product Specification 樣品規格</b>         | <b>4</b>  |
| 1.1      | Product Name Code No. 品名編號                | 4         |
| 1.2      | Scope 適用範圍                                | 4         |
| 1.3      | Function 功能                               | 4         |
| 1.4      | Construction 結構                           | 5         |
| 1.5      | Environment Conditions 環境參數               | 5         |
| 1.6      | Optical Characteristics 光學特徵              | 5         |
| 1.7      | Mechanical Characteristics 機械特徵           | 5         |
| <b>2</b> | <b>Appearance Limit Standard 外觀檢驗標準</b>   | <b>6</b>  |
| 2.1      | Scope 適用範圍                                | 6         |
| 2.2      | Inspection Conditions 檢測條件                | 6         |
| 2.3      | Appearance Limit Standard 外觀檢驗標準          | 6         |
| <b>3</b> | <b>Reliant Condition 信賴性條件</b>            | <b>8</b>  |
| <b>4</b> | <b>Regulation of Marking Code 噴碼編號的規則</b> | <b>11</b> |

|                                  |    |
|----------------------------------|----|
| 5 Attachment 附件.....             | 12 |
| 5.1 Engineering Drawing 工程圖..... | 12 |
| 5.2 FPC Drawing FPC 工程圖.....     | 13 |

## Warranty

Products manufactured to these specifications shall be capable of meeting all characteristics from ATC'S delivery onwards or for a minimum period of 1 year of the customer received when stored and used as specified under normal conditions within the contents of these sheets.

### 保質期

此規格觸控式螢幕，從 ATC 出貨之日起，至少一年內應符合下列正常條件下的儲存和使用規格。

## 1 Sample Specification 樣品規格

### 1.1 Product Name Code No.: Capacitive Transparent Touch Panel

品名編號：電容性的透明輕觸面板

### 1.2 Scope 適用範圍

The purpose of this specification is to define the general provisions and quality requirements that apply to the supply of capacitive-type multi-touch function touch sensor module. This document, together with the Module Assembly Drawing, is the highest-level specification for this product. It describes the product, identifies supporting documents and contains specifications.

這份說明書的目的就是為multi-touch功能的觸摸感應模組提供常規規定和品質需求。這份檔和模組裝配圖紙是該產品的最高等級說明書，它包括產品介紹、支援檔和規格。

### 1.3 Function 功能

Touch sensor module is a capacitive-type that customer uses to compliance with flat panel display like TFT-LCD. Once user touches it by finger, the circuitry for this touch sensor indicates coordinates point at the contact point.

消費者將電容式觸摸感應模組用於類似 TFT-LCD 的平面顯示器上，當使用者用手指觸摸時，TOUCH SENSOR 電路就顯示出與觸摸位置對應的點。

### 1.4 Construction 結構

| Construction<br>結構            | Materials used<br>所用材料   | Code No.<br>編號 | Comment<br>注釋                                        |
|-------------------------------|--------------------------|----------------|------------------------------------------------------|
| Cover lens<br>面版              | toughened glass<br>鋼化玻璃  | 1.1            | Thickness : 1.1mm<br>厚度:1.1mm                        |
| Graphic overlay<br>OCA<br>透明膠 | Adhesive 粘膠              | 0.2            | Thickness : 0.2mm<br>厚度: 0.2mm                       |
| sensor<br>传感器                 | Conductive glass<br>导电玻璃 | 0.7            | Conductive glass ; Thickness: 0.7mm<br>导电玻璃；厚度：0.7mm |

### 1.5 Environment Conditions 環境參數

| Items 項目                                 | Value 值                  |
|------------------------------------------|--------------------------|
| Operating temperature & Humidity 工作溫濕度範圍 | -20℃ ~ +70℃: 45% ~ 85%RH |
| Storage temperature & Humidity 儲存溫濕度範圍   | -30℃ ~ +80℃: 45% ~ 85%RH |

### 1.6 Optical Characteristics 光學特徵

| Items 項目                     | Value 值                         |
|------------------------------|---------------------------------|
| Optical Characteristics 光學特性 | Transparency > 82%<br>透明度大於 82% |
| Hardness 表面硬度                | ≥ 6H                            |

### 1.7 Mechanical Characteristics 機械特徵

| Item 項目                | Description 描述                    | Unit 單位 |
|------------------------|-----------------------------------|---------|
| Touch Sensor Size 屏體尺寸 | 542.16 (L) × 318.44 (W)           | mm      |
| Outline Size 外形尺寸      | 572.60 (L) × 341.60 (W) × 2.0 (T) | mm      |
| View Area 可視區          | 522.10 (L) × 294.40 (W)           | mm      |
| Sensor Area 功能區        | 525.10 (L) × 297.40 (W)           | mm      |
| Input Type 輸入方式        | USB                               |         |
| Aspect Ratio 比例        | 16:9                              |         |

## 2 Appearance Limit Standard 外觀檢驗標準

### 2.1 Scope 範圍

Touch panel visible side. 產品的可視區

### 2.2 Inspection Conditions 檢測條件

(1) The brightness in text site:800-1200LUX

光照條件:800-1200LUX

(2) Inspection distance: 25-35cm

檢測距離:25-35cm

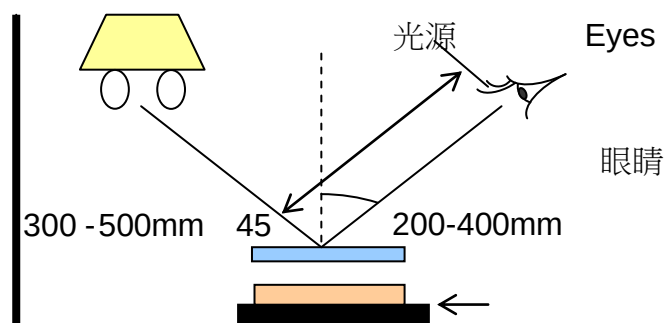
(3) Visual angle:>45 度

檢測角度: >45 度

(4) Light source: 40W natural light

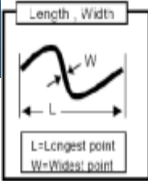
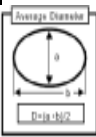
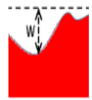
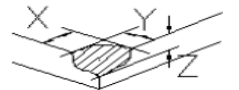
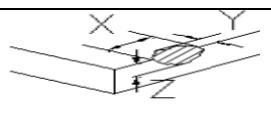
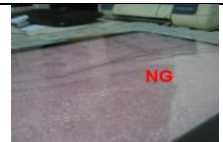
電源強度: 40W

A source of light ( 12-20W )



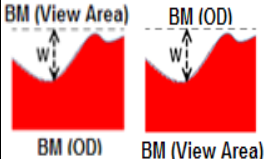
( Remark: D=diameter 直徑 ; L=length 長度 ; W=width 寬 ; GT=glass thickness 玻璃總厚 )

## 2.3 Appearance Limit Standard 外觀檢驗標準

| Type                                                                                              | Criteria on View Area (VA)                                                                                                                                                                                          | Criteria on Deco Area (BM)                                                                                                                                                                                                  |                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 線缺陷<br>(不可擦試異物, 刮傷)<br>Line Shape Defeat<br>(Threadlike / Scratch / Lint/ Fiber)                  | $W \leq 0.1\text{mm}$ : Ignore<br>$0.1\text{mm} < W \leq 0.2\text{mm}$ ,<br>$L \leq 10\text{mm}$ : $N \leq 3$<br>$0.2\text{mm} < W$ or<br>$L > 10\text{mm}$ : $N=0$<br>(Distance between defeats: $> 10\text{mm}$ ) | $W \leq 0.1\text{mm}$ : Ignore<br>$0.1\text{mm} < W \leq 0.2\text{mm}$ ,<br>$L \leq 10\text{mm}$ : $N \leq 3$<br>$0.2\text{mm} < W$ or<br>$L > 10\text{mm}$ : $N=0$<br>(Distance between defeats: $> 10\text{mm}$ )         |                                                                                          |
| 點缺陷<br>(汽泡/凹凸點/異色點)<br>Dot Shape Defeat<br>(Polarizer contamination Bubble / Dent / Dust / Stain) | $D \leq 0.25\text{mm}$ : Ignore<br>$0.25\text{mm} < D \leq 0.4\text{mm}$ :<br>$N \leq 4$<br>$0.4\text{mm} < D$ : $N=0$<br>(Distance between defeats: $> 10\text{mm}$ )                                              | $D \leq 0.3\text{mm}$ : Ignore<br>$0.3\text{mm} < D \leq 0.5\text{mm}$ : $N \leq 4$<br>$0.5\text{mm} < D$ : $N=0$<br>(Distance between defeats: $> 10\text{mm}$ )                                                           |       |
| 點缺陷<br>(不可擦試異物, 刮傷)<br>Dot Shape Defeat<br>(Non-removable fiber, Scratch)                         | $D \leq 0.25\text{mm}$ : Ignore<br>$0.25\text{mm} < D \leq 0.4\text{mm}$ : $N \leq 4$<br>$0.4\text{mm} < D \leq 0.5\text{mm}$ : $N \leq 2$<br>$0.5\text{mm} < D$ : $N=0$                                            | $D \leq 0.25\text{mm}$ : Ignore<br>$0.25\text{mm} < D \leq 0.4\text{mm}$ : $N \leq 4$<br>$0.4\text{mm} < D \leq 0.5\text{mm}$ : $N \leq 2$<br>$0.5\text{mm} < D$ : $N=0$                                                    |       |
| Light Sensor / Camera hole 點狀不良<br>Dot Defeat on Light Sensor / Camera hole                       | N/A                                                                                                                                                                                                                 | $D \leq 0.1\text{mm}$ : Ignore<br>$0.1\text{mm} < D \leq 0.15\text{mm}$ : $N \leq 2$<br>$0.15\text{mm} < D$ : $N=0$                                                                                                         |                                                                                          |
| Light Sensor / Camera hole 面內漏缺墨 Ink Defeat on Light Sensor / Camera hole                         | N/A                                                                                                                                                                                                                 | $W \leq 0.1\text{mm}$ , Length Ignore                                                                                                                                                                                       |                                                                                         |
| 油墨區針孔<br>Dot-Type Light Leakage on BM                                                             | N/A                                                                                                                                                                                                                 | $D \leq 0.2\text{mm}$ : Ignore<br>$0.2\text{mm} < D$ : Allowed to re-work with ink pen                                                                                                                                      | Inspect under WHITE background<br>超過則允許補墨                                              |
| 油墨區線狀漏光<br>Line-Type Light Leakage on BM                                                          | N/A                                                                                                                                                                                                                 | $W < 0.1\text{mm}$ , Length Ignore<br>$W \leq 0.15\text{mm}$ , $L \leq 20\text{mm}$ , Ignore<br>$W > 0.15\text{mm}$ and $L > 20\text{mm}$ , allowed to re-work with ink pen                                                 | Inspect under WHITE background<br>超過則允許補墨                                              |
| Logo Artwork 內點狀不良<br>Logo Artwork - Dot Defect                                                   | N/A                                                                                                                                                                                                                 | $D \leq 0.1\text{mm}$ , Ignore<br>$0.1\text{mm} < D \leq 0.15\text{mm}$ , 1EA/Letter<br>$D > 0.15\text{mm}$ , Reject                                                                                                        |                                                                                        |
| Logo Artwork 鋸齒狀不良<br>Logo Artwork - Saw Edge                                                     | N/A                                                                                                                                                                                                                 | $W \leq 0.3\text{mm}$ , Length Ignore                                                                                                                                                                                       |                                                                                        |
| Fish Eye (Pit)                                                                                    | N/A                                                                                                                                                                                                                 | $D \leq 0.2\text{mm}$ : Ignore<br>$0.2\text{mm} < D \leq 0.3\text{mm}$ : $N \leq 3$<br>$0.3\text{mm} < D \leq 0.4\text{mm}$ : $N \leq 2$<br>$0.4\text{mm} < D \leq 0.5\text{mm}$ : $N \leq 1$<br>$0.5\text{mm} < D$ : $N=0$ |   |
| Corner Chipping                                                                                   | N/A                                                                                                                                                                                                                 | $Y \leq 0.1\text{mm}$ , $X < 0.5\text{mm}$ , ignore<br>$0.1\text{mm} < Y < 0.3\text{mm}$ ,<br>$X < 1.5\text{mm}$ , 2EA/Edge                                                                                                 |                                                                                        |
| Side Chipping                                                                                     | N/A                                                                                                                                                                                                                 | $Y \leq 0.1\text{mm}$ , $X < 0.5\text{mm}$ , ignore<br>$0.1\text{mm} < Y < 0.3\text{mm}$ ,<br>$X < 1.5\text{mm}$ , 2EA/Edge                                                                                                 |                                                                                        |
| 保護膜皺折(背面)<br>Protective Film - Winkle (Back side)                                                 | Not Allowed                                                                                                                                                                                                         | Not Allowed                                                                                                                                                                                                                 |                                                                                        |

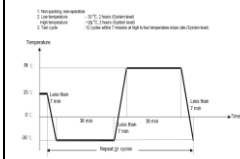


|                                                 |                                     |     |  |
|-------------------------------------------------|-------------------------------------|-----|--|
| Protective Film – Bubble<br>(Front & Back side) | D ≤ 10mm : Ignore<br>10mm < D : N=0 | N/A |  |
|-------------------------------------------------|-------------------------------------|-----|--|

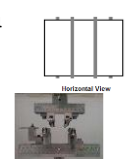
| Type                                               | Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Note                                                                                |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 印刷邊緣鋸齒/漏墨<br>(SAW/Ink Excess on Black Matrix (BM)) | Near TP View Area (VA):<br>W ≤ 0.2 mm, L ≤ 20mm: OK<br>W > 0.2mm or L > 20mm: N=0<br>Near TP Outline Dimension (OD):<br>W ≤ 0.3mm: OK<br>W > 0.3mm: N=0                                                                                                                                                                                                                                                                                                                                      |  |
| Glass Crack                                        | Not Allowed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| FPC -金手指<br>(Golden Finger)                        | Not allow one of the following conditions on surface<br>(Both sides)<br>- Scratches(刮伤)<br>-Oxidation (氧化)<br>-Solder wedding(沾锡)<br>-Dirty(脏污)<br>-Missing copper(漏铜)<br>-Dead-foil (死折痕)                                                                                                                                                                                                                                                                                                   |  |
| FPC -本体(Body)                                      | Not allow one of the following conditions on surface<br>(Both sides)<br>- Scratches(刮伤)<br>-Tear-off on border edge (FPC 边缘撕裂)<br>-Burr on FPC edge (FPC 边缘毛边)<br>-Improper/missing printing(漏印刷、印刷錯誤或無法辨視)<br>-Stiffener tilt from FPC(补强板翘起)<br>-Dead-foil (死折痕)                                                                                                                                                                                                                           |  |
| Dirty/Discoloration                                | Follow the limit sample                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                     |
| Cleanable Dirty                                    | Cleanable Dirty don't account into defect.<br>Cleanable Dirty(Use clean room special wiper,<br>dust-free clean cloth or dust-free cotton swab to take<br>moderate solvent<such as: IPA or Ethanol> and<br>other effective cleaning method can wipe the dirty)<br>The uncleanable dirty is invisible from front side after<br>assembly don't account into defect.<br>Defect judge standard:<br>The uncleanable dirty is visible from front side can judge<br>as the dot defect specification. |                                                                                     |
| Defeat on the back side of<br>touch screen         | All the defects on the back side invisible from front side<br>and not impact the assembly, ignore.                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                     |
| Other defeats                                      | The defects not be defined, follow limit sample                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                     |

### 3. Reliant Condition 信賴性條件

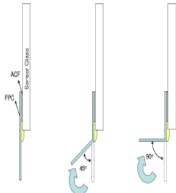
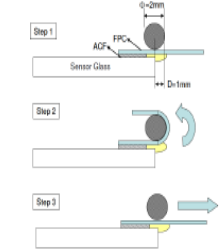
| Touch Panel Reliability Test Items and Criteria |                              |          |                                                                                                                                                                                                                                                 |      |
|-------------------------------------------------|------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|                                                 | Test Item                    | Qty(pcs) | Test Criteria                                                                                                                                                                                                                                   | Note |
| Storage                                         | High Temp./<br>High Humidity | 5        | Test Conditions:<br>- 70oC / 90%RH @ 240 hrs<br>Pass Criterion:<br>- No permanent cosmetic damage after test<br>- No functional failure after test<br>- No extremely loss of anti-blocking particles<br>(Need OM or 2.5D inspection after test) |      |
|                                                 | High<br>Temperature          | 5        | Test Conditions:<br>- 70oC @ 240 hrs<br>Pass Criterion:<br>- No permanent cosmetic damage after test<br>- No functional failure after test<br>- No extremely loss of anti-blocking particles<br>(Need OM or 2.5D inspection after test)         |      |

|  |                 |   |                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |
|--|-----------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  | Low Temperature | 5 | Test Conditions: -30oC @ 240 hrs<br>Pass Criterion: <ul style="list-style-type: none"> <li>- No permanent cosmetic damage after test</li> <li>- No functional failure after test</li> <li>- No extremely loss of anti-blocking particles (Need OM or 2.5D inspection after test)</li> </ul>                                                                                                              |                                                                                     |
|  | Thermal shock   | 5 | Test Conditions: <ol style="list-style-type: none"> <li>1. -30oC, 30 min --&gt; 70oC, 30 min (Per cycle)</li> <li>2. Total: 25 cycles</li> </ol> Pass Criterion: <ul style="list-style-type: none"> <li>- No permanent cosmetic damage after test</li> <li>- No functional failure after test</li> <li>- No extremely loss of anti-blocking particles (Need OM or 2.5D inspection after test)</li> </ul> |  |

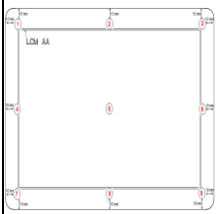
## Touch Panel Strength Test Items and Criteria

|                                                                  | Test Item                           | Qty (pcs) | Test Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Note                                                                                                                                                                                                      |
|------------------------------------------------------------------|-------------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Glass Strength                                                   | Ball-drop Test                      | 5 ~ 10    | Test Condition: <ol style="list-style-type: none"> <li>1. Test on touch panel only (W/O LCM)</li> <li>2. Steel ball weight: 130g</li> <li>3. Ball-drop start from 20cm, follow sequence to drop each test point</li> <li>4. If all 5 point didn't cause TP break, increase 10 cm and repeat step 2 until broken</li> </ol> Pass Criterion: <ul style="list-style-type: none"> <li>- Affordable impact <math>\geq</math> 20 cm</li> </ul>                                                                                                                                                                                                                               | Need to provide real test data <ul style="list-style-type: none"> <li>- Per pcs</li> <li>- Average value</li> </ul>    |
|                                                                  | 4-point Bending Test                | 5 ~ 10    | Test Condition: <ol style="list-style-type: none"> <li>1. Test on touch panel only (W/O LCM)</li> <li>2. Speed = 10 mm / min</li> <li>3. Copper Stick Diameter: 6 mm</li> <li>4. Test method: 54 mm / 108 mm (Horizontal)</li> </ol> Pass Criterion: <ul style="list-style-type: none"> <li>- Affordable DOL: <math>\geq</math> 200 Mpa</li> </ul>                                                                                                                                                                                                                                                                                                                     | Need to provide real test data <ul style="list-style-type: none"> <li>- Per pcs</li> <li>- Average value</li> </ul>  |
|                                                                  | Display Hardness Test               | 5         | Test Conditions: Refer to ASTM D3363 Standard Test Method <ol style="list-style-type: none"> <li>1. Test Material:               <ul style="list-style-type: none"> <li>- Pencil classification: 7H~6B</li> <li>- Sandpaper: #400 grid</li> </ul> </li> <li>2. Test Condition:               <ul style="list-style-type: none"> <li>- Loading: 750g, - Angle: 45°</li> <li>- Position: VA area of test samples</li> <li>- length of the stroke: 6.5mm</li> </ul> </li> </ol> Pass Criterion: <ul style="list-style-type: none"> <li>Glass <math>\geq</math> 7H after test (W/O any scratch)</li> <li>PMMA <math>\geq</math> 3H after test (W/O any scratch)</li> </ul> |                                                                                                                      |
| AF Coating (For touch panel equip with Anti-finger coating only) | Water Contact angel Validation Test | 5         | Test Liquid: Pure water<br>Test Conditions: <ol style="list-style-type: none"> <li>1. Before abrasion test: Measure contact angle</li> <li>2. Then abress surface with AF coating               <ul style="list-style-type: none"> <li>- Material: Steel wool #0000</li> <li>- Test area: 20mm x 20mm</li> <li>- Loading: 500g, - Test times: 40 cycles/min</li> </ul> </li> </ol> Pass Criterion: <ul style="list-style-type: none"> <li>- Contact angle <math>&gt;105^\circ</math> (Before 2000-cycle abrasion test)</li> <li>- Contact angle <math>&gt;100^\circ</math> (After 2000-cycle abrasion test)</li> </ul>                                                 | Need to provide real test data                                                                                                                                                                            |

|  |                                                 |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                   |
|--|-------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
|  | Oleic<br>Contact<br>angel<br>Validation<br>Test | 5 | <p>Test Liquid:</p> <ul style="list-style-type: none"> <li>- Oleic acid (18:1)</li> <li>- IUPAC name: (Z)-Octadec-9-enoic acid</li> <li>- Formula: <math>C_{18}H_{34}O_2</math></li> </ul> <p>Test Conditions:</p> <ol style="list-style-type: none"> <li>1. Before abrasion test: Measure contact angle</li> <li>2. Then abress surface with AF coating <ul style="list-style-type: none"> <li>- Material: Steel wool #0000</li> <li>- Test area: 20mm x 20mm</li> <li>- Loading: 500g, - Test times: 40 cycles/min</li> </ul> </li> </ol> <p>Pass Criterion:</p> <ul style="list-style-type: none"> <li>- Contact angle &gt;65° (Before 2000-cycle abrasion test)</li> <li>- Contact angle &gt;60° (After 2000-cycle abrasion test)</li> </ul> | Need to provide<br>real test data |
|--|-------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|

| Touch Panel FPC Test Items and Criteria |                     |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                       |
|-----------------------------------------|---------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                         | Test Item           | Qty (pcs) | Touch Panel FPC Test Items and CriteriaTest Criteria                                                                                                                                                                                                                                                                                                                                                                                                     | Note                                                                                  |
|                                         | Direct Pulling Test | 5         | <p>Test Conditions:</p> <ol style="list-style-type: none"> <li>1. Pulling weight: 500g.</li> <li>2. Pulling speed: 25 mm/min</li> <li>3. Pulling angle: 90o</li> <li>4. After test, verify touch panel functionality via test jig</li> </ol> <p>Pass Criterion:</p> <ul style="list-style-type: none"> <li>- No damage of FPC itself</li> <li>- No any peeling on FPC located on bonding pad area</li> <li>- No functional failure after test</li> </ul> |    |
|                                         | Bending test        | 5         | <p>Test Conditions:</p> <ol style="list-style-type: none"> <li>1. 45 degree bending: 100 times</li> <li>2. 90 degree bending: 200 times</li> <li>3. After test, verify touch panel functionality via test jig</li> </ol> <p>Pass Criterion:</p> <ul style="list-style-type: none"> <li>- No damage of FPC itself</li> <li>- No any peeling on FPC located on bonding pad area</li> <li>- No functional failure after test</li> </ul>                     |   |
|                                         |                     | 5         | <p>Test Conditions:</p> <ol style="list-style-type: none"> <li>1. Flex bending: 30 cycles<br/>(Each cycle: 0o -&gt; 180o --&gt; 0o)</li> <li>2. After test, verify touch panel functionality via test jig</li> </ol> <p>Pass Criterion:</p> <ul style="list-style-type: none"> <li>- No damage of FPC itself</li> <li>- No any peeling on FPC located on bonding pad area</li> <li>- No functional failure after test</li> </ul>                         |  |

| Touch Panel EMC Test Item and Criteria |                    |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                |
|----------------------------------------|--------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|                                        | Test Item          | Qty (pcs) | Test Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Note                                                                           |
|                                        | ESD on Touch Panel | 1         | <p>Test Condition:</p> <p>Normal</p> <ul style="list-style-type: none"> <li>- Air discharge: ±10KV (±2KV, ±4KV, ±8KV, ±10KV)</li> <li>- Contact discharge: ±8KV (±2KV, ±4KV, ±6KV, ±8KV)</li> </ul> <p>Marginal (For reference only)</p> <ul style="list-style-type: none"> <li>- Air discharge: ±20KV (±12KV, ±14KV, ±16KV, ±18KV, ±20KV)</li> <li>- Contact discharge: ±10KV</li> </ul> <p>Test Procedure:</p> <ul style="list-style-type: none"> <li>- Test on front surface of touch panel only<br/>(No need to connect to TP controller board)</li> <li>- Test Point: 9 (Face to user side) <ul style="list-style-type: none"> <li>- Each test point aware of TP OD 10 mm</li> <li>- Each test point hit ESD 10 times</li> </ul> </li> </ul> | <p>2 pcs for ESD air discharge test</p> <p>2 pcs for ESD contact discharge</p> |

|  |  |  |                                                                                                                                                                                                                                         |                                                                                             |
|--|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
|  |  |  | Validation:<br>- After ESD test, connect tested TP into test jig and run test program to verify TP function<br>Pass Criterion:<br>- No ITO pattern, metal trace or metal bridge broken after test<br>- No functional failure after test | test<br> |
|--|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|

| Touch Panel Carton/Package Test Items and Criteria |                           |           |                                                                                                                                                                                                                                                                                                                                                                                        |      |
|----------------------------------------------------|---------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|                                                    | Test Item                 | Qty (pcs) | Test Criteria                                                                                                                                                                                                                                                                                                                                                                          | Note |
|                                                    | Simulation Vibration Test | 1         | Test Conditions:<br>1. Truck mode: 0.52G/rms, 20 mins/axis (X/Y/Z axis)<br>2. Rail mode: 0.29G/rms, 20 mins/axis (X/Y/Z axis)<br>3. Air mode: 1.05G/rms, 20 mins/axis (X/Y/Z axis)<br>Pass Criterion:<br>- No visible damage to the sample<br>- Product has to pass all the functional check after the completion of the test<br>- Control board and FPC connection is kept in package |      |
|                                                    | Vibration Test            | 1         | Test Conditions:<br>1. Acceleration: 14.7 m/sec (1.5G)<br>2. Frequency: 5 - 500 Hz<br>3. Duration: 15 minutes<br>Pass Criterion:<br>- No visible damage to the sample<br>- Product has to pass all the functional check after the completion of the test<br>- Control board and FPC connection is kept in package                                                                      |      |
|                                                    | Drop Test With Package    | 1         | Test Conditions:<br>60 cm, 1 corner, 3 edges, 6 faces<br>Pass Criterion:<br>- No visible damage to the sample<br>- Product has to pass all the functional check after the completion of the test<br>- Control board and FPC connection is kept in package                                                                                                                              |      |

| Touch Panel Optical Test Items and Criteria |                                                          |           |                                                                                                                                                                                              |      |
|---------------------------------------------|----------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|                                             | Test Item                                                | Qty (pcs) | Test Criteria                                                                                                                                                                                | Note |
|                                             | Transmittance and color shift on Touch panel Active Area | 1         | Refer to ASTM C1649:<br>- 08 Standard Practice for Instrumental Transmittance Measurement<br>Pass Criterion:<br>1. CCT +/- 100K<br>or<br>2. Reflection  a*  <= 0.5<br>Reflection  b*  <= 3.0 |      |
|                                             | Haze (Active Area)                                       |           | Pass Criterion: <= 2.5 %                                                                                                                                                                     |      |

#### 4. Attachment 附件

##### 4.1 Engineering Drawing 工程圖