

FAX060-30-070001

~ 7" LucidBond with SR 4W Resistive T/P

2009/1/15

Engineering Specifications v.1.0

Preliminary Specifications

Final Specifications

[This specification is
subject to change
without notice.]

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ROHS

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FAX060-30-070001

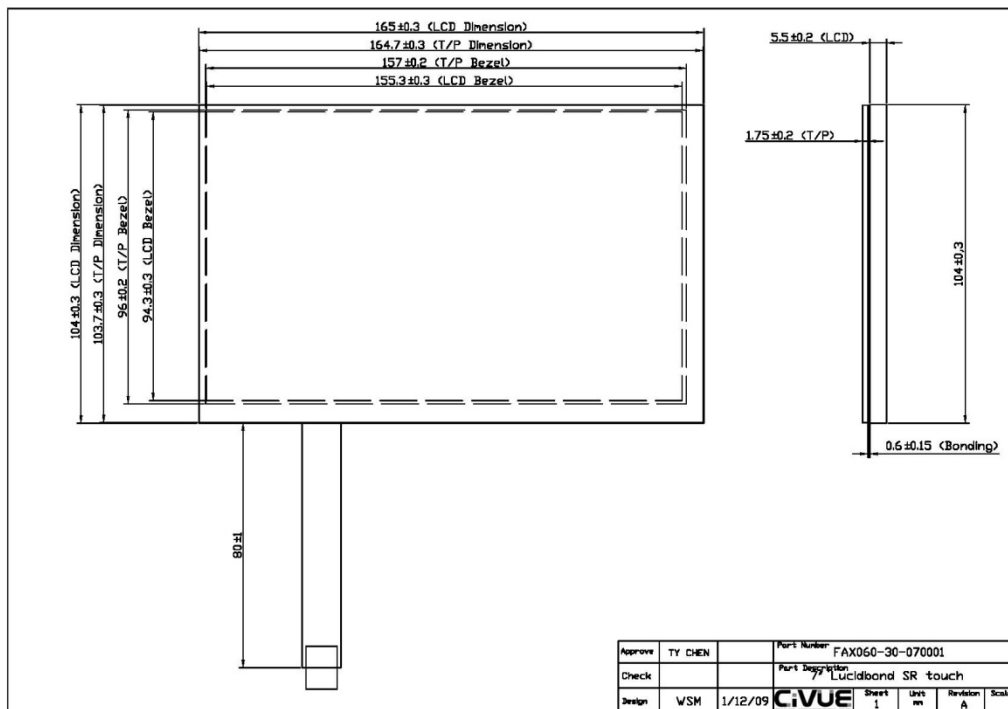
ENGINEERING SPECIFICATIONS

1 | GENERAL DESCRIPTION

Structure	Description
Cover Lens	Low reflective polarized 4W resistive touch
Bonding Layer	CiVUE LucidBond Optical Bond (0.6mm)
Display	ALC-070004-01-1(GATW70SN8K1EA)

Assembly	Dimensions
Frame Size	165.00±0.30 X 104.00±0.30 mm
Thickness	7.85±0.55 mm

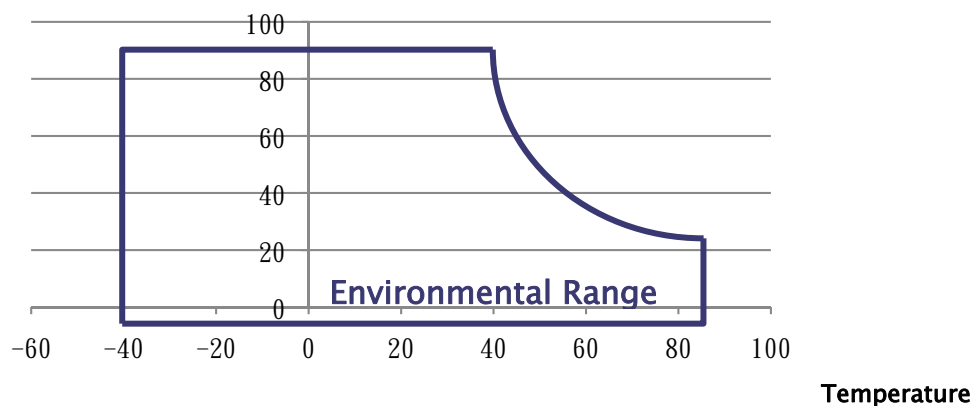
2 | ASSEMBLY MECHANICAL DRAWING



3 | Bonding Environmental Characteristics

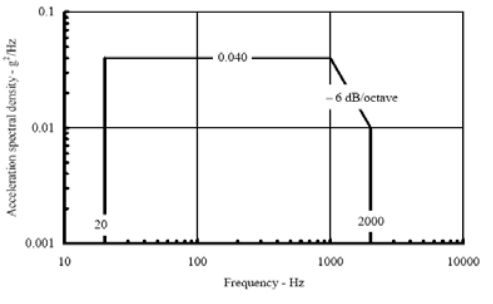
Item	Value	Unit	Note
Temperature	-40 ~ +85	°C	(2)
Humidity	0 ~ 95	%RH	(2)

(2) Relative Humidity vs. Temperature



4 | BONDING RELIABILITY

Item	Condition	Judgment
High Temperature	85°C for 500 hours	No change of appearance
Low Temperature	-40°C for 500 hours	No change of appearance
Constant Temperature & Humidity	60°C, 93±2%RH for 500 hours	No change of appearance
Thermal Cycle	-40 ~ 85°C for 50 cycles	No change of appearance
UV Resistance	UVA 340nm wavelength for 200 hours (ASTM G-154)	No change of appearance

Shock Test	40g, 11 ms pulse, $\pm X$, $\pm Y$, $\pm Z$ axes (MIL-STD-810F)	No change of appearance
Vibration Test	 <p>FIGURE 514.5C-17. General minimum integrity exposure.</p> <p>1 hour duration (MIL-STD-810F)</p>	No change of appearance

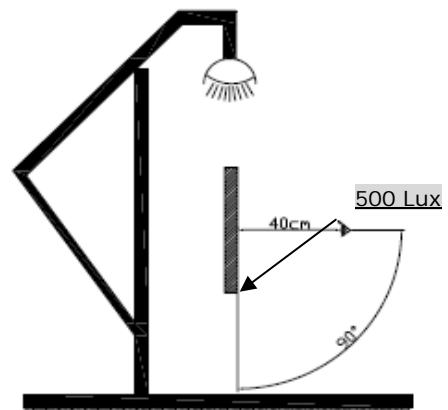
5 | APPEARANCE SPECIFICATIONS

(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 \geq 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



↔
(D)30 inch

(2) Inspection Specification

Judge Area	Judge Item		Bonding Inspection Specification			
Viewing Area	Particle Bubbles Scratch	Round	Diameter (D): mm		Quantity (N)	
			$D \leq 0.25$		Disregarded	
			$0.25 < D \leq 0.5$		$N \leq 8$	
			$D > 0.5$		NG	
		Linear	Length (L): mm	Width (W): mm	Quantity (N)	
			$W \leq 0.05$ and $L \leq 12$		Disregarded	
			$0.05 < W \leq 0.2$ and $L \leq 12$		$N \leq 8$	
			$W > 0.1$ and $L > 12$		NG	

6 | AGENCY APPROVAL

Agency/Test Standard	Description
RoHS	RoHS compliance

7 | STORAGE

- Store packaged products at the temperature and humidity mentioned in the spec with care. (Relative humidity up to 90% is for 0~35; RH lower than 50% is suggested when the temperature is higher than 60°C)
- Do not store the touch screen in the place condensation may form.

8 | 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 disassembled without CiVUE permission.
5. Do not twist or bend the module.
6. Please follow all handling instructions of individual components in the attached Appendices.

9 | 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 contact CiVUE's representative.

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ALC-070004-01-1

~ 7" Enhanced High Bright LCD with
LED Backlight for Outdoor Displays

2009/1/5

Engineering Specifications v.1.0

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Final Specifications

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ALC-070004-01-1

ENGINEERING SPECIFICATIONS

1. General Description and Features

ALC-070004-01-1 (based on GATW70SN8K1EA) is a transmissive type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module, a driver circuit and a back-light unit. Graphics and texts can be displayed on a WVGA 800 (W) x 3 x 480 (H) dots (16:9 aspect ratio) with 262,144 colors by supplying 18 bits data signal (6bits/each color). The following table described the features:

1.1 Features

- Transmissive and back-light with 27 LEDs are available.
- TN (Twisted Nematic) mode.
- Digital RGB (6bits/color) data transfer.
- Data enable mode.
- Data inverted function for reducing EMI.

1.2 LCD Module

Item	Specification	Unit
Screen Size	7.0 inches	Diagonal
Display Resolution	800 (H) x 480 (V)	Pixel
Active Area	152.40 (H) x 91.44 (V)	mm
Outline Dimension	165.00 (H) x 104.00 (V) x 5.50 (T)	mm
Display Mode	Normally white mode/ Transmissive	--
Pixel Arrangement	R,G,B Vertical Stripe	--
Pixel Size	190.5 x 190.5	um
Display Color	Full Colors	--
Viewing Direction	6 o'clock	--
Input Interface	Digital RGB (6bits/color) Data	--

2. Mechanical Information

Item	Min.	Typ.	Max.	Unit	Note	
Module Size	Horizontal (H)	--	165.00	--	mm	
	Vertical (V)	--	104.00	--	mm	
	Thickness (T)	--	5.50	--	mm	(1)
	Thickness (T)	--	6.9	--	mm	(2)
Weight	--	155	--	g	--	

Note (1) Exclude Component . Refer to the Outline Dimension Drawing as attached.

(2) Include Component . Refer to the Outline Dimension Drawing as attached

3. Electrical Specifications

3.1 Absolute Max. Ratings

3.1.1 Absolute Ratings of Environment

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

($T_a=25\pm 2^\circ\text{C}$, $V_{SS}=\text{GND}=0$)

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T_{STG}	-30	80	$^\circ\text{C}$	(1)
Operating temperature	T_{OPR}	-20	70	$^\circ\text{C}$	(1,2,3)

Note (1) 95 % RH Max. ($40^\circ\text{C} \geq T_a$). Maximum wet-bulb temperature at 39°C or less. ($T_a > 40^\circ\text{C}$) No condensation.

Note (2) In case of below 0° , the response time of liquid crystal (LC) becomes slower and the color of panel becomes darker than normal one. Level of retardation depends on temperature, because of LC's character

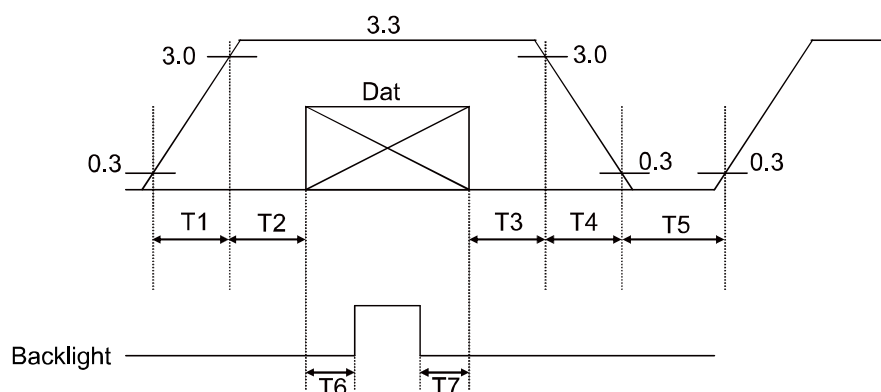
Note (3) Only operation is guaranteed at operating temperature. Contrast, response time, another display quality are evaluated at $+25^\circ\text{C}$.

3.1.2 Electrical Absolute Maximum Ratings

($V_{SS}=\text{GND}=0$)

Parameter	Symbol	Min.	Max.	Unit	Remark
Power supply voltage	V_{CC}	-0.3	5.0	V	
Signal input voltage	R0-R5,G0-G5, B0-B5,DCLK,DE	-0.3	$V_{CC}+0.3$	V	--
Permissive input ripple voltage	V_{RF}	--	100	mVp-p	$V_{CC}=+3.3\text{V}$

Display On/Off Sequence :



Data: DCLK, R0 ~ R5, G0 ~ G5, B0 ~ B5, DE

$T1 \leq 10\text{ms}$, $50\text{ms} \leq T2$, $0 < T3 \leq 50\text{ms}$, $0 < T4 \leq 10\text{ms}$, $1\text{s} \leq T5$, $200\text{ms} \leq T6$, $200\text{ms} \leq T7$

3.2 Electrical Characteristics

3.2.1 DC Electrical Characteristics of the TFT LCD

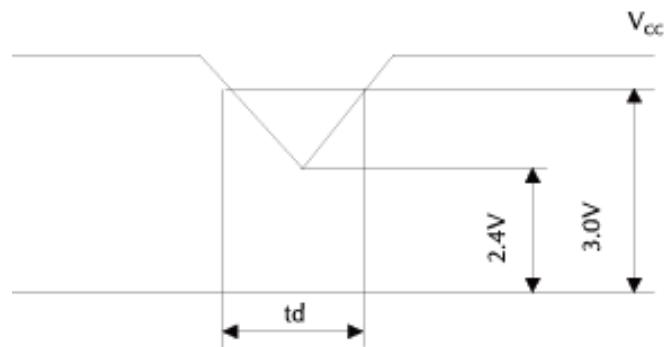
(Ta=25±2°C, V_{SS}=GND=0)

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply	VCC	3.0	3.3	3.6	V	Note 1
Input Voltage for logic	H Level	V _{IH}	0.7xVCC	-	VCC	V
	L Level	V _{IL}	0	-	0.2xVCC	V
Power Supply current	ICC		150	200	mA	Note 2

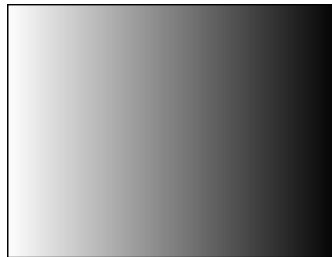
Note1: Vcc-dip conditions

Vcc-dip conditions should also follow the Vcc-turn-on conditions

T_d ≤ 10ms



Note2: $f_v = 60\text{Hz}$, $T_a = 25^\circ\text{C}$, Display pattern : 64 Gray pattern



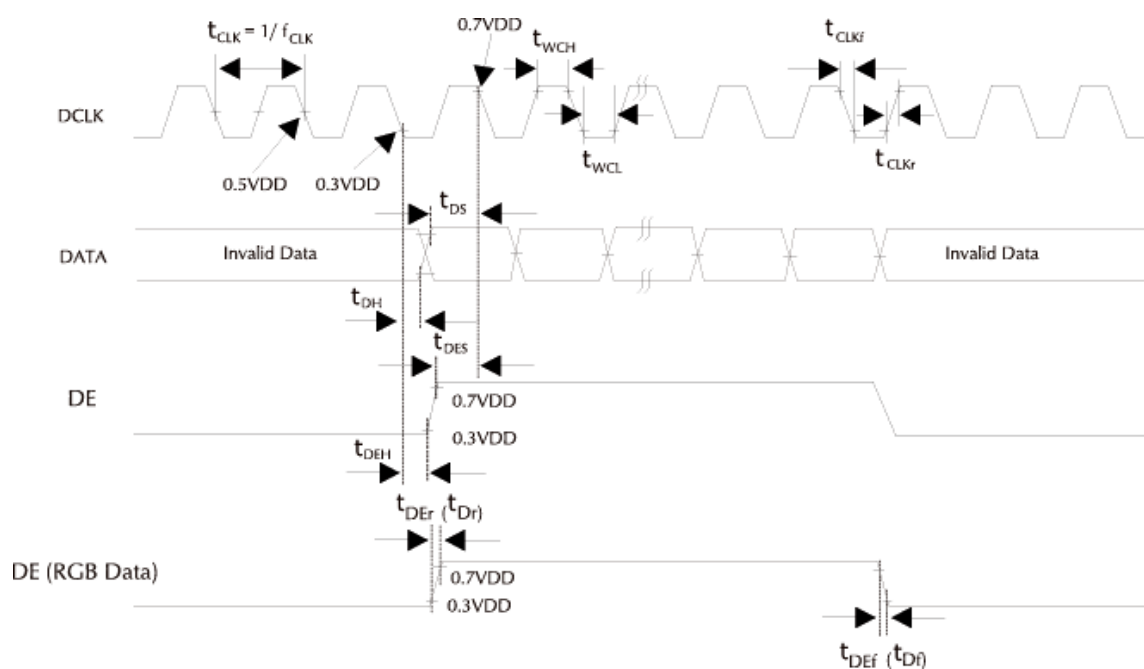
3.3 AC Timing Characteristic of The LCD

3.3.1 Timing Condition (DE only mode)

Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit.	Remark
DCLK	DCLK period	t _{CLK}	31	37.0	40.0	ns	
	Frequency	f _{CLK}	25	27	32.2	MHz	
	DCLK High plus width	t _{WCH}	6	-	-	ns	
	DCLK Low plus width	t _{WCL}	6	-	-	ns	
DATA	Data setup time	t _{DS}	5	-	-	ns	
	Data hold time	t _{DH}	10	-	-	ns	
	Rise/Fall Time	t _{Dr} , t _{Df}			10	ns	
DE	Setup Time	t _{DES}	5			ns	
	Hold Time	t _{DEH}	10			ns	
	Rise/Fall Time	t _{DEr} , t _{DEf}			16	ns	
	Horizontal Period	t _{HP}	850	900	950	t _{CLK}	
	Horizontal Valid	t _{HV}	800				
	Horizontal Blank	t _{HBK}	50	100	150		
	Vertical Period	t _{VP}	490	500	550	t _{HP}	
	Vertical Valid	t _{VV}	480				
	Vertical Blank	t _{VBK}	10	20	40		
	Vertical Frequency	f _V	55	60	65	Hz	

3.3.2 Timing Characteristic

3.3.2.1 DE and RGB Input Timing



3.4 Back-Light Unit

The Back-light system is an edge-lighting type with 27 white LED (Light Emitting Diode)s. The characteristics of 27 white LEDs are shown in the following tables.

(Ta= Room Temp)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Voltage	V_F	-	(9.6)	-	V	
Forward Current	I_F	-	180	-	mA	(1)
Power Consumption	P_{BL}	-	1782	-	mW	(2)

Note (1) LEDS in 3 series x 9 parallel type.

(2) Where $I_F = 180\text{mA}$, $V_F = 9.6$, $P_{BL} = V_F \times I_F$

4. Optical Characteristics

4.1 Optical characteristic of the LCD

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state.

Measuring equipment: BM-7A

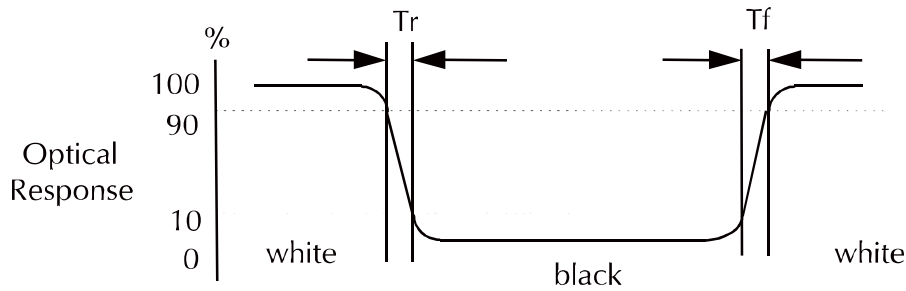
Item	Symbol	Condition	Min	Type	Max	Unit	Note
Brightness			550	600	--	cd/m ²	
Response time	T_r	$\theta=0^\circ$	-	15	20	ms	.
	T_f		--	25	35	ms	
Contrast ratio	CR	At optimized viewing angle	(350)	(400)	--	--	
Color Gamut	NTSC %	--	--	50	--	%	
Color Chromaticity (CIE 1931)	Red	R_x	$\theta=0^\circ$ Normal Viewing Angle	0.562	0.612	0.662	--
		R_y		0.294	0.344	0.394	
	Green	G_x		0.258	0.308	0.338	--
		G_y		0.496	0.546	0.596	
	Blue	B_x		0.090	0.140	0.190	--
		B_y		0.080	0.130	0.180	
	White	W_x		0.257	0.307	0.357	--
		W_y		0.299	0.349	0.399	
Viewing Angle (6H)	Hor.	θ_R	CR \geq 10	55	65	--	Degree
		θ_L		55	65	--	
	Ver.	ϕ_H		40	50	--	
		ϕ_L		55	65	--	

a. Test equipment setup

After stabilizing and leaving the panel alone shall be warmed up for the stable operation of LCM, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7(fast) with a viewing angle of 2° at a distance of 50cm and normal direction.

b. Definition of response time: Tr and Tf

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

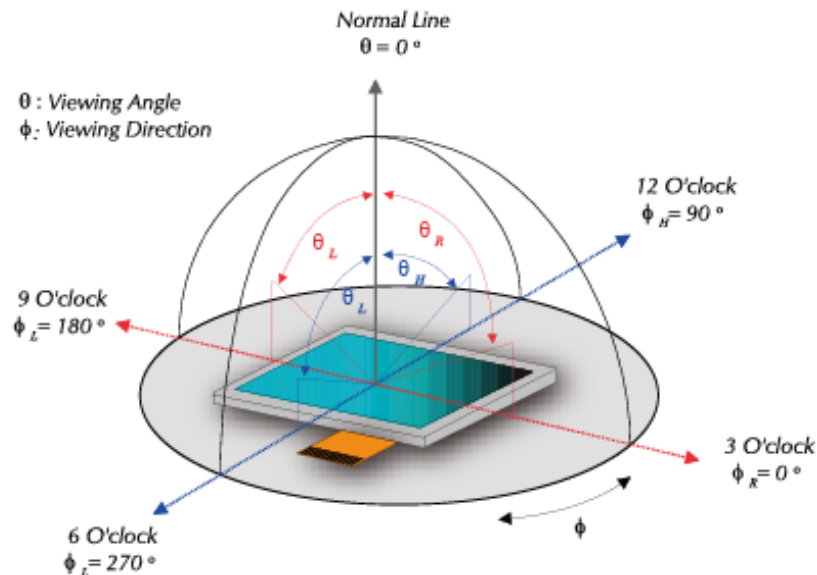


c. Definition of contrast ratio:

$$\text{Contrast Ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$

d. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

e. View Angle



f. Definition of Luminance of White: Luminance of white at the center points

Light Source of Back-Light Unit	LED Type
---------------------------------	----------

g. Definition of White Uniformity

Min. luminance of white among 9-points

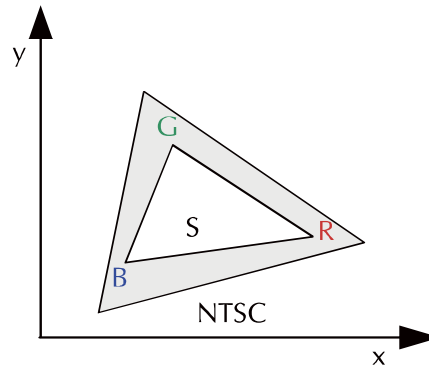
$$\text{White Uniformity} = \frac{\text{Min. luminance of white among 9-points}}{\text{Max. luminance of white among 9-points}}$$

Max. luminance of white among 9-points

h. The definition of Color Gamut -Color Chromaticity CIE 1931

Color coordinate of white & red, green, blue at center point.

Color Gamut : NTSC(%) = (RGB Triangle Area / NTSC Triangle Area) x 100



5. I/O Terminal

5.1 Pin Assignment

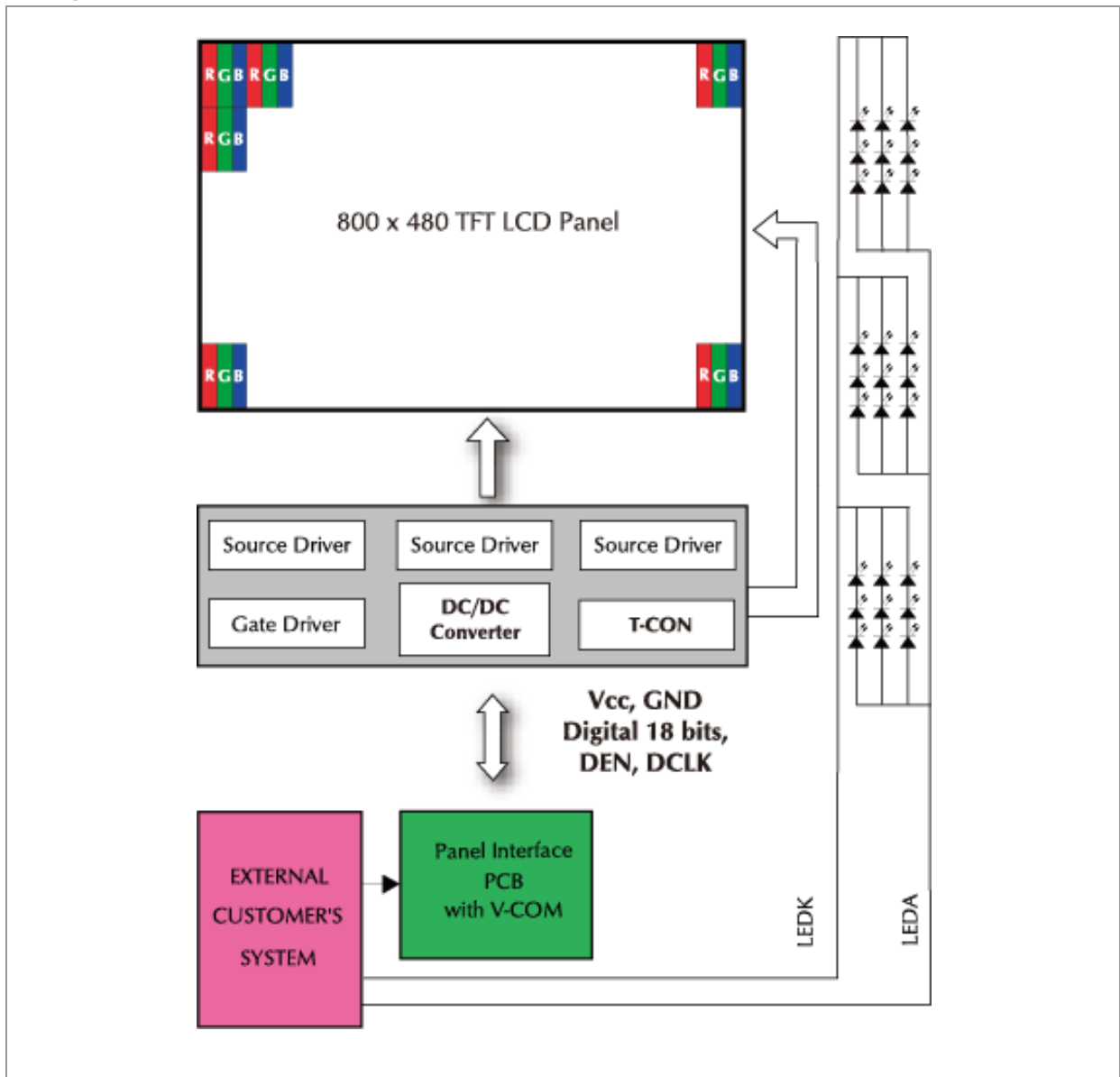
Pin No.	Symbol	I/O	Function	Remark
1	GND	P	Ground	
2	GND	P	Ground	
3	NC	--	No Connection	
4	VCC	P	Power Supply	
5	VCC	P	Power Supply	
6	VCC	P	Power Supply	
7	VCC	P	Power Supply	
8	VCC	P	Power Supply	
9	DE	I	Data Enable Timing Signal	
10	GND	P	Ground	
11	GND	P	Ground	
12	GND	P	Ground	
13	B5	I	Blue data signal (MSB)	
14	B4	I	Blue data signal	
15	B3	I	Blue data signal	
16	GND	P	Ground	
17	B2	I	Blue data signal	
18	B1	I	Blue data signal	
19	B0	I	Blue data signal (LSB)	
20	GND	P	Ground	
21	G5	I	Green data signal (MSB)	
22	G4	I	Green data signal	
23	G3	I	Green data signal	
24	GND	P	Ground	
25	G2	I	Green data signal	
26	G1	I	Green data signal	
27	G0	I	Green data signal (LSB)	
28	GND	P	Ground	
29	R5	I	Red data signal (MSB)	
30	R4	I	Red data signal	
31	R3	I	Red data signal	
32	GND	P	Ground	
33	R2	I	Red data signal	
34	R1	I	Red data signal	
35	R0	I	Red data signal (LSB)	
36	GND	P	Ground	
37	GND	P	Ground	
38	DCLK	I	Data Clock	
39	GND	P	Ground	
40	GND	P	Ground	

I: Input, O: Output, P: Power

Remarks:

- 1) GND Pin must ground contact, can not be floating.

Block Diagram



5.2 Back-light Unit (BLU)

Pin No.	Symbol	Function	Remark
1	LEDA	Power Supply for LED backlight	
2	LEDK	GND for LED backlight	

5.3 Displayed Color and Input Data

	Color & Gray Scale	Data Signal																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	 Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	 Red(0)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	 Green(0)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	 Blue(0)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	 Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	 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
Red	 Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	 Red(62)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	 Red(61)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	 Red(31)	0	1	1	1	1	1	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	0
	 Red(0)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	 Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	 Green(62)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	 Green(61)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	 Green(31)	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	 Green(1)	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	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	 Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	 Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	 Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:

	Blue(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(1)	0	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	0	0	1	1	1	1	1	1

0 : Low level voltage, 1 :High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. With the combination of total 18

bit data signals, the 262,144-color display can be achieved on the screen.

6. Reliability

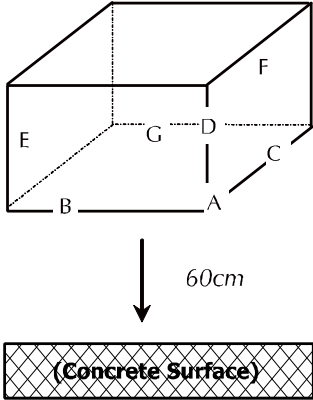
No change on display and in operation under the following test condition.

Condition: Unless otherwise specified, tests will be conducted under the following condition.

Temperature: 20±5°C.

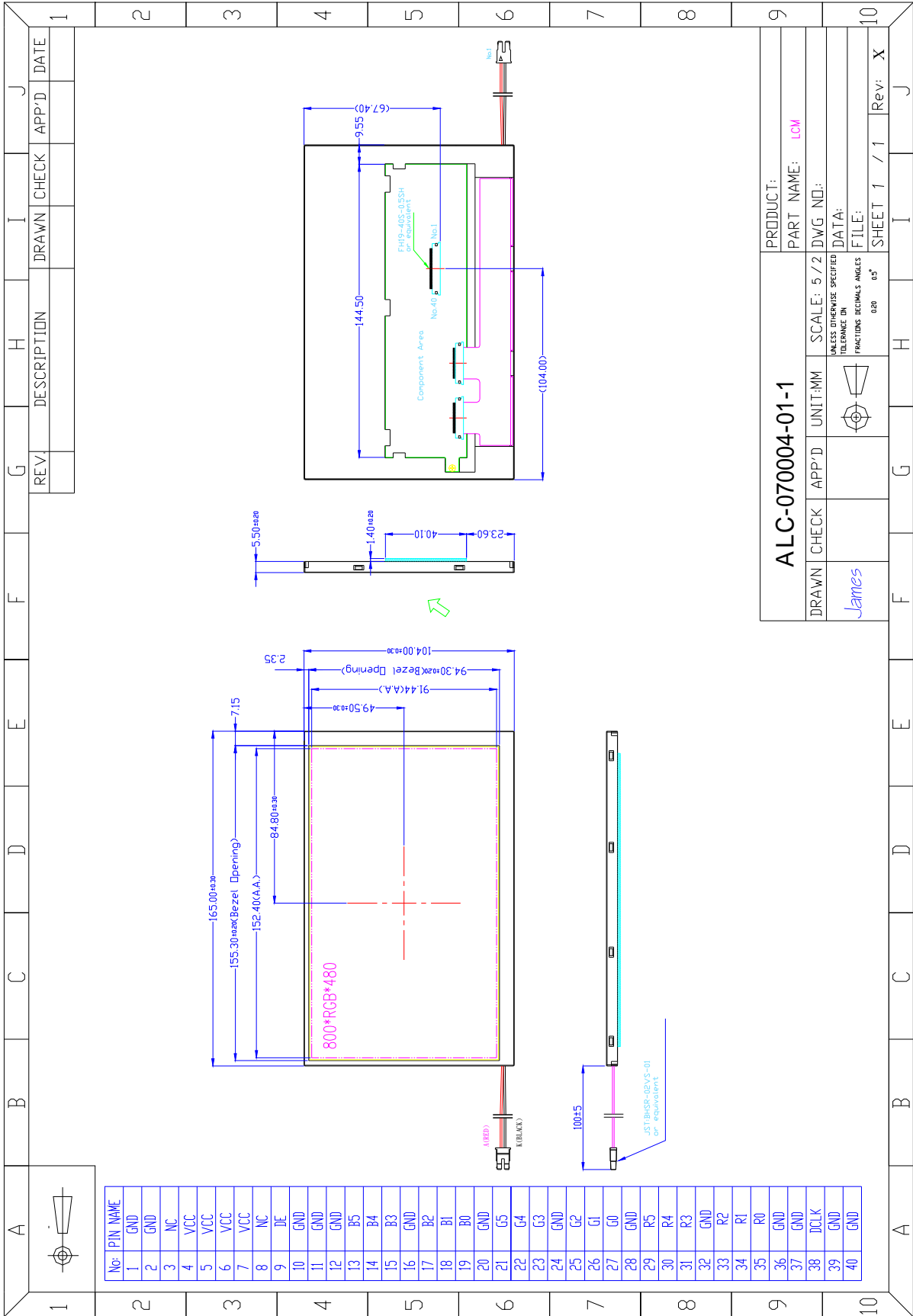
Humidity: 65±5%RH.

Tests will be not conducted under functioning state.

No.	Parameter	Condition	Notes
1	High Temperature Operating	70°C±2°C, 120hrs (Operation state).	
2	Low Temperature Operating	-20°C±2°C, 120hrs (Operation state).	1
3	High Temperature Storage	80°C±2°C, 120hrs.	2
4	Low Temperature Storage	-30°C±2°C, 120hrs.	1,2
5	Damp Proof Test	40°C±2°C, 90~95%, 120hrs.	1,2
6	Vibration Test	Total fixed amplitude: 1.5mm. Vibration Frequency: 10~55Hz. One cycle 60 seconds to 3 direction of X, Y, Z each 15 minutes.	3
7.	Shock Test	To be measured after dropping from 60cm high on the concrete surface in packing state.  <p style="text-align: right;"><i>Dropping method corner dropping:</i></p> <p style="text-align: right;"><i>A corner: Once edge dropping.</i></p> <p style="text-align: right;"><i>B, C, D edge: Once face dropping.</i></p> <p style="text-align: right;"><i>E, F, G face: Once.</i></p>	

- Notes:
1. No dew condensation to be observed.
 2. The function test shall be conducted after 4 hours storage at the normal temperature and humidity after removed from the test chamber.
 3. Vibration test will be conducted to the product itself without putting I in a container.

7. Mechanical Drawing



DRAWN		CHECK		APP'D		DATE	
James							
PRODUCT:				PART NAME: LCM			
SCALE: 5/2				DWG NO.:			
UNLESS OTHERWISE SPECIFIED TOLERANCE ON FRACTIONS DECIMALS ANGLES				DATA:			
0.20 0.5°				FILE:			
SHEET 1		/ 1		Rev: X		J	

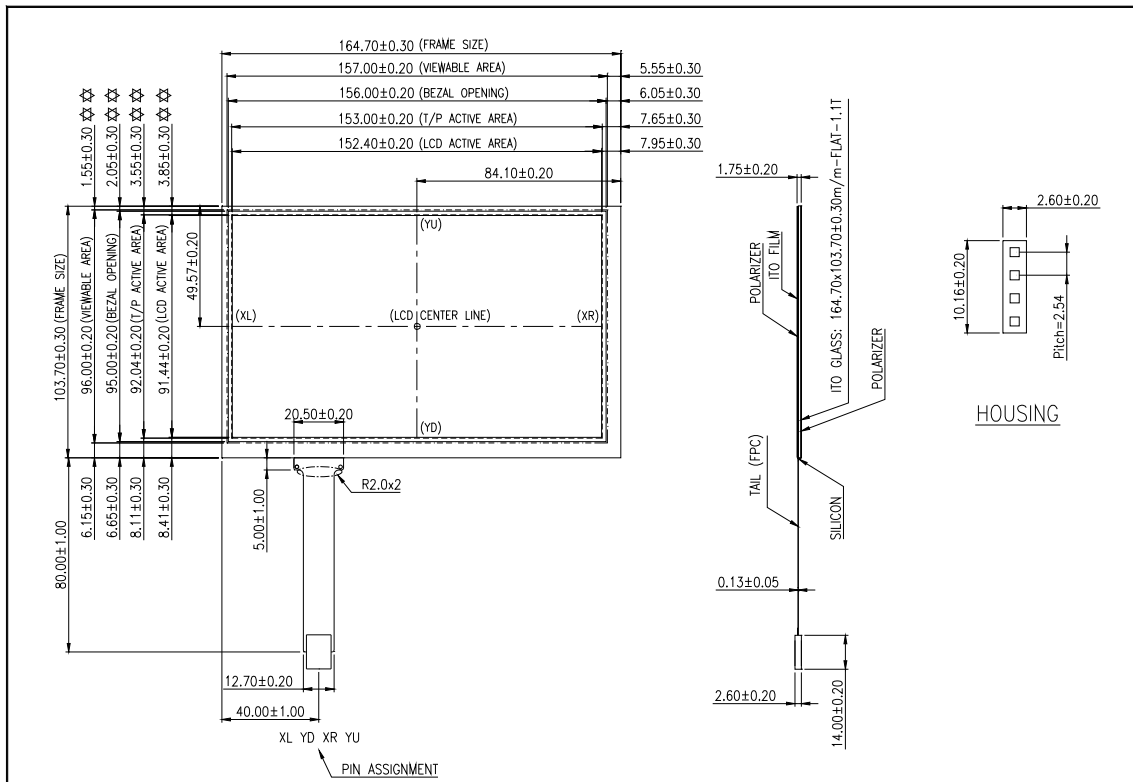
1. FEATURES

Type	Four-Wire Analog Resistive Touch Panel		
Structure	Material	Thickness	Type
	Polarizer	0.4 mm	AR
	ITO OPTICAL FILM	0.2 mm	Normal-Type
	ITO/GLASS	1.1 mm	Normal-Type
Input Mode	Stylus or Finger		
Connector	FPC		

2. DIMENSIONS

Item	Specification (unit in mm)
(1) Frame Size	164.70±0.30 x 103.70±0.30
(2) View Area	157.00±0.20 x 96.00±0.20
(3) Active Area	152.40±0.20 x 91.44±0.20
(4) Total Thickness	1.75±0.20
(5) Tail Length	80.00±1.00

[Engineering Drawing]



3. ENVIRONMENTAL CHARACTERISTICS

Status		Temperature
(1)	Operation	-10~60°C
(2)	Storage	-20~70°C

Note: The environment is of normal atmosphere pressure.

4. OPTICAL CHARACTERISTICS

Item		Specification
(1)	Transparency	>70%
(2)	Reflectance	<4%

Note1: Transparency is measured by using BYK-Gardner instrument.

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

5. ELECTRICAL CHARACTERISTICS

Item		Specification
(1)	Terminal Resistance	XL-XR:500~1650Ω, YU-YD: 150~550Ω
(2)	Linearity	≤2.0%, After 9 points calibration. (Test method reference item 9)
(3)	Operation Voltage	5VDC
(4)	Chattering	≤10ms
(5)	Insulation	≥20MΩ, 25VDC
(6)	Endurance	No arcing damage at 25VDC, 60sec.
(7)	Operative Resistance	≤2KΩ

6. MECHANICAL CHARACTERISTICS

	Item	Condition	Specification
(1)	Activation Force	Stylus = R0.8	$\leq 250\text{g}$
(2)	Impact	$\Phi 25.4\text{mm}$ Steel Ball/66g Height=30cm	1 time, no damage (Impact at center area)
(3)	Static Load	15kg at $\Phi 20\text{mm}$ area for 30 Sec	No damage
(4)	Hardness	2H pencil, pressure 1n/45°(JIS K5600, 500g)	$\geq 2\text{H}$
(5)	Tail Peeling	300g by 90 degree	Satisfy (1) of item 5
(6)	Tail 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 ,240hrs and normalized for 4 hrs	Satisfy (1), (2) of item 4; (2), (5) of item 5;
(2)	Heat Cycle	70°C /240 hrs and normalized for 4 hrs	Same as above
(3)	Cold Cycle	-20°C /240 hrs and normalized for 4 hrs	Same as above
(4)	Thermal Cycle	-20~70°C (0.5hr each), 10 Cycles, $\Delta T \leq 30\text{sec}$ and normalized for 4 hrs	Same as above

8. DURABILITY

	Item	Condition	Specification
(1)	Finger Touch	1,000,000 times, R8, Silicon Rubber (Please refer to Appendix II)	Satisfy(1),(2),(5) of item 5;
(2)	Pen Sliding	100,000 times, R0.8, Stylus (Please refer to Appendix II.)	Satisfy(1),(2),(5) of item 5;