

PRODUCT SPECIFICATIONS

MODULE NO. : IE-TFT-0708048-RTP-3.5/92

DRAWING BY : QSC

DATE : 2010-11-03

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FOR CUSTOMER'S APPROVAL

CHECK BY: _____

DATE : _____

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COMMENT:

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Record of Revision

Version	Revise Date	Page	Content
Final-spec.01	2010/01/19	All	Initial Release
Final-spec.02	2010/03/22	1	Add the Value of Weight
		17	Add Packaging Material Table & Packaging Quantity
		18	Add Packaging Drawing
Final-spec.03	2010/04/28	All	Add the Model Name, Spec NO., and Update the Logo
Final-spec.04	2010/11/03	6	Modify V _{COM} values and add note 4

Contents

1. General Specifications	1
2. Pin Assignment	2
3. Operation Specifications	5
3.1. Absolute Maximum Ratings	
3.1.1. Typical Operation Conditions	6
3.1.2. Current Consumption	7
3.2. Power Sequence	7
3.3. Timing Characteristics	8
3.3.1. AC Electrical Characteristics	8
3.3.2. Input Clock and Data Timing Diagram	9
3.3.3. Timing	9
3.3.4. Data Input Format	10
4. Optical Specifications	12
5. Reliability Test Items	15
6. General Precautions	16
6.1. Safety	16
6.2. Handling	16
6.3. Static Electricity	16
6.4. Storage	16
6.5. Cleaning	16
7. Mechanical Drawing	17
8. Package Drawing	18
8.1. Packaging Material Table	18
8.2. Packaging Quantity	18
8.3. Packaging Drawing	19

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	7.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800 h 3(RGB) h 480	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.0642(W) h 0.1790(H) mm	
6	Active area	154.08(W) h 85.92(H) mm	
7	Panel size	165.0(W) h100.0(H) h3.50(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Display Color	16.7M	
11	Interface	Digital, Parallel 8-bit RGB	
12	Panel power consumption	0.226W (Typ.)	
13	Weight	TBD	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

FPC Connector is used for the module electronics interface. The recommended model is FH12A-50S-0.5SH manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Remark
1	VLED+	P	Power for LED backlight (Anode)	
2	VLED+	P	Power for LED backlight (Anode)	
3	VLED-	P	Power for LED backlight (Cathode)	
4	VLED-	P	Power for LED backlight (Cathode)	
5	GND	P	Power ground	
6	V _{COM}	I	Common voltage	
7	DV _{DD}	P	Power for Digital Circuit	
8	MODE	I	DE/SYNC mode select	Note 1
9	DE	I	Data Input Enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	Note 2
19	B0	I	Blue data(LSB)	Note 2
20	G7	I	Green data(MSB)	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	Note 2

27	G0	I	Green data(LSB)	Note 2
28	R7	I	Red data(MSB)	
29	R6	I	Red data	
30	R5	I	Red data	
31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	Note 2
35	R0	I	Red data(LSB)	Note 2
36	GND	P	Power Ground	
37	DCLK	I	Sample clock	Note 3
38	GND	P	Power Ground	
39	L/R	I	Left / right selection	Note 4,5
40	U/D	I	Up/down selection	Note 4,5
41	V _{GH}	P	Gate ON Voltage	
42	V _{GL}	P	Gate OFF Voltage	
43	AV _{DD}	P	Power for Analog Circuit	
44	RESET	I	Global reset pin.	Note 6
45	NC	-	No connection	
46	V _{COM}	I	Common Voltage	
47	DITHB	I	Dithering function	Note 7
48	GND	P	Power Ground	
49	NC	-	No connection	
50	NC	-	No connection	

I: input, O: output, P: Power

Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE="1", VS and HS must pull high.

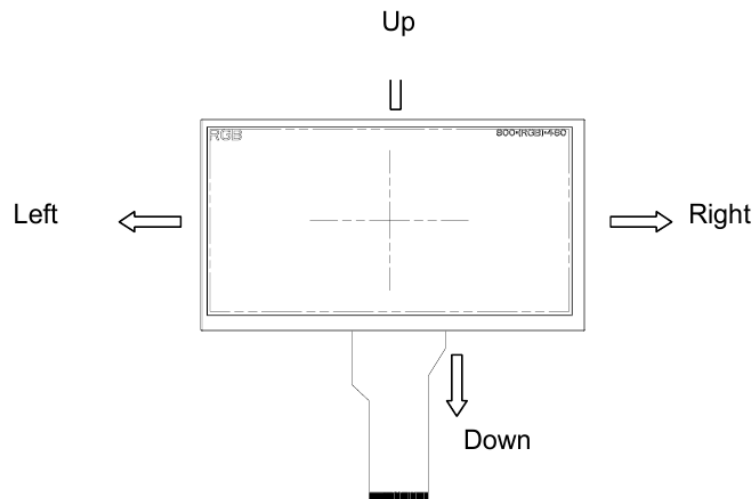
When select SYNC mode, MODE= "0", DE must be grounded.

Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

Note 3: Data shall be latched at the falling edge of DCLK.

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DV _{DD}	Up to down, left to right
DV _{DD}	GND	Down to up, right to left
GND	GND	Up to down, right to left
DV _{DD}	DV _{DD}	Down to up, left to right

Note 5: Definition of scanning direction.
Refer to the figure as below:



Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 7: Dithering function enable control, normally pull high.
When DITHB="1", Disable internal dithering function,
When DITHB="0", Enable internal dithering function,

3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	DV_{DD}	-0.3	5.0	V	
	AV_{DD}	6.5	13.5	V	
	V_{GH}	-0.3	40.0	V	
	V_{GL}	-20.0	0.3	V	
	$V_{GH}-V_{GL}$	-	40.0	V	
Operation Temperature	T_{OP}	-20	70	°	
Storage Temperature	T_{ST}	-30	80	°	

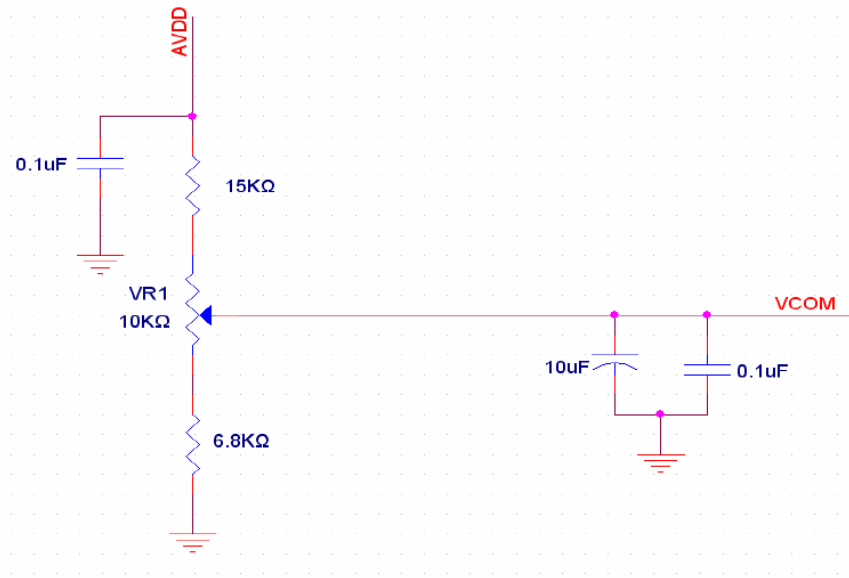
Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

3.1.1. Typical Operation Conditions

(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	DV _{DD}	3.0	3.3	3.6	V	Note 2
	AV _{DD}	10.2	10.4	10.6	V	
	V _{GH}	15.3	16.0	16.7	V	
	V _{GL}	-7.7	-7.0	-6.3	V	
Input signal voltage	V _{COM}	2.6	(3.6)	4.6	V	Note 4
Input logic high voltage	V _{IH}	0.7 DV _{DD}	-	DV _{DD}	V	Note 3
Input logic low voltage	V _{IL}	0	-	0.3 DV _{DD}	V	

- Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.
Note 3: DCLK,HS,VS,RESET,U/D, L/R,DE,R0~R7,G0~G7,B0~B7,MODE,DITHB.
Note 4: Typical V_{COM} is only a reference value. It must be optimized according to each LCM. Please use VR and base on below application circuit.



3.1.2. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	0.2	1.0	mA	$V_{GH} = 16.0V$
	I_{GL}	-	0.2	1.0	mA	$V_{GL} = -7.0V$
	IDV_{DD}	-	4.0	10	mA	$DV_{DD} = 3.3V$
	IAV_{DD}	-	20	50	mA	$AV_{DD} = 10.4V$

3.1.3. Backlight Driving Conditions

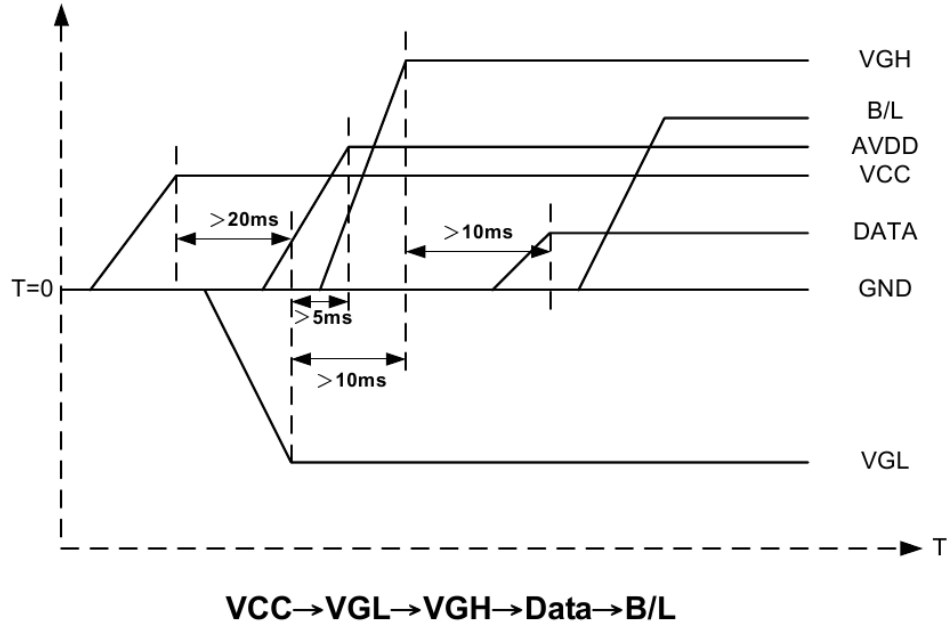
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L	8.4	9.3	10.5	V	Note 1
Current for LED Backlight	I_L	72	80	88	mA	Note 2
LED life time	-	20,000	-	-	Hr	Note 3

Note 1: The LED Supply Voltage is defined by the number of LED at $T_a=25^{\circ}C$ and $I_L=80mA$. In the case of 3pcs LED, $V_L=3.1*3=9.3V$.

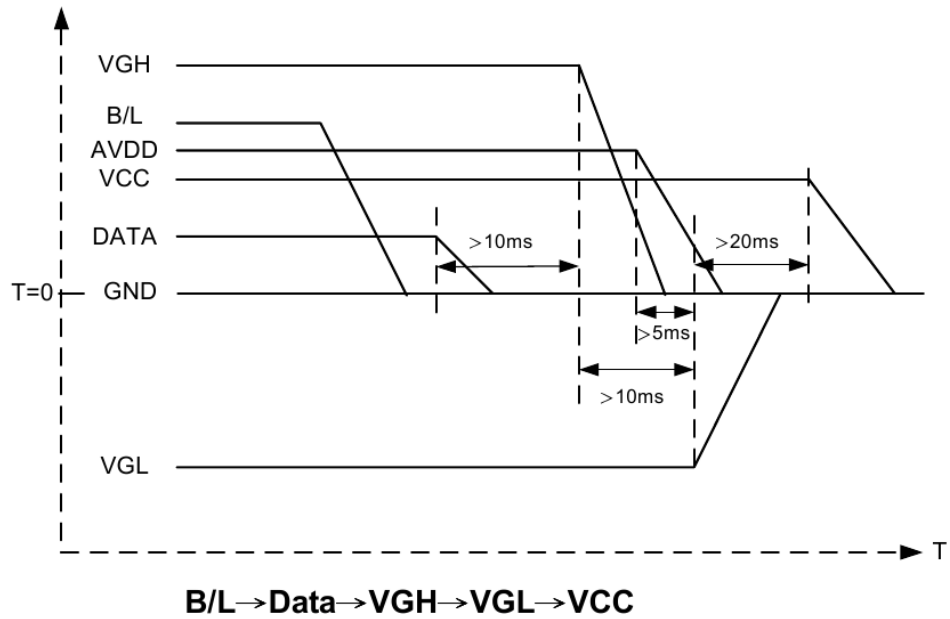
Note 2: The total current for LED backlight.

Note 3: The "LED life time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is $25^{\circ}C$ and $I_L=80mA$. The LED lifetime could be decreased if operating I_L is larger than 80 mA.

1. Power on :



2. Power off:



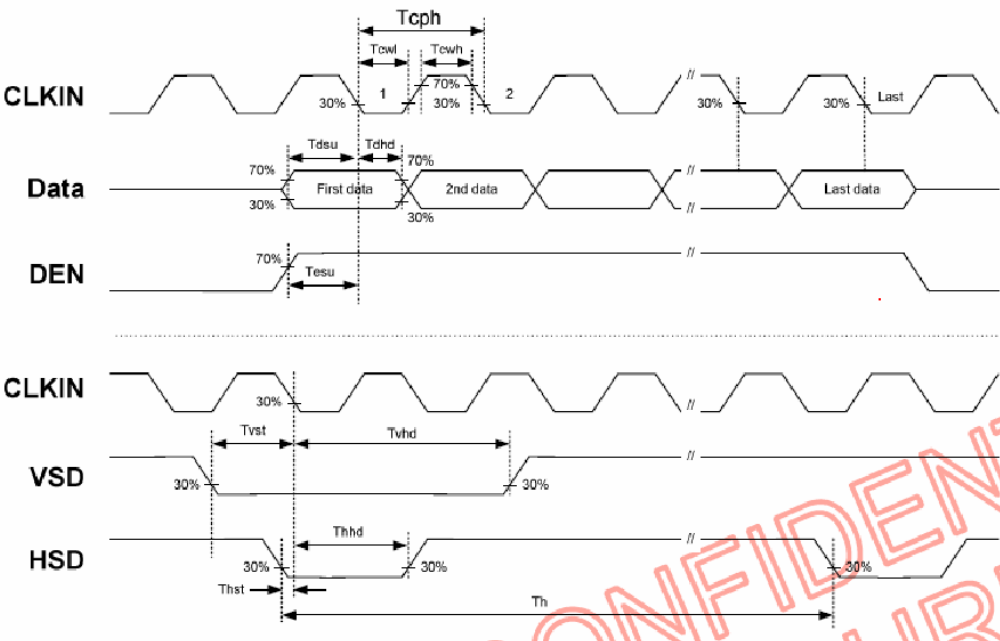
Note: Data include: STVD, STVU, CKV, OEH, STHL, STHR, CPH3, CPH2, CPH1, V_R, V_G, V_B.

3.3. Timing Characteristics

3.3.1. AC Electrical Characteristics

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	T_{hst}	8	-	-	ns	
HS hold time	T_{hhd}	8	-	-	ns	
VS setup time	T_{vst}	8	-	-	ns	
VS hold time	T_{vhd}	8	-	-	ns	
Data setup time	T_{dsu}	8	-	-	ns	
Data hole time	T_{dhd}	8	-	-	ns	
DE setup time	T_{esu}	8	-	-	ns	
DE hole time	T_{ehd}	8	-	-	ns	
DV _{DD} Power On Slew rate	T_{POR}	-	-	20	ms	From 0 to 90% DV _{DD}
RESET pulse width	T_{Rst}	1	-	-	ms	
DCLK cycle time	T_{coh}	20	-	-	ns	
DCLK pulse duty	T_{cwh}	40	50	60	%	

3.3.2. Input Clock and Data Timing Diagram



3.3.3. Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	

VS pulse width	tpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

3.3.4. Data Input Format

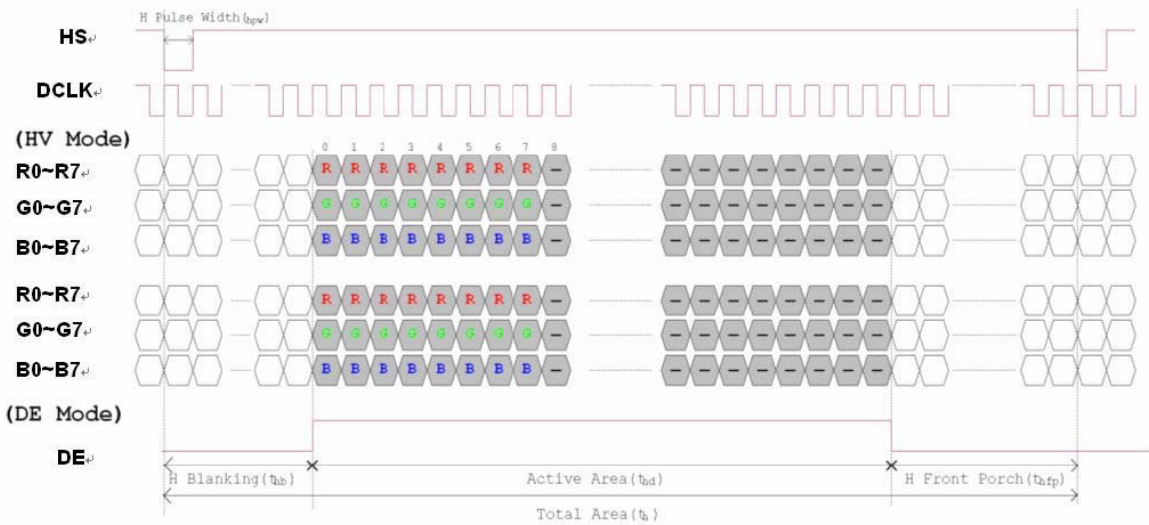


Figure 3. 1 Horizontal input timing diagram.

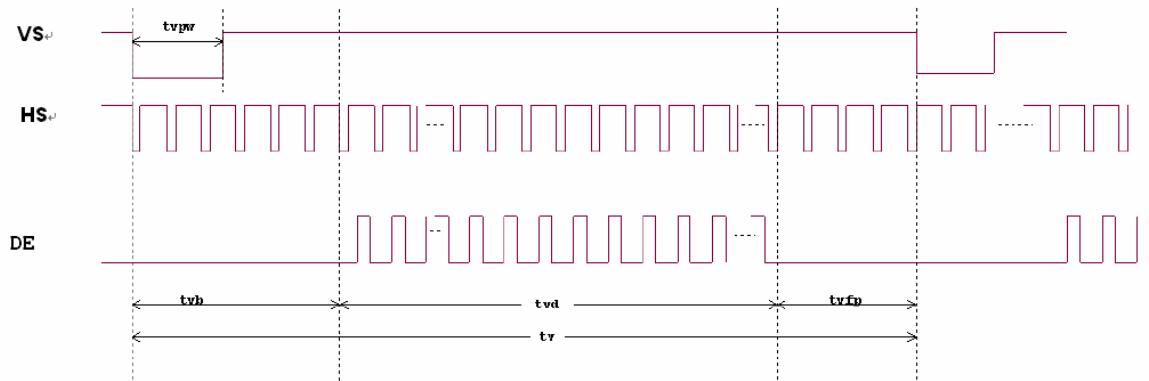


Figure 3. 2 Vertical input timing diagram.

4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR $\geq$ 10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	55	60	-	degree	Note 1
	θ_R	$\Phi=0^\circ$ (3 o'clock)	55	60	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	35	40	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	55	60	-		
Response time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	15	30	msec	Note 3
	T_{OFF}		-	20	40	msec	Note 3
Contrast ratio	CR		250	300	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.28	0.33	0.38	-	
Luminance	L		200	250		-cd/m ²	Note 6
Luminance uniformity	Y_U		70	75	-	-	Note 7

Test Conditions:

1. $V_{CC}=5V$, $AV_{DD}=5V$, $I_L=80mA$ (Backlight current), the ambient temperature is 25°C
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

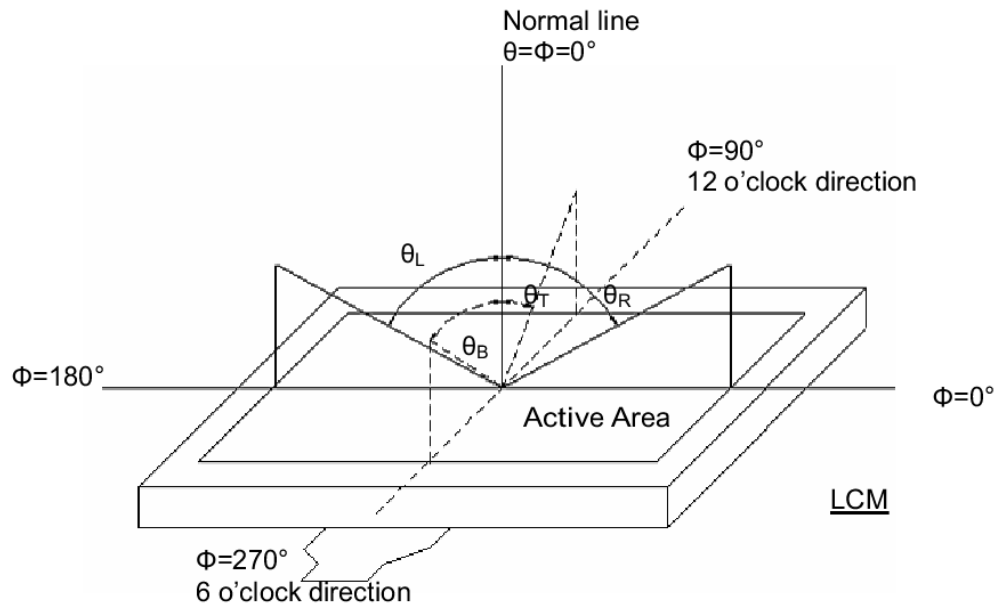


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

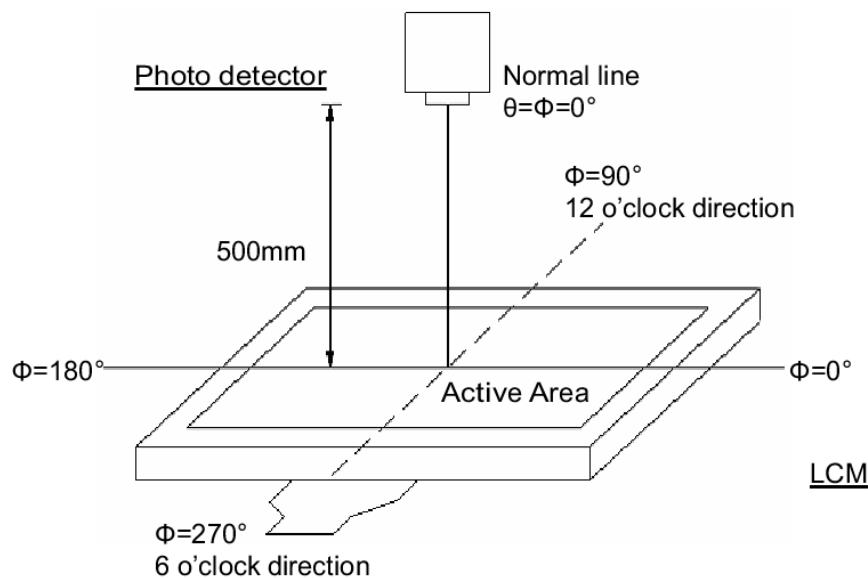


Fig. 4-2 Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

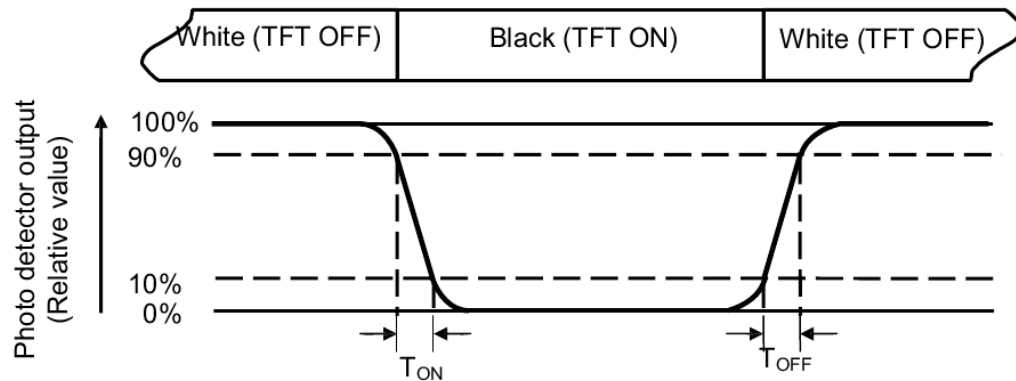


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel.

5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80℃ 240hrs	Note 1 Note 4
Low Temperature Storage	Ta = -30℃ 240hrs	Note 1 Note 4
High Temperature Operation	Ts = 70℃ 240hrs	Note 2 Note 4
Low Temperature Operation	Ta = -20℃ 240hrs	Note 1 Note 4
Operate at High Temperature and Humidity	+60℃ , 90%RH 240hrs	Note 4
Thermal Shock	-30℃ /30 min ~ +80℃ /30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note 4

Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

6. General Precautions

6.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

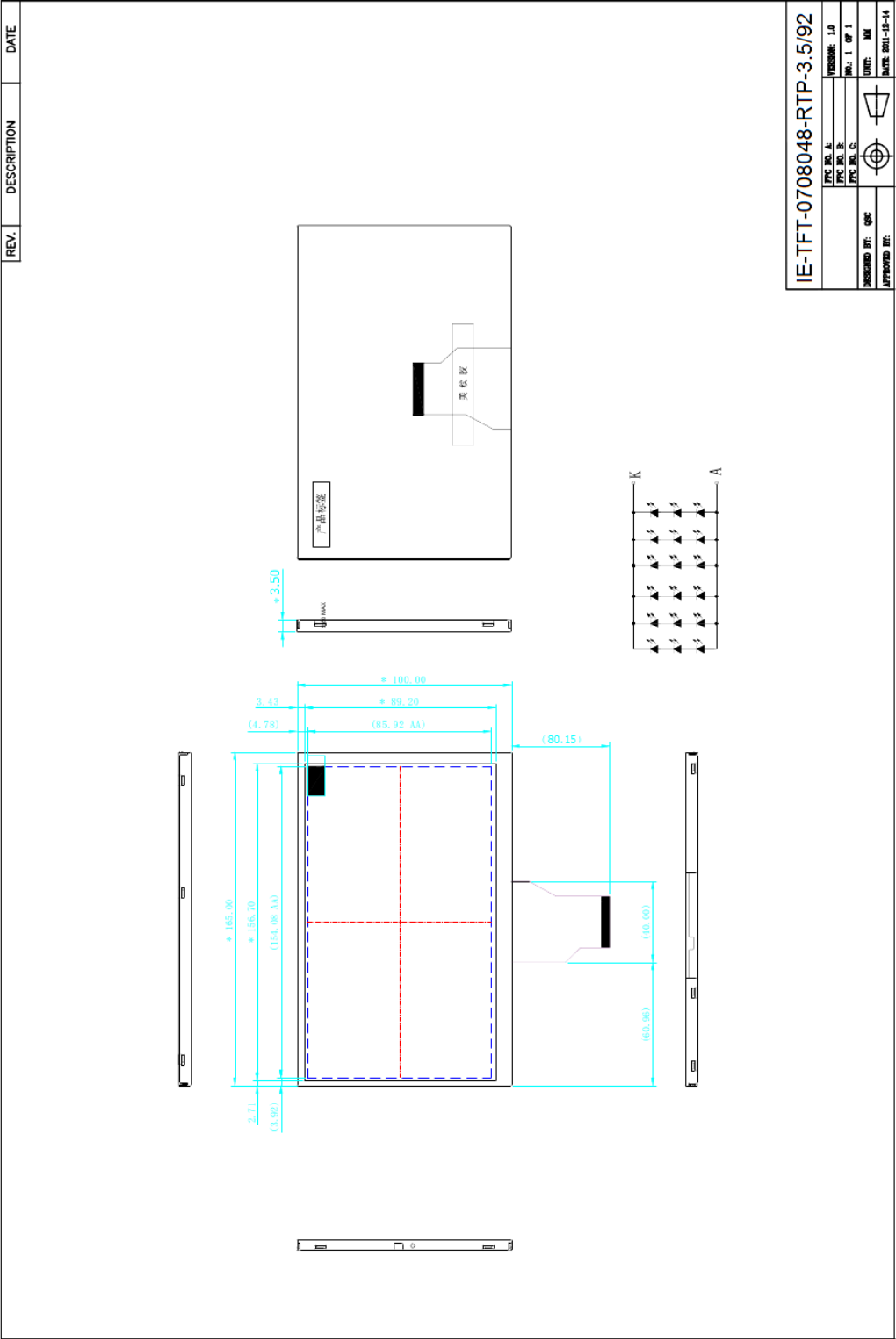
6.4. Storage

1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

6.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft cloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

7. Mechanical Drawing



8. Package Drawing

8.1. Packaging Material Table

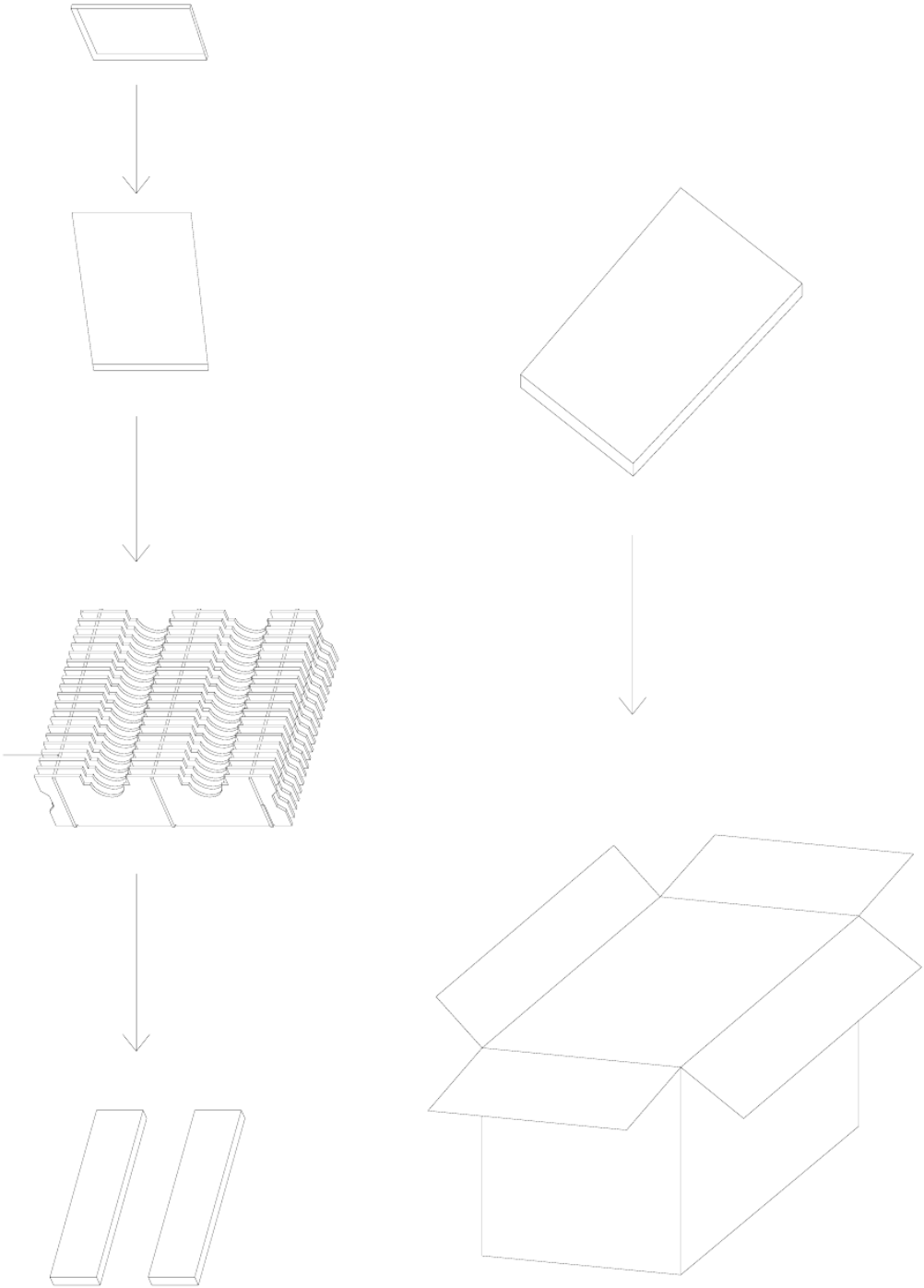
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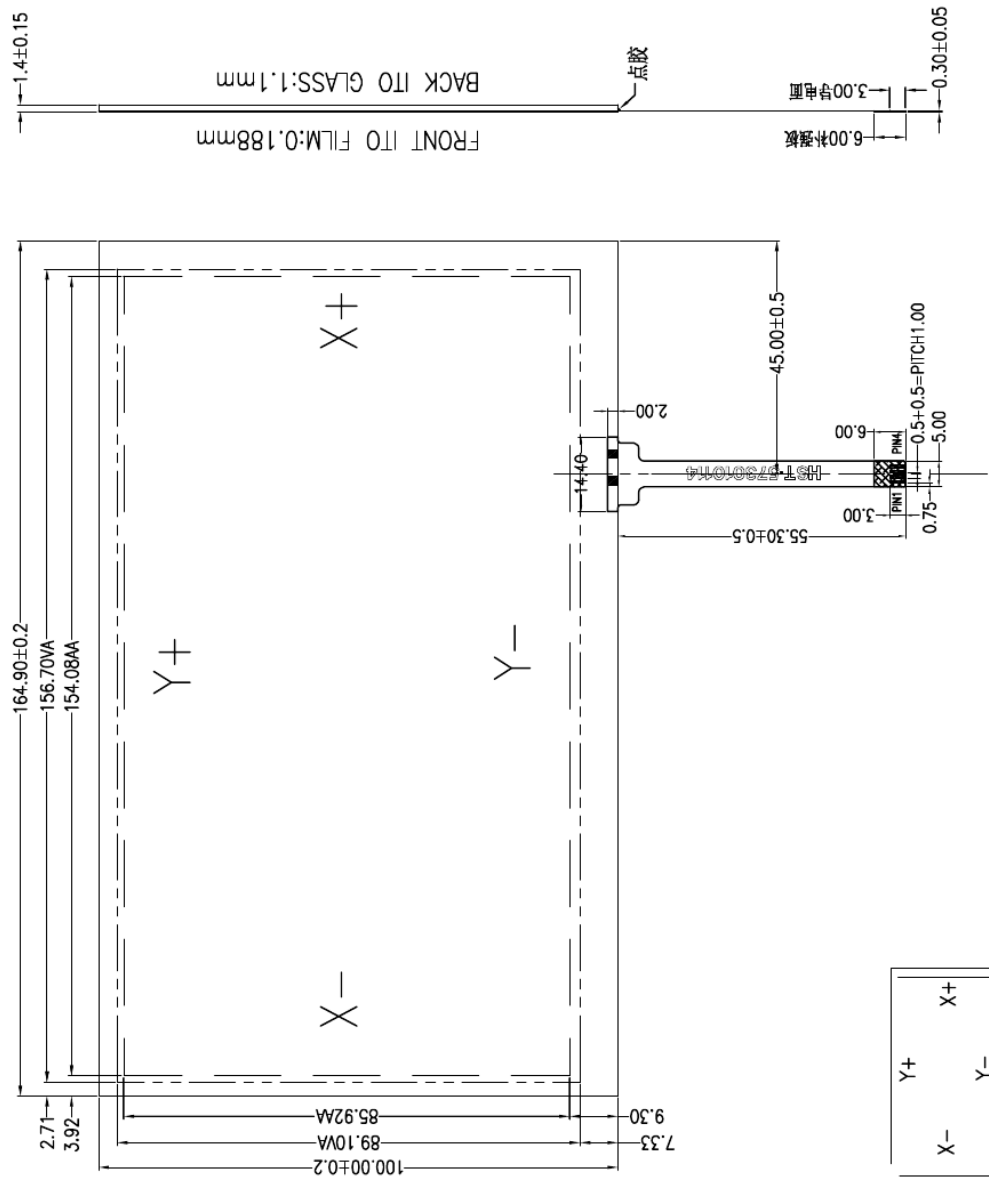
No.	Item	Model (Material)	Dimensions(mm)	Unit Weight (kg)	Quantity	Remark
1	LCM Module	IE-TFT-0708048- RTP-3.5/92	165.0 × 100.0 × 3.5	0.166	50 pcs	
2	Partition	BC Corrugated paper	512 × 349 × 226	1.360	1 set	
3	Corrugated Bar	B Corrugated paper	512 × 11 × 3	0.032	4 set	
4	Dust-Proof Bag	PE	700 × 530	0.041	1 pcs	
5	A/S Bag	PE	180 × 133 × 0.2	0.002	50 pcs	
6	Carton	Corrugated paper	530 × 355 × 255	0.830	1 pcs	
7	Total weight	10.759± 5%Kg				

8.2. Packaging Quantity

Total LCM quantity in Carton: no. of Partition 2 Rows x quantity per Row 25 = 50
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8.3. Packaging Drawing





SPECIFICATIONS	
Transmittance	80% or more
Resistance	Direction "X" (Glass) : 200~900 Ω
between Lead	Direction "Y" (Film) : 200~900 Ω
Linearity	Direction "X" : 1.5% or less
	Direction "Y" : 1.5% or less
Insulation R	20M Ω or more at DC 25V
Chattering Time	10msec or less
Input Method	A Special Stylus or Finger
Operating Force	Stylus: 80g or less
	Finger: 80g or less
Surface Hardness	3H or more
Punching Life	Punch 1000000times

外型尺寸	工作电压	DC 3V	设计	QSC	11/03/09	视角	产品编号
可视区尺寸	操作温度	-20~50° C	审核				
前物料/厚度	储存温度	-40~60° C	批准			mm	
后物料/厚度	接口方式	FPC				±0.2	±0.5°
						公 差	版本 A
						1/1	
						比例	

IE-TFT-0708048-RTP-3.5/92