

# Product Information

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# TRIO-RT

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**T**ransmissive and **R**eflective **I**lluminations **O**ptimized  
**R**esistive **T**ouch Panel  
Transflective and Direct Sunlight Readable When Integrated With  
**TrioLCD**

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## 1. FEATURES OF TRIO- RESISTIVE TOUCH PANEL

Type	4 & 5 -Wire Analog Resistive Touch Panel		
Structure	Material	Thickness	Type
	ITO/PET	188um	Non-Glare Or Anti-Reflective
	ITO/GLASS	T-0.35mm	Normal Type
Input Mode	Stylus or Finger		
Connector	FPC		
Reflectance	Sunlight Reflectance < 1%		
Outdoor Readability	Transflective when integrated with TrioLCD and Direct Sunlight Readable		

## 2. GENERAL SPECIFICATIONS

Description Item		Specification unit: mm, unless otherwise noted
(1)	Frame Area	FFF.FF ±0.30 X FFF.FF ±0.30
(2)	View Area	VVV.VV ±0.20 X VVV.VV ±0.20
(3)	Active Area	AAA.AA ±0.20 X AAA.AA ±0.20
(4)	Total Thickness (Tc)	T.TT ± 0.15
(5)	Tail Length	LL.LL ±1.00

Note 1. Actual General Specification is listed in the table of Appendix II.  
Detailed specification is available in drawings per request.

Note 2. Glass thickness = Total Thickness – 0.85 mm.

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### 3. ENVIRONMENTAL CHARACTERISTICS

Status	Temperature	Humidity
(1) Operation	0°C ~ + 50°C	20%~85% RH
(2) Storage	-20°C ~ + 70°C	20%~85% RH

Note: Parts of Trio-RT are fully compliant with the requirements of RoHS (Restriction of Hazardous Substances Directive). Label of RoHS (as shown) will appear on Trio-RT's package.



### 4. OPTICAL CHARACTERISTICS

Item	Specification
(1) Transparency	≥ 72% at wave length 550nm
(2) Newton Ring	As per actual sample provided
(3) Reflectance	Sunlight Reflectance < 1% (Specular Reflectance < 0.8%) (Diffuse Reflectance < 0.1%)

Note1: Transparency and Haze is measured by using BYK-Gardner Instrument.

Note2: Test method-satisfy (2) of Item 10.

### 5. ELECTRICAL CHARACTERISTICS

Item	Specification
(1) Terminal Resistance	Up: 400 ~ 1000Ω , Down : 150 ~ 800Ω
(2) Linearity	X axis ≤ 1.5%, Y axis ≤ 1.5% (Test method reference Item 9)
(3) Chattering	≤30 ms
(4) Insulation	≥ 20 MΩ/25V(DC)
(5) Endurance	No arcing damage at DC 25V/60sec
(6) Operative Resistance	≤ 2KΩ

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## 6. MECHANICAL CHARACTERISTICS

Item		Condition	Specification
(1)	Operation Force	Stylus=R0.8	≤50g
(2)	Impact	22.0 $\psi$ DIA. Steel Ball/45g Height=30cm	1 time, no damage (Impact at center area)
(3)	Static Load	5kg at $\psi$ 10 mm area for 30 Sec	Satisfy (1),(2),(4) of Item 5 and (1) of Item 6
(4)	Hardness	3H pencil, pressure 1n/45°(JISK5400)	≥3H
(5)	Peeling	800g/cm by 90 degree	Satisfy (1) of Item 5
(6)	Bending	10 times by radius R: 1mm 500g left & right 135 degree	Satisfy (1) of Item 5

## 7. RELIABILITY

Item		Condition	Specification
(1)	Constant Temperature/ Humidity	60°C/90%RH, 120hrs and normalized for 4 hrs	Satisfy (1),(2), of Item 4; (1),(2),(4)of Item5; (1) of Item 6
(2)	Heat Cycle	70°C/120hrs and normalized for 4 hrs	Same as above
(3)	Cold Cycle	-20°C/120hrs and normalized for 4 hrs	Same as above
(4)	Thermal Cycle	-20°C~+70°C(0.5hr each), 10 Cycles (within 24 hr) and normalized for 4 hrs	Same as above

## 8. DURABILITY

Item		Condition	Specification
(1)	Write Test	100,000 times, Force 250g ,R0.8	Satisfy(1),(2),(4)of Item 5; (1) of Item 6
(2)	Knock Test	1,000,000 times , Force 250g , 3HZ, R8/HS60	Same as above

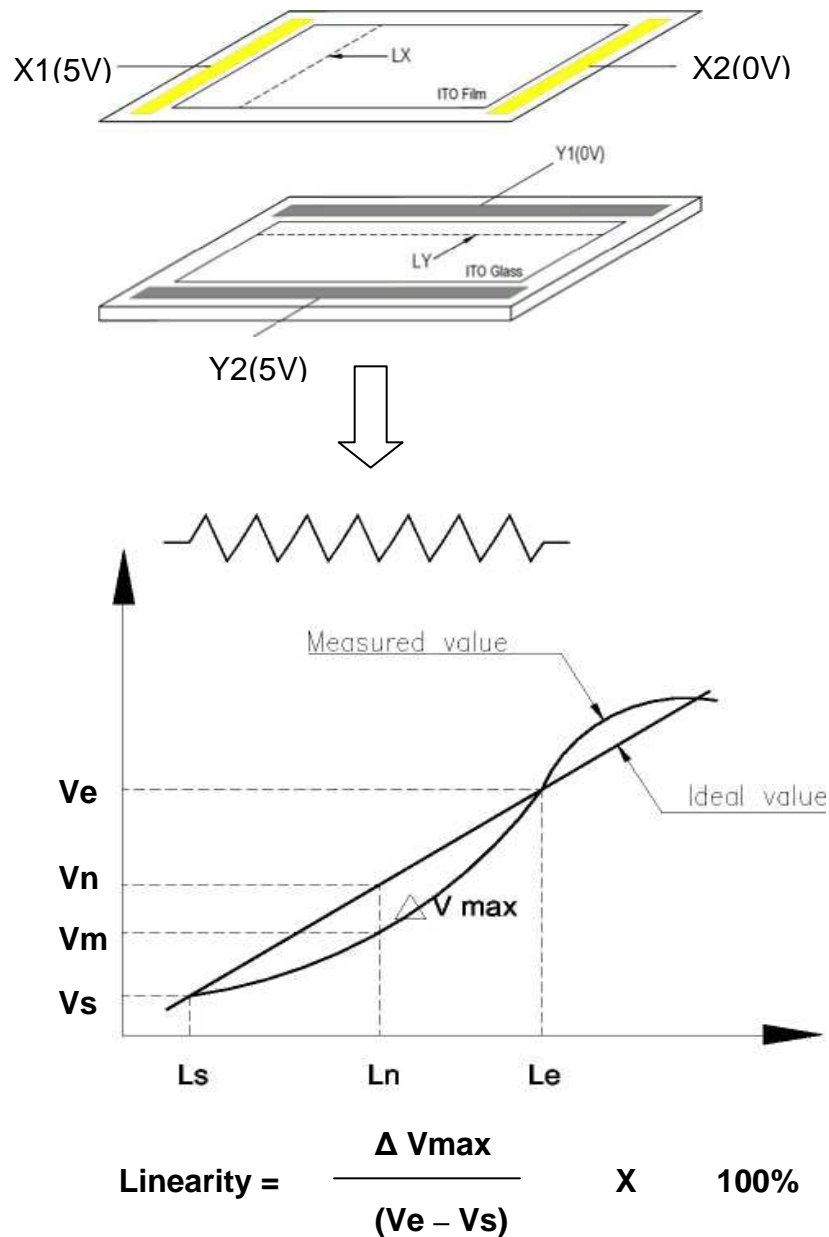
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## 9. INSPECTION METHOD

Linearity Condition:

Voltage (DC 5V) is applied to X1 or Y2 and ground (0V) is applied to X2 or Y1. Using stylus to draw straight lines (LX and LY) at 5mm intervals within active area and detect the voltage at Y2 or X1. To Measure the voltage differences between X1 and X2 or Y1 and Y2.

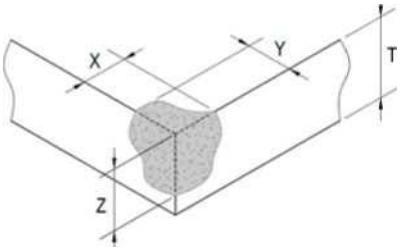
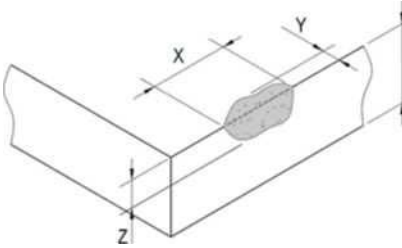
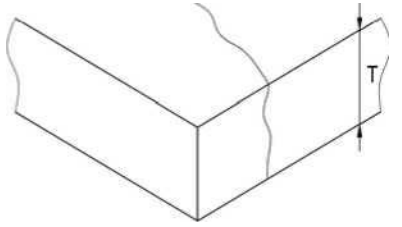


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## 10. APPEARANCE INSPECTION

- (1) The flaws and impurities are allowed outside viewing area except for those affecting electrical functions.
- (2) The inspection shall be performed by using one 17w fluorescent lamp as back or side light. The panel shall be placed at 30cm away from eyes.
- (3) Glass flaw

Corner Flaw		$X \leq 3.0\text{mm}$ $Y \leq 3.0\text{mm}$ $Z \leq T$
Edge flaw		$X \leq 3.0\text{mm}$ $Y \leq 3.0\text{mm}$ $Z \leq T$
Progressive flaw		None allowed

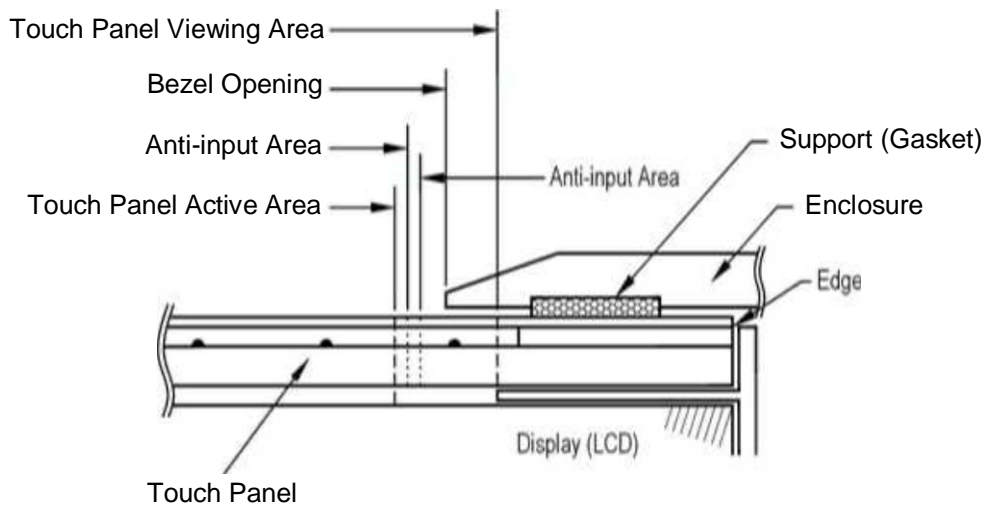
T = Glass Thickness  
 Please Refer to Appendix I for Appearance Specifications.

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## 11. ATTENTION FOR MOUNTING CONDITION

- (1) The Support which fixes the touch panel must be designed outside of Viewable Area.
- (2) Design enclosure with enough clearance to avoid pressing on touch panel surface.
- (3) Bezel opening must be between Viewable Area and Active Area.
- (4) Bezel opening must not touch Viewable Area.
- (5) We recommend elastic material made Support.
- (6) Do not use adhesive to bond Top Surface (ITO Film) of touch panel with Enclosure.
- (7) Edges of touch panel are conductive. Do not touch it with metal after mounting.



## 12. GUARANTY

With the exceptions listed below, all ALP's products are guaranteed free of manufacturing defects for a period of up to one year. All defected products will be repaired or exchanged free of charge if determined to be the responsibility of ALP. ALP reserves the sole discretion in determining the causes and the responsibilities of any defects or damages.

List of Exceptions:

- (1) Damages caused by improper handling of clients, including and not limited to, during shipping or manufacturing processes.
- (2) Damages caused by disasters, either by natural causes or human factors, after the delivery of products.
- (3) Any repairs, modifications or disassembling of ALP's products without prior notification to and the consent of ALP.

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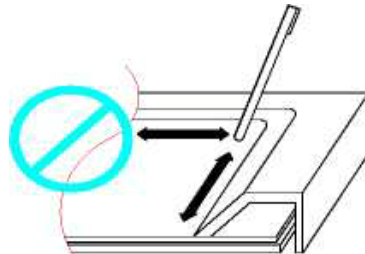
### 13. CAUTIONS

Storage	(1) Store packaged products at the temperature and humidity mentioned in the specification with care. Do not expose products to direct sunlight or stress such as that caused by piling.
Unpacking	(1) Check for the correct vertical direction of the package before unpacking.
Handling	(1) Clean finger sacks or gloves and mask are required during handing to prevent finger-prints or stain on the products and damages to the products caused by sharp edges. (2) Do not handle the viewing area of the panel. (3) Do not handle the panel at the tail (connector) to prevent detachment of the tail to the panel.
Cleaning	(1) Clean and soft clothes with neutral detergent or with ethanol may be used for cleaning. (2) Do not use any chemical solvent, acidic or alkali solution. (3) Do not allow liquid from soaking into the joint of film and glass which may result in peeling or malfunctioning.
Installing and Assembling	(1) Excessive force or strain to the panel or the tail is prohibited. (2) Provide a clearance of at least 0.3mm between panel and display module. (3) The panel is designed with air groove. Insulation and cushioning pads should be designed around the edges of the panel to prevent liquid penetration or dust gathering.
Operating	(1) Operate with a stylus (tip R0.8 or over), or with a finger without applying excessive load. Sharp edged or hard articles are prohibited. (2) The gathering of dew in the panel may occur with abrupt temperature or humidity changes. A stable environment condition is recommended.
Others	(1) Keep the surface clean. No adhesives should be applied. (2) Avoid high voltage and static charge. (3)ALP reserves the right to substitute materials with the same grade and specification.

絕對禁止沿著機殼四周邊緣作畫線動作如此會令 PET/FILM 因承受極大的壓力而破壞，更會因此而得

Touch Panel 喪失功能。如圖。

It is absolutely forbidden to draw lines along with the edge of the housing because the extreme force will damage the PET/FILM and cause the failure of the touch panel.



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#### 14. APPENDIX I: Appearance Specifications

Particle	(1) Diameter $\leq$ 0.25 (each area contains $\leq$ 2 particles, total $\leq$ 5 particles) → OK (2) 0.25<Diameter $\leq$ 0.3 (each area contains $\leq$ 2 particles, total $\leq$ 5 particles) → OK (3) Diameter>0.3 → NG
Blur Stain	(1) Diameter $\leq$ 0.25 (each area contains $\leq$ 2 particles, total $\leq$ 5 particles) → OK (2) 0.25<Diameter $\leq$ 0.3 (each area contains $\leq$ 2 particles, total $\leq$ 5 particles) → OK (3) Diameter>0.25 → NG
Linear Object	(1) Widths $\leq$ 0.05 and Length $\leq$ 12 → OK (2) 0.05<Width $\leq$ 0.1 and Length $\leq$ 5, total $\leq$ 3 objects → OK (3) Width>0.1 and Length>0.2 → NG (4) Curled objects are regarded as particles
Blister	(1) As per actual samples provided
Fish Eye (Spread White Spots)	(1) Diameter $\leq$ 0.5 → OK (2) Diameter>0.3 → NG (3) Each area contains $\leq$ 3 spots, total $\leq$ 5 spots → OK
Newton Ring	(1) As per actual samples provided
Color Tone	(1) As per actual samples provided
Scratch	(1) 0.05< Width $\leq$ 0.1 and Length $\leq$ 12, total $\leq$ 5 scratches → OK (2) Width>0.1 or Length>12 → NG
Interference Pattern	(1) Inspection according to the standard testing methods
Damages to Glass A. Corner B.	(1) Length $\leq$ 2, Width $\leq$ 2, Depth $\leq$ 1/3T, Total $\leq$ 2 damages → OK (2) Damages with possible worsening disallowed

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## 15. APPENDIX II: General Specification and Product Selection Guide of Trio-RT

4-wired Trio resistive touch panel								
Size	Part Number	Frame Area	Viewing Area	Active Area	Tc	Tail Connector	Tail Length	Tail Location
2.5"	TRIORT025P4	63.50 x 41.50	56.00 x 34.00	54.40 x 32.40	1.90	ZIF	19.50	10 O'clock
3.0"	TRIORT030P4	70.00 x 55.00	61.50 x 47.60	60.10 x 46.20	1.50	ZIF	30.00	3 O'clock
3.5"	TRIORT035P4	82.50 x 63.20	71.50 x 56.50	73.00 x 54.00	1.85	ZIF	20.00	5 O'clock
3.9"	TRIORT039P4	69.50 x 89.50	60.98 x 80.90	59.98 x 79.90	1.60	ZIF	20.00	10 O'clock
4.0"	TRIORT040P4	90.00 x 70.00	81.40 x 61.00	78.00 x 59.00	1.95	ZIF	22.00	4 O'clock
5.8"	TRIORT058P4	137.50 x 107.00	122.60 x 93.80	116.20 x 87.30	1.85	AMP	79.10	9 O'clock
6.4"	TRIORT064P4	152.90 x 120.00	135.60 x 102.60	130.60 x 98.40	1.85	AMP	79.10	9 O'clock
7.0"	TRIORT070P4	169.50 x 106.00	158.00 x 95.00	154.00 x 92.00	2.00	AMP	80.00	11 O'clock
7.5"	TRIORT075P4	180.90 x 143.00	162.90 x 124.40	155.90 x 117.40	2.30	AMP	116.00	10 O'clock
8.4"	TRIORT084P4	183.40 x 139.55	173.80 x 131.20	172.40 x 129.80	1.85	AMP	80.00	10 O'clock
10.4"	TRIORT104P4	231.40 x 174.00	214.50 x 162.00	212.00 x 159.20	1.85	AMP	80.00	9 O'clock
12.1"	TRIORT121P4	268.50 x 201.50	253.50 x 189.00	245.00 x 183.00	2.75	AMP	80.00	10 O'clock
14.1"	TRIORT141P4	302.00 x 234.00	288.70 x 217.70	284.70 x 213.70	2.75	AMP	116.50	7 O'clock
15.0"	TRIORT150S4	330.50 x 255.50	311.00 x 235.00	303.00 x 227.00	2.75	AMP	80.00	9 O'clock
17.0"	TRIORT170S4	366.00 x 289.00	346.00 x 276.00	338.00 x 268.00	3.90	AMP	80.00	3 O'clock
18.1"	TRIORT181S4	388.61 x 308.61	366.00 x 293.20	359.00 x 287.20	3.90	AMP	250.00	9 O'clock
5-wired Trio resistive touch panel								
Size	Part Number	Frame Area	Viewable Area	Active Area	Tc	Tail Connector	Tail Length	Tail Location
6.4"	TRIORT064P5	156.46 x 122.94	136.05 x 104.04	130.05 x 98.04	2.70	AMP	190	9 O'clock
10.4"	TRIORT104P5	231.65 x 174.24	213.87 x 161.04	211.58 x 158.75	2.70	AMP	190	9 O'clock
12.1"	TRIORT121P5	271.00 x 205.50	252.50 x 190.50	248.00 x 185.00	2.70	AMP	190	9 O'clock
15.0"	TRIORT150P5	323.59 x 245.20	306.96 x 232.16	304.04 x 228.09	1.85	AMP	190	9 O'clock
17.1"	TRIORT171S5	365.50 x 290.32	349.50 x 278.12	340.10 x 272.54	2.70	AMP	190	9 O'clock

Note1. Patent pending Trio-RT products are optically enhanced resistive touch panel with low sunlight reflection that will work with any regular LCD. When integrated with ALP's patented TrioLCD, a direct sunlight readable transfective RT-TrioLCD is resulted, which is suitable for various outdoor and mobile applications, such as digital signage, PDA, navigator, security camera, military hand-held devices, tablet PC, and rugged notebooks.

Note2. ALP provides the service to customize manufacture Trio-RT with your specifications. A minimum NRE fee is charged for the service.

Note3. The listed Tc (Total Thickness) is based on the standard regular glass used in production of the panel. Other thickness of glass and chemically tempered glass are also available per request.

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