

Specification

Module No. : GEA-070E01-DC9509-G020

Version No. : A2

Client Confirmation	Approved by	Prepared by
	Carl Chen	Dou Zhang

Issue History

Version	History	Date	Remarks
A1	First Issue	2020/01/13	
A2	Updated 2. Feature & 3.Electrical Specifications & 5. Reliability Test & 6. Label, Package and Firmware Version; Removed 7. Quality Guarantee & 8. Miscellaneous & 9. Display Specification; Added 7.Mechanical Drawing.	2023/04/14	

CONTENTS

1. Purpose	4
2. Feature	5
2.1 Module Structure	5
2.2 General Specifications	5
3. Electrical Specifications	6
3.1 Display Electrical Specifications	6
3.1.1 TFT LCD Module Electrical Specification	6
3.1.2 Backlight Unit	7
3.1.3 Electrical Interface Connection	8
3.1.4 Display Timing Specifications	9
3.1.5 Power ON/OFF Sequence	10
3.2 Touch Panel Interface Connection	11
3.2.1 Interface Connection	11
3.2.2 Connector Pins Definition	11
3.2.3 I ² C Interface	11
4. Optical Specifications	12
4.1 Display Optical Characteristics	12
4.2 Module Appearance Specifications	14
4.2.1 Terms Definition	14
4.2.2 Inspection Conditions	15
4.2.3 Printing Area Appearance Inspection Criteria	16
4.2.4 View Area Appearance Inspection Criteria	17
4.2.5 Glass Breakage	19
5. Reliability Test	20
6. Label, Package and Firmware Version	21
6.1 Label	21
6.1.1 Product Label Information	21
6.1.2 Product Label Size and Position	21
6.2 Package	22
6.2.1 Packaging Steps	22
6.2.2 Carton Information:	22
6.3 Firmware Version	22
7. Mechanical Drawing	23

1. Purpose

This specification document is issued for the Capacitive-Type Touch Panel with BOE Display delivered by General Electrical Touch Co., Limited. This document defined the general provisions (including structure, performance, characteristics and quality guarantee) for the specific module listed at the front page of this document. In the event of conflict between this document and other documents, this document including the attachments and drawing, is highest-level specification for this products.

Here we confirm that all components into our Touch Modules are ROHS and REACH Conform.

2. Feature

2.1 Module Structure

Main Component	Materials	Remarks
Cover Glass	2mm Chemical Toughened Glass	Black Organic Printing
Adhesive	OCA	0.175 mm
Touch Sensor	0.55mm DITO glass + COF FPC	SIS9509 Controller
Air Bonding Tape	3M 4905	0.50mm
Display	TFT LCD	BOE GT070WVM-N10

2.2 General Specifications

Item	Specifications	Remark
Display Active Area	154.08(H) × 85.92(V) mm	
Display Resolution	800(H) × 480(V)	
Pixel Pitch	0.1926(H) × 0.179(V) mm	
Pixel Arrangement	R.G.B. Vertical Stripe	
Display Colors	16.7M Colors	8bit
Display Luminance of White	500 cd/m ²	Min. 400
Display Mode	Normally White	
Display Surface Treatment	Haze 25%, 3H	
Electrical Interface	Display: LVDS	
	Touch: USB and I ² C	
Touch Activation	Multi-finger touch	
Touch Resolution	14X, 23Y	
Touch Controller	SIS9509	
Bonding Method	CG to touch sensor: optical bonding TP module to display: tape bonding	
Outline Dimension	184.00(H) × 128.00(V) × 8.93 mm	

3. Electrical Specifications

3.1 Display Electrical Specifications

3.1.1 TFT LCD Module Electrical Specification

[Ta=25±2℃]

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
Power Supply Input Voltage	V _{DD}	3.0	3.3	3.6	V	Note 1
Power Supply Current	I _{DD}	-	520	700	mA	
Positive-going Input Threshold Voltage	V _{IT+}	-		+100	mV	V _{com} = 1.2V typ.
Negative-going Input Threshold Voltage	V _{IT-}	-100		-	mV	
Differential input common mode voltage	V _{com}		1.2		V	V _{IH} =100mV, V _{IL} =-100mV

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 °C Max value at Black Pattern.

3.1.2 Backlight Unit

[Ta=25±2℃]

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power supply voltage for Back light		V _{LED}	8.1	9.3	9.9	V
Power supply Current for Back light		I _{LED}	-	160	-	mA
Power supply for Back light		P _{LED}	1.296	1.488	1.584	W
EN Control Level	Backlight on	V _{ENH}	2	-	-	V
	Backlight off	V _{ENL}	-	-	0.6	V
PWM Control Level	PWM High Level	V _{PML}	2	-	-	V
	PWM Low Level	V _{PML}	-	-	0.6	V
PWM Control Frequency		F _{PWM}	0.12	-	1	KHz
Duty Ratio		-	5	-	100	%

Notes:

1. Calculator Value for reference I_{LED} × V_{LED} = P_{LED}.
2. The LED Life-time define as the estimated time to 50% degradation of initial luminous under the condition of the ambient temperature of 25℃.

3.1.3 Electrical Interface Connection

The electronics interface connector is FH34S_20P-0.5mm.

Terminal	Symbol	Functions	Terminal	Symbol	Functions
Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	LEDA	Led anode	26	G1	Green data
2	LEDA	Led anode	27	G0	Green data
3	LEDK	Led cathode	28	R7	Red data
4	LEDK	Led cathode	29	R6	Red data
5	GND	Ground	30	R5	Red data
6	VCOM	Common voltage input	31	R4	Red data
7	VDD	Power Supply	32	R3	Red data
8	MODE	DE / SYNC mode select	33	R2	Red data
9	DE	Data Input Enable	34	R1	Red data
10	VS	Vertical Sync input.	35	R0	Red data
11	HS	Horizontal Sync input	36	GND	Ground
12	B7	Blue data	37	DCLK	Data clock
13	B6	Blue data	38	GND	Ground
14	B5	Blue data	39	L/R	Source Right or Left sequence control
15	B4	Blue data	40	U/D	Gate Up or Down scan control
16	B3	Blue data	41	VGH	Positive power of TFT
17	B2	Blue data	42	VGL	Negative power of TFT
18	B1	Blue data	43	AVDD	Analog power supply
19	B0	Blue data	44	RESET	Global reset pin.
20	G7	Green data	45	DUMMY	No Connection
21	G6	Green data	46	VCOM	Common voltage input
22	G5	Green data	47	DITHB	Disable internal dithering function.
23	G4	Green data	48	GND	Ground
24	G3	Green data	49	DUMMY	No Connection
25	G2	Green data	50	DUMMY	No Connection

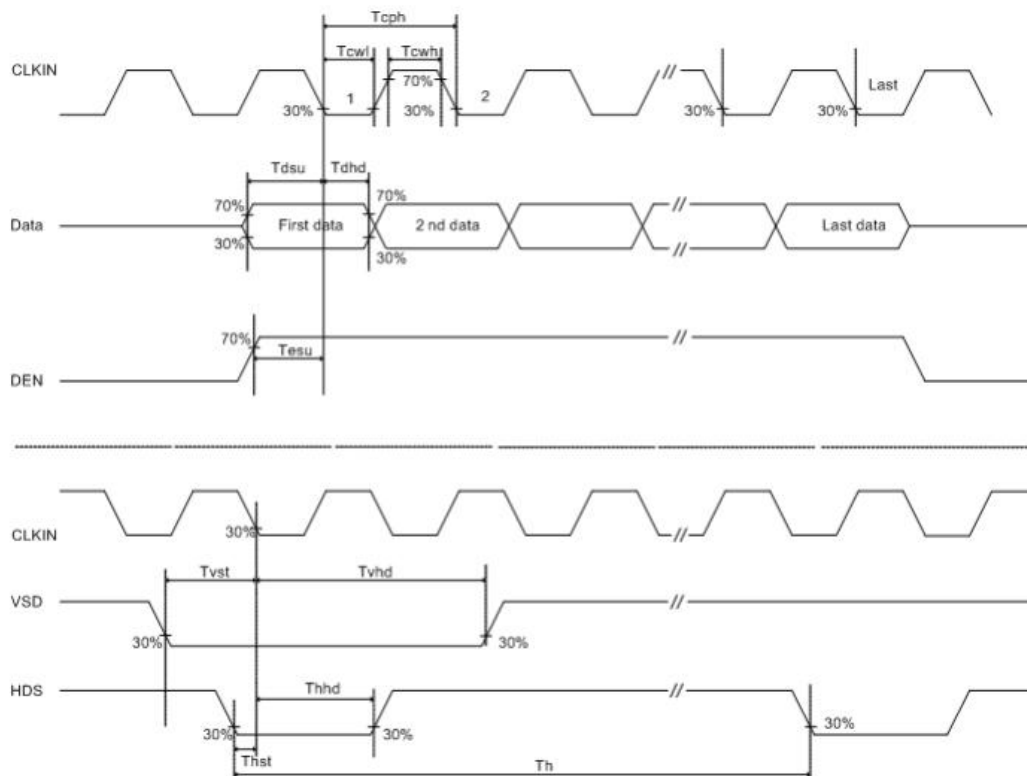
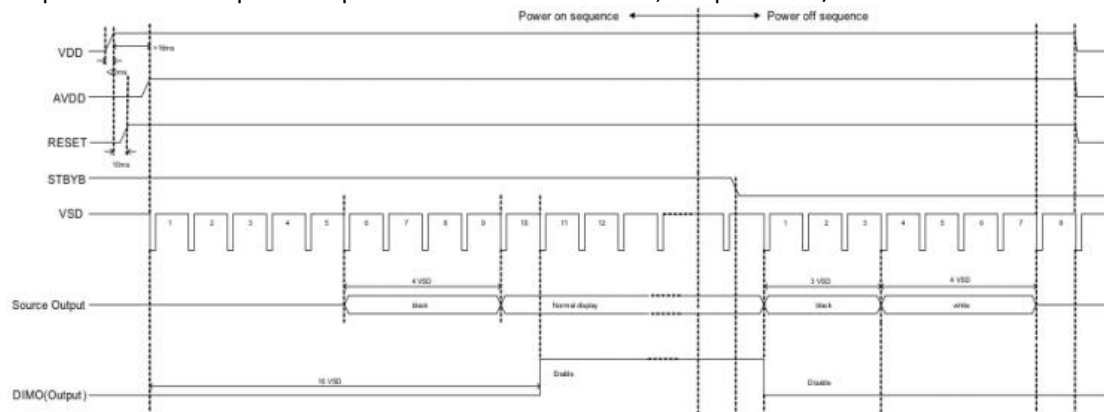
3.1.4 Display Timing Specifications

The display is operated by the DE only.

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	28.2	29.2	40	MHz
Horizontal display area	thd	800			pixel
HSYNC period time	th	908	928	1088	pixel
HSYNC blanking	thb+ thfp	88	88	88	pixel
Vertical display area	Tvd	480			H
Frequency	fV	-	60	-	Hz
VSYNC period time	Tv	517	525	613	H
VSYNC blanking	Tvb+ Tvfp	-	32	-	H

3.1.5 Power ON/OFF Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off.



3.2 Touch Panel Interface Connection

3.2.1 Interface Connection

Item	Specification	Remarks
FPC type	COF	
Connector	USB-MINI-B	
	Molex 53261-1071	or compatible
Communication	USB and I ² C	

3.2.2 Connector Pins Definition

<Molex 53261-1071 Pins Definition>

Pin	Definition	Description
1	V _{CC}	5V
2	USB Data+	
3	USB Data-	
4	SDA	I ² C serial data
5	SCL	I ² C serial clock
6	INT/CHG	Interrupt pin sending request to HOST
7	Reset	Low active power on reset signal
8	GPIO0	General purpose input/output port
9	GND	
10	GND-Shielding	

3.2.3 I²C Interface

Slaver address	0x5c(7-bits addressing, programmable)
Clock rate	@400 kHz(fast mode)
Interrupt mode	Default active low, level trigger
_CID	PNP0C50
_DSM	3CDF6F7-4267-4555-AD05-B30A3D8938DE
HID Descriptor address	0x0000

4. Optical Specifications

4.1 Display Optical Characteristics

The test of optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature $=25\pm 2^{\circ}\text{C}$) with the equipment of Luminance meter system (Goniometer system and TOPCONE PR730) 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 $\theta_{\phi=0}$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta_{\phi=90}$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta_{\phi=180}$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta_{\phi=270}$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or ϕ , the center of the measuring spot on the display surface shall stay fixed. The measurement shall be operating for 10 minutes prior to measurement. VDD shall be $3.3\pm 0.3\text{V}$ 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	-	70	-	Deg.	Note 1
		Θ_9		-	70	-	Deg.	
	Vertical	Θ_{12}		-	70	-	Deg.	
		Θ_6		-	70	-	Deg.	
Luminance Contrast ratio		CR	$\Theta = 0^\circ$	400	600	-		Note 2
Luminance of White	Center	Y_w	$\Theta = 0^\circ$	400	500	-	cd/m ²	Note 3
White Luminance uniformity	9 Points	ΔY_9		70	75	-	%	Note 4
Color Gamut	NTSC	CIE1931	$\Theta = 0^\circ$	45	50	-	%	Note 5
Reproduction of color	White	W_x	$\Theta = 0^\circ$	Typ	0.313	Typ		
		W_y		-0.05	0.329	+0.05		
Response Time		Tr+Td	Ta= 25° C $\Theta = 0^\circ$	-	25	30	ms	Note 6

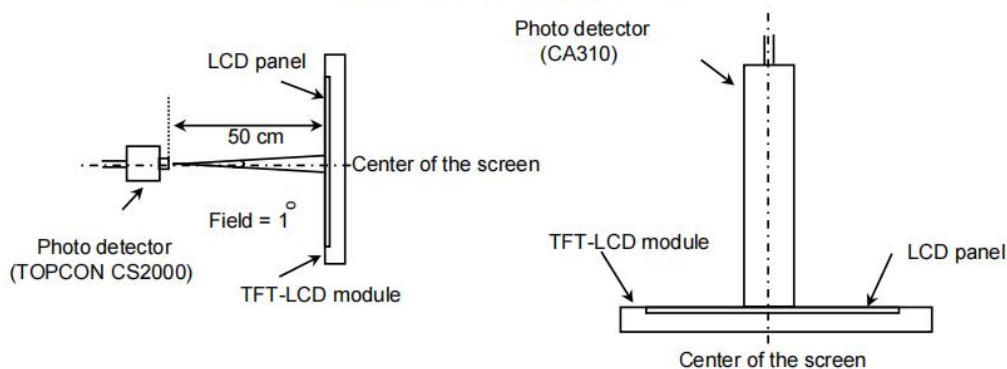
Note:

- Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing is 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).
- Contrast measurements shall be made at viewing angle of $\Theta=0^{\circ}$ 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 luminance values of center of 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. The luminance is measured by CS2000/CA310 when the LED current is set at 160mA.
4. The White luminance uniformity on LCD surface is then expressed as: $\Delta Y = \text{Minimum Luminance of 9 Points points} / \text{Maximum Luminance of 9 Points points}$ (See Figure 2).
5. The color chromatically coordinates specified in table above 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 electrode-optical response time measurements shall be made as Figure 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_r , and 90% to 10% is T_d .

Figure 1. Measurement Set Up



View angel range, uniformity, etc. measurement setup Flicker, measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (9 points)

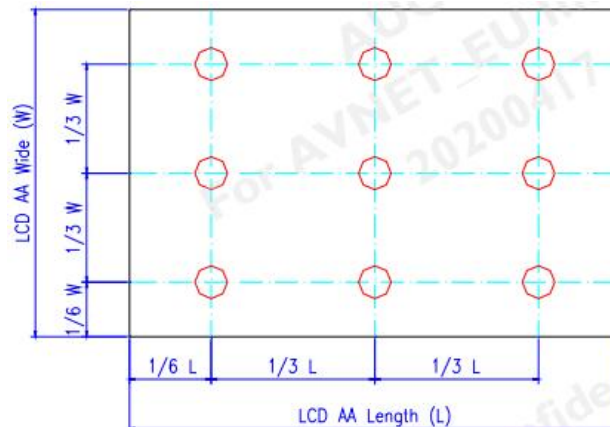
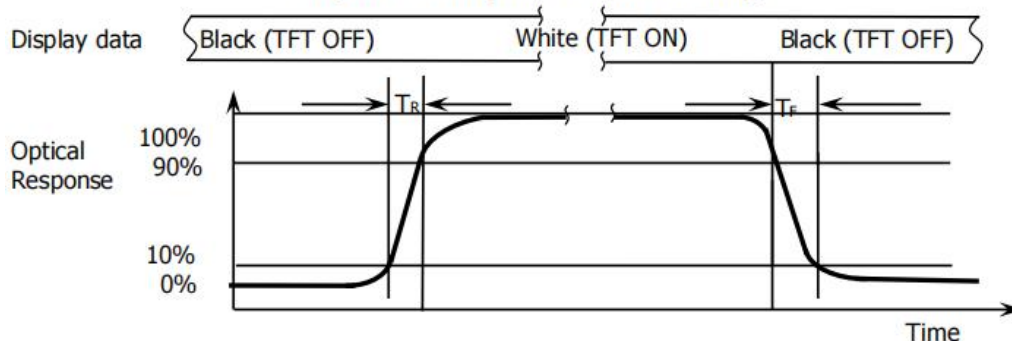
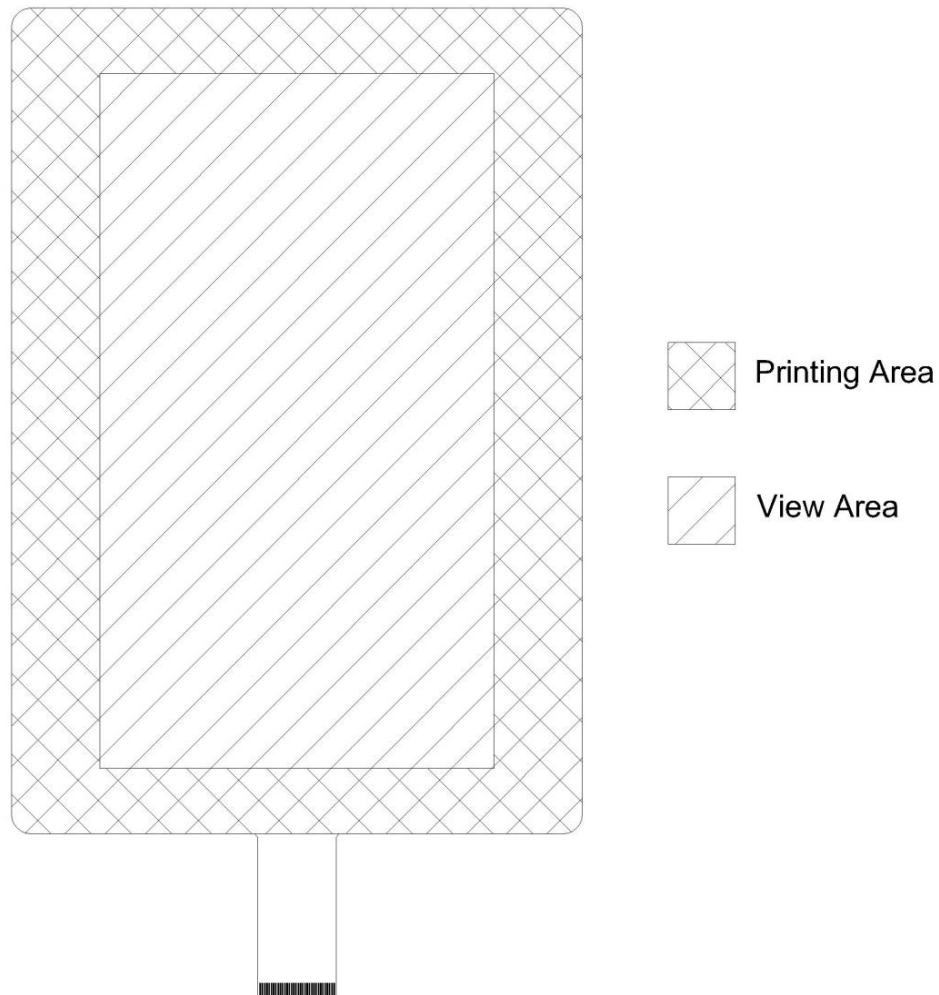


Figure 3. Response Time Testing

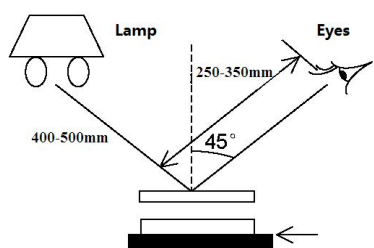
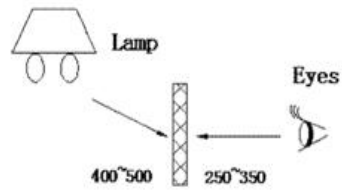


4.2 Module Appearance Specifications

4.2.1 Terms Definition



4.2.2 Inspection Conditions

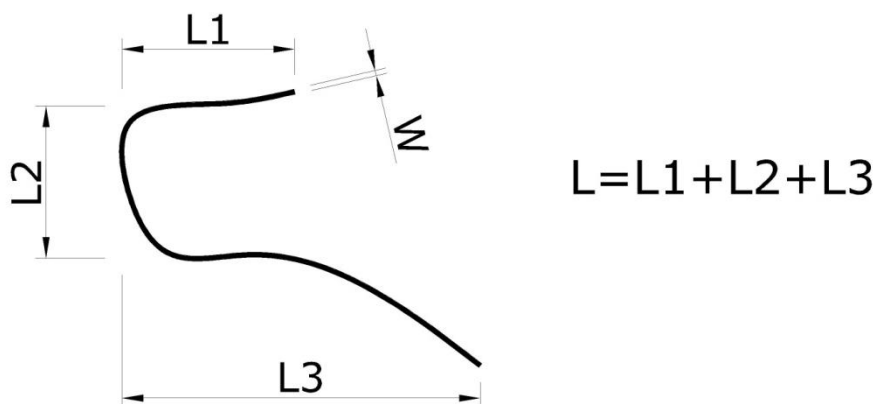
Items	Conditions	Remarks
Inspection Lamp	Florescent Cool White Lamp, 1000~1200Lux	
Inspection with Reflect Light (RL)	*Normal eyes level 1.0 (with Glasses accepted); *Distance between Lamp and product:40-50cm; *Distance between Eyes and Product:25-35cm; *Angle of view: 45°; *Black background; *Inspection time no more than 10s.	
Inspection with Through Light (TL)	*Normal eyes level 1.0 (with Glasses accepted); *Distance between Lamp and Product: 40-50cm; *Distance between Eyes and Product: 25-35cm; *Angle of view: 45°; *Black background; *Inspection time no more than 10s.	

4.2.3 Printing Area Appearance Inspection Criteria

Items	Conditions	Inspection Criteria	Method
Light Transparent Hole/Light Leakage	TL	Not Allowed (Repaired with black marker pen at the back side can be accepted.)	Eye view
Ink Off	TL	Not Allowed	Eye view
Stain and Dirty Mark	RL	*Stain and dirty mark refer to visible sheet contamination; the non-cleanable stain should be inspected as "Dot-like Defects". *Contamination cannot be cleaned by soft cloth and alcohol, Not Allowed; *Contamination can be cleaned by soft cloth and alcohol, Accept; but if the ratio of such contamination defected products is more than 10% of all the inspected products, Not Allowed;	Eye view
Liner-like Defects	RL	Refer to 4.2.4 Liner-like Defects.	Eye view, dot/wire gauge
Dot-like Defects	RL	Refer to 4.2.4 Dot-like Defects.	Eye view, dot/wire gauge
Logo/ Letter	RL	*Logo Break; Not Allowed *within a shaping printing $< 120 \text{ mm}: \pm 0.10$ $\geq 120 \text{ mm} < 400 \text{ mm}: \pm 0.15$ $\geq 400 \text{ mm}: \pm 0.25$ *between shaping printing(offset to 2nd, 3rd, etc. color) $< 400 \text{ mm}: \pm 0.30$ $\geq 400 \text{ mm}: \pm 0.50$	Eye view, dot/wire gauge

4.2.4 View Area Appearance Inspection Criteria

(W=Width, L=Length)



<Liner-like Defects>

Condition	Width(mm)	Length(mm)	Criteria
RL	$W \leq 0.03$	Not limited	*Accept QTY: not limited.
	$0.03 < W \leq 0.05$	$L \leq 10$	*Accept QTY: not more than 4; *Not allowed if the distance between 2 objects is less than 20 mm.
	$0.05 < W \leq 0.08$	$L \leq 10$	*Accept QTY: not more than 2; *Not allowed if the distance between 2 objects is less than 20 mm.
	$W > 0.08$	$L > 10$	*Not allowed.
	Liner-like Defects including: Liner Foreign Object/Scratch.		

< Dot-like Defects>

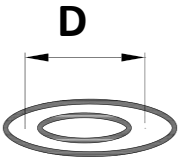
(D=Diameter)

Condition	Average Diameter(mm)	Criteria
RL	$D \leq 0.15$	*Not limited.
	$0.15 < D \leq 0.20$	*Accept Qty: not more than 8; *Not allowed if the distance between 2 defects is less than 20mm.
	$0.20 < D \leq 0.30$	*Accept Qty: not more than 3; *Not allowed if the distance between 2 defects is less than 20mm.
	$D > 0.30$	*Not allowed.
	Dot-like Defects including: Foreign Objects/Stab.	

< Stain and Dirty Mark>

Condition	Criteria
RL	* Stain and Dirty Mark refer to the visible contamination in mass, Dot-like contamination should be inspect as "Dot-like Defects"; *Contamination cannot be clean by soft cloth and alcohol, Not Allowed; *Contamination can be clean by soft cloth and alcohol, Accept; but if the ratio of such defected products are more than 10% of all the inspected products, Not Allowed.

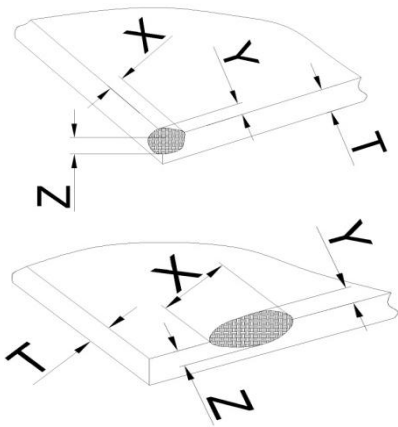
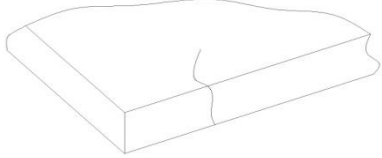
< Surface Fisheye>

Condition	Average Diameter(mm)	Criteria	Remarks
RL	$D \leq 0.15$	*Accept QTY: not more than 3; * Not allowed if the distance between 2 objects is less than 50 mm.	
	$0.15 < D \leq 0.30$	*Accept Qty: not more than 2; * Not allowed if the distance between 2 objects is less than 50 mm.	
	$0.30 < D \leq 0.50$	*Accept Qty: not more than 1.	
	$D > 0.50$	*Not allowed.	

<Defects of back side, locates outside the View Area>

The Appearance defects, such as Scratch, Foreign Object, Stain and Dirty-mark, on the backside of Module not lead to the performance failure	Accept
FPC and sensor pin bonding migration not more than pin width 1/2	Accept
Scratches on bonding area on silver	Not Allowed
Mechanical damages on FPC(dent/kink)	Not Allowed
Glue residue, broken and oxidation on gold fingers	Not Allowed

4.2.5 Glass Breakage

Items	Criteria	Remarks
Corner/ Edge Breakage	$*(X+Y)/2 < 0.3 \text{ mm}$, $Z < 1/3T \text{ mm}$; distance between 2 defects more than 5 mm; *Accept QTY: not more than 3.	
Crack	Not Allowed.	

5. Reliability Test

The reliability test items and its conditions are shown in below.

No	Test Items	Conditions
1	High temperature storage test	Ta =80℃, 240 hrs
2	Low temperature storage test	Ta =-30℃, 240 hrs
3	High temperature & high humidity operation test	Ta =60℃, 90%RH, 240hrs
4	High temperature operation test	Ta =70℃, 240hrs
5	Low temperature operation test	Ta =-20℃, 240hrs
6	Thermal shock (non-operating)	Ta = -30℃ ↔ 80℃ (0.5hr), 100 cycle
7	Vibration test (non-operating)	Random: 0.015G ² /Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ 8H
8	Image Sticking	5*5 Pattern, 2hrs 25±2℃ check pattern Gray 127, after 5 mins, the mura must be disappeared completely
9	ESD test	Air Voltage: ±15KV Contact Voltage: ±8KV R: 330Ω C: 150pF 5 times
10	Impact Resistance	Steel ball: 64 g Height: 30 cm

Note: After the reliability test, the product only guarantee function normally without any fatal defect (non-display, line defect, abnormal display etc). All the cosmetic specification is judged before the reliability test.

6. Label, Package and Firmware Version

6.1 Label

6.1.1 Product Label Information



GEA-070E01-DC9509-G020

Product code.

SMT-DA-070N000-SU9509-5-3

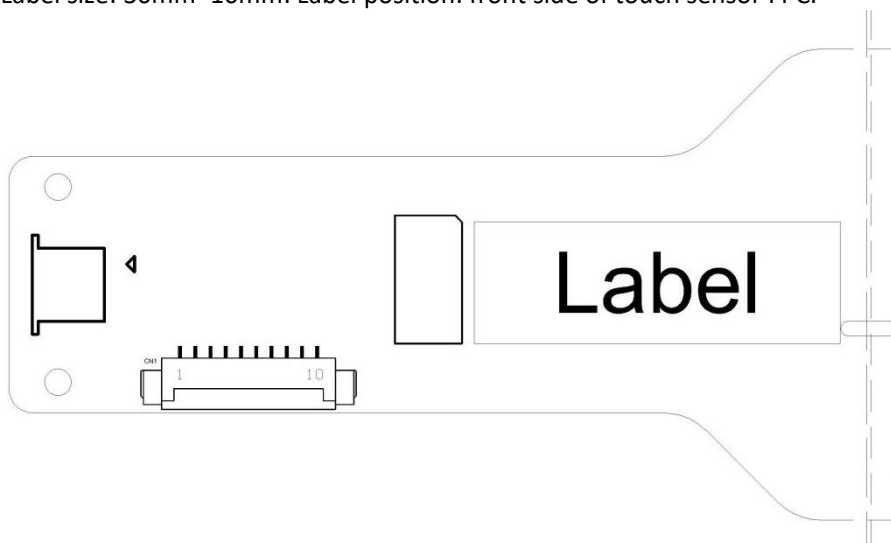
Touch sensor type for test.

07023150001EDC2

070: product active area size 2315: YYWW 0001: series number SISP: internal code

6.1.2 Product Label Size and Position

Label size: 30mm*10mm. Label position: front side of touch sensor FPC.



6.2 Package

6.2.1 Packaging Steps

TBC

6.2.2 Carton Information:

Size	55*40*25 (L*W*H)	cm
Product QTY of full box	TBC	PCS
Total weight	TBC	kg
Single product weight	TBC	kg

6.3 Firmware Version

Fw_7_dual.bin



Fw_7_dual.bin

7. Mechanical Drawing

