









## 5. INTERFACE PIN CONNECTION

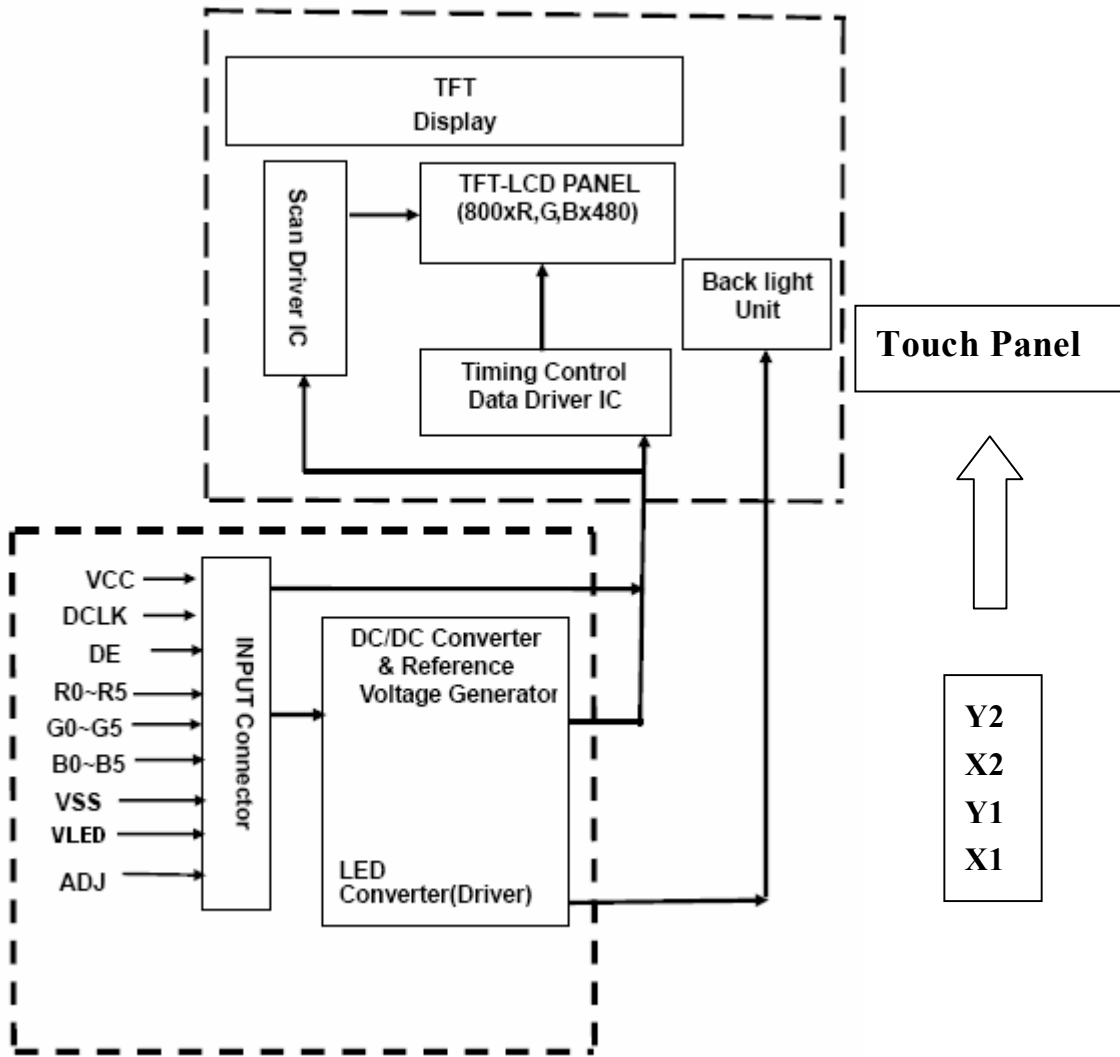
### 5.1 LCM PANEL DRIVING SECTION (CN1 Connector: Starconn 089N40-000R00-G2)

PIN NO	SYMBOL	FUNCTION	REMARK
1	GND	GROUND	
2	GND	GROUND	
3	ADJ	BRIGHTNESS CONTROL FOR LED B/L	
4	VLED	POWER SUPPLY FOR LED DRIVER CIRCUIT	
5	VLED	POWER SUPPLY FOR LED DRIVER CIRCUIT	
6	VLED	POWER SUPPLY FOR LED DRIVER CIRCUIT	
7	VCC	POWER SUPPLY FOR DIGITAL CIRCUIT	
8	VCC	POWER SUPPLY FOR DIGITAL CIRCUIT	
9	DE	DATA ENABLE	
10	GND	GROUND	
11	GND	GROUND	
12	GND	GROUND	
13	B5	BLUE DATA SIGNAL(MSB)	
14	B4	BLUE DATA SIGNAL	
15	B3	BLUE DATA SIGNAL	
16	GND	GROUND	
17	B2	BLUE DATA SIGNAL	
18	B1	BLUE DATA SIGNAL	
19	B0	BLUE DATA SIGNAL(LSB)	
20	GND	GROUND	
21	G5	GREEN DATA SIGNAL(MSB)	
22	G4	GREEN DATA SIGNAL	
23	G3	GREEN DATA SIGNAL	
24	GND	GROUND	
25	G2	GREEN DATA SIGNAL	
26	G1	GREEN DATA SIGNAL	
27	G0	GREEN DATA SIGNAL(LSB)	
28	GND	GROUND	
29	R5	RED DATA SIGNA(MSB)	
30	R4	RED DATA SIGNA	
31	R3	RED DATA SIGNA	
32	GND	GROUND	
33	R2	RED DATA SIGNA	
34	R1	RED DATA SIGNA	
35	R0	RED DATA SIGNA(LSB)	
36	GND	GROUND	
37	GND	GROUND	
38	DCLK	CLOCK SIGNALS	
39	GND	GROUND	
40	GND	GROUND	

## 5.2 TOUCH PANEL SCREEN

PIN NO	SYMBOL	FUNCTION	REMARK
1	Y2	TOUCH PANEL SIGNAL(Y-TOP)	
2	X2	TOUCH PANEL SIGNAL(X-Right)	
3	Y1	TOUCH PANEL SIGNAL(Y-Bottom)	
4	X1	TOUCH PANEL SIGNAL(X-Left)	

## 6. BLOCK DIAGRAM



## 7. ABSOLUTE MAXIMUM RATINGS

### 7.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	COMMENT
Power Supply Voltage	VCC	-0.3	+7.0	V	
Logic Output Voltage	V <sub>I</sub>	-0.3	VCC+0.3	V	

### 7.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		COMMENT
	MIN	MAX	MIN	MAX	
Ambient Temperature(°C)	-10	60	-20	70	Note 1,2,3
Humidity(% RH)	-	90	-	90	Note 4

Note 1 : The response time will become lower when operated at low temperature.

Note 2 : Background color changes slightly depending on ambient temperature.

Note 3 : Operation Ta=60°C & -10°C ≤ 96Hrs.

Note 4 : Operation Ta=40°C & H=90% ≤ 96Hrs.

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## 8.ELECTRICAL CHARACTERISTICS

### 8.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Power Voltage for LCD	VCC	3.0	3.3	3.6	V
	ICC	-	225	337.5	mA
Input High Voltage	V <sub>IH</sub>	0.7*VCC	-	VCC	V
Input Low Voltage	V <sub>IL</sub>	GND	-	0.3*VCC	V
Output High Voltage	V <sub>OH</sub>	0.8VCC	-	VCC	V
Output Low Voltage	V <sub>OL</sub>	GND	-	0.2VCC	V

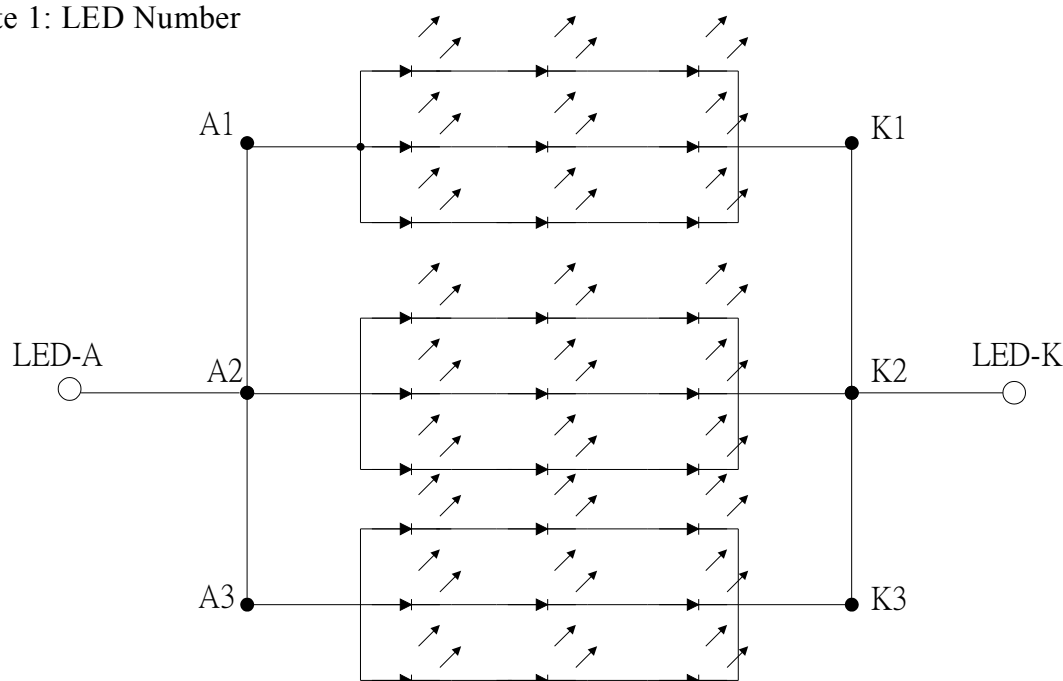
### 8.2 BACKLIGHT UNITS

Ta=25°C

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
LED Driving Voltage	VLED	3	5	5.5	V
LED Driving Current	I <sub>LED</sub> (VLED=3.3V)	-	650	850	mA
	I <sub>LED</sub> (VLED=5V)	-	400	550	mA
ADJ Input Voltage	-	3	-	3.3	V
ADJ Frequency	-	19	20	21	KHz

※ USE NICHIA LED.

Note 1: LED Number



Note 2: The LED of B/L is drive by current only, drive voltage is for reference only, drive voltage can make driving current under safety area(current between minimum and maximum). 30K hours is only an estimate for reference.



# 9.OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK	
Contrast Ratio	CR	At optimized Viewing angle	300	400	-	-	Note (1)	
Response Time	TR	T=0	-	5	10	ms	Note (2)	
	TF		-	15	20	ms		
Brightness		ADJ=3.3V	320	400	-	cd/m2		
Uniformity			70	-	-	%	Note(5)	
Chromaticity	White	x	Viewing Angle $\Theta_x=\Theta_y=0^\circ$	0.28	0.33	0.38	-	Note (4)
		y		0.33	0.38	0.43	-	
Viewing Angle	$\Theta_{x+}$	$CR \geq 10$	60	70	-	Deg.	Note (3)	
	$\Theta_{x-}$		60	70	-			
	$\Theta_{y+}$		40	50	-			
	$\Theta_{y-}$		50	60	-			

\*Note (1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L63 / L0$$

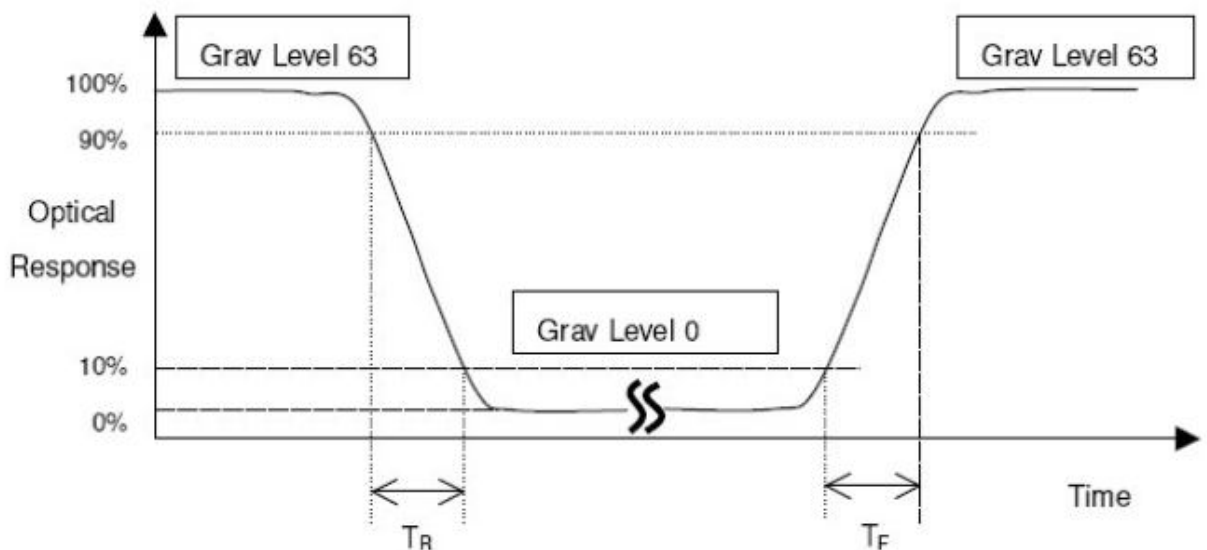
L63: Luminance of gray level 63

L0: Luminance of gray level 0

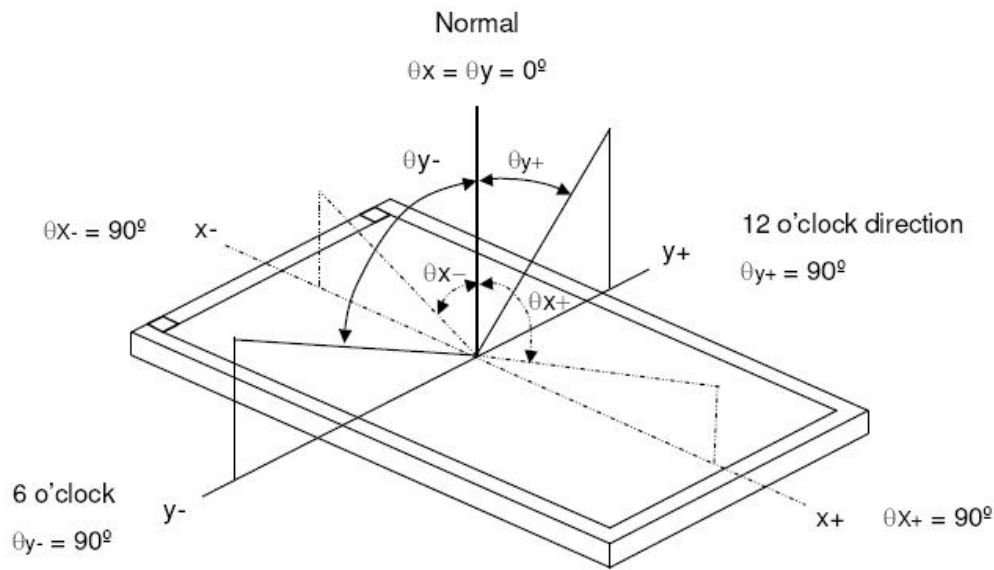
$$CR = CR (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

\*Note (2) Definition of Response Time ( $T_R$ ,  $T_F$ ):

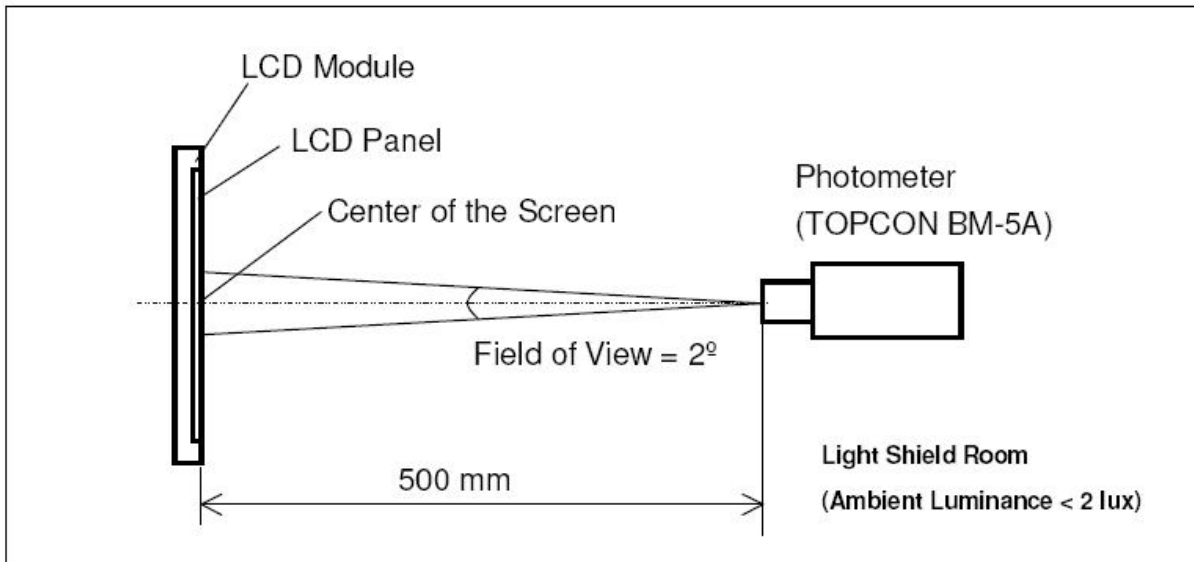


\*Note(3) Definition of Viewing Angle

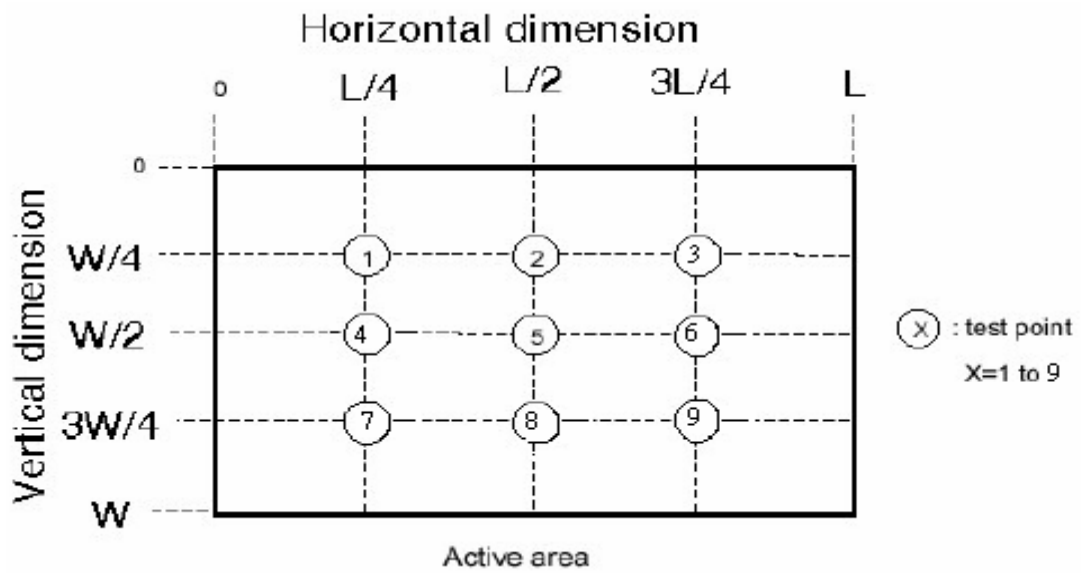


\*Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



\*Note (5)



$$\left( 1 - \frac{\text{MAX Luminance} - \text{Average Luminance}}{\text{Average Luminance}} \right) \times 100\% > 70\%$$

# 10. TOUCH PANEL SPECIFICATIONS

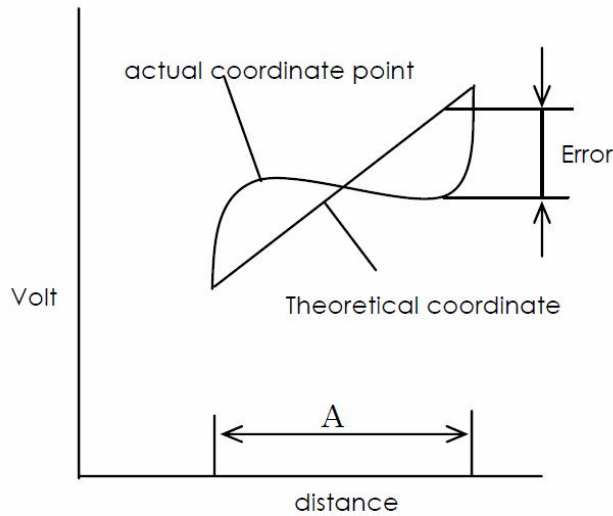
## 10.1 ELECTRICAL CHARACTERISTICS OF TOUCH PANEL

ITEM		SPECIFICATION
(1)	Loop Resistance	X:450Ω~1100Ω,Y:100Ω~400Ω
(2)	Linearity	$X \leq 1.5\%$ , $Y \leq 1.5\%$ (see Note1)
(3)	Working Voltage	DC 10V Max.

### Note 1

Difference between actual voltage & theoretical voltage is an error at ant points.

Linearity is the value max. error voltage divided by voltage difference on active area inside 2mm.



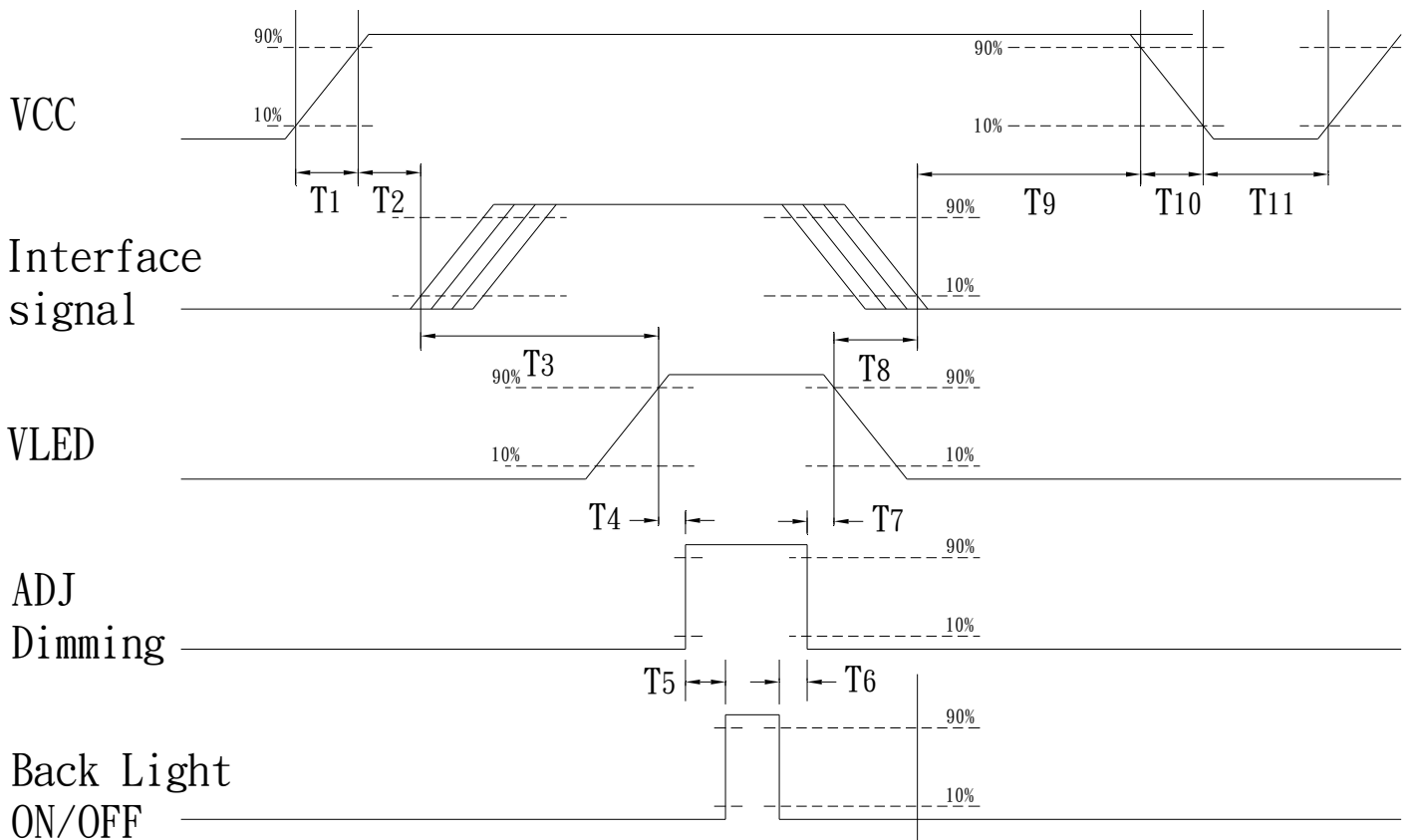
A: Guaranteed active area

## 10.2 TOUCH PANEL SCREEN

Pin NO.	Description
1	Y2
2	X2
3	Y1
4	X1

# 11. TIMING SPECIFICATIONS

## 11.1 POWER SIGNAL SEQUENCE



Power ON/OFF sequence timing

PARAMETER	MIN.	TYP.	MAX.	UNIT
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	10	-	-	ms
T5	10	-	-	ms
T6	0	-	-	ms
T7	10	-	-	ms
T8	100	-	-	ms
T9	0	16	50	ms
T10	-	-	10	ms
T11	1000	-	-	ms

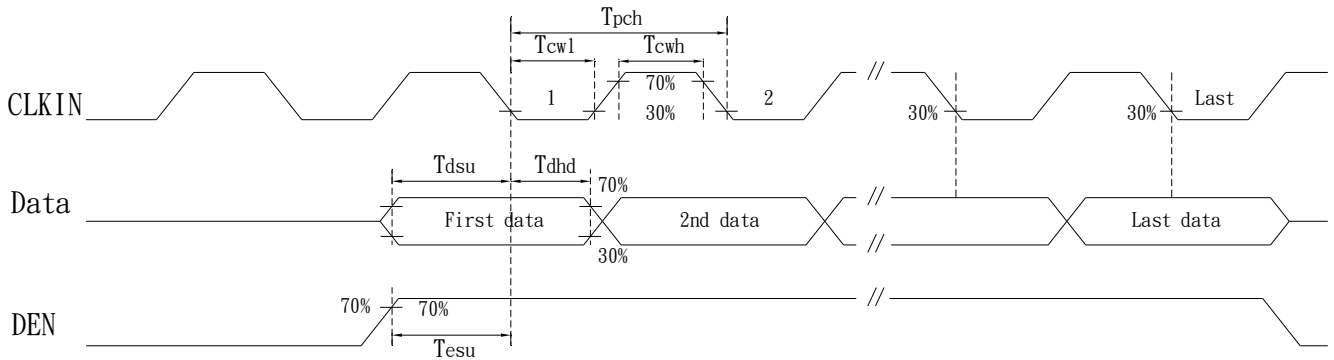
The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

### 11.2 AC TIMING CHARACTERISTICS

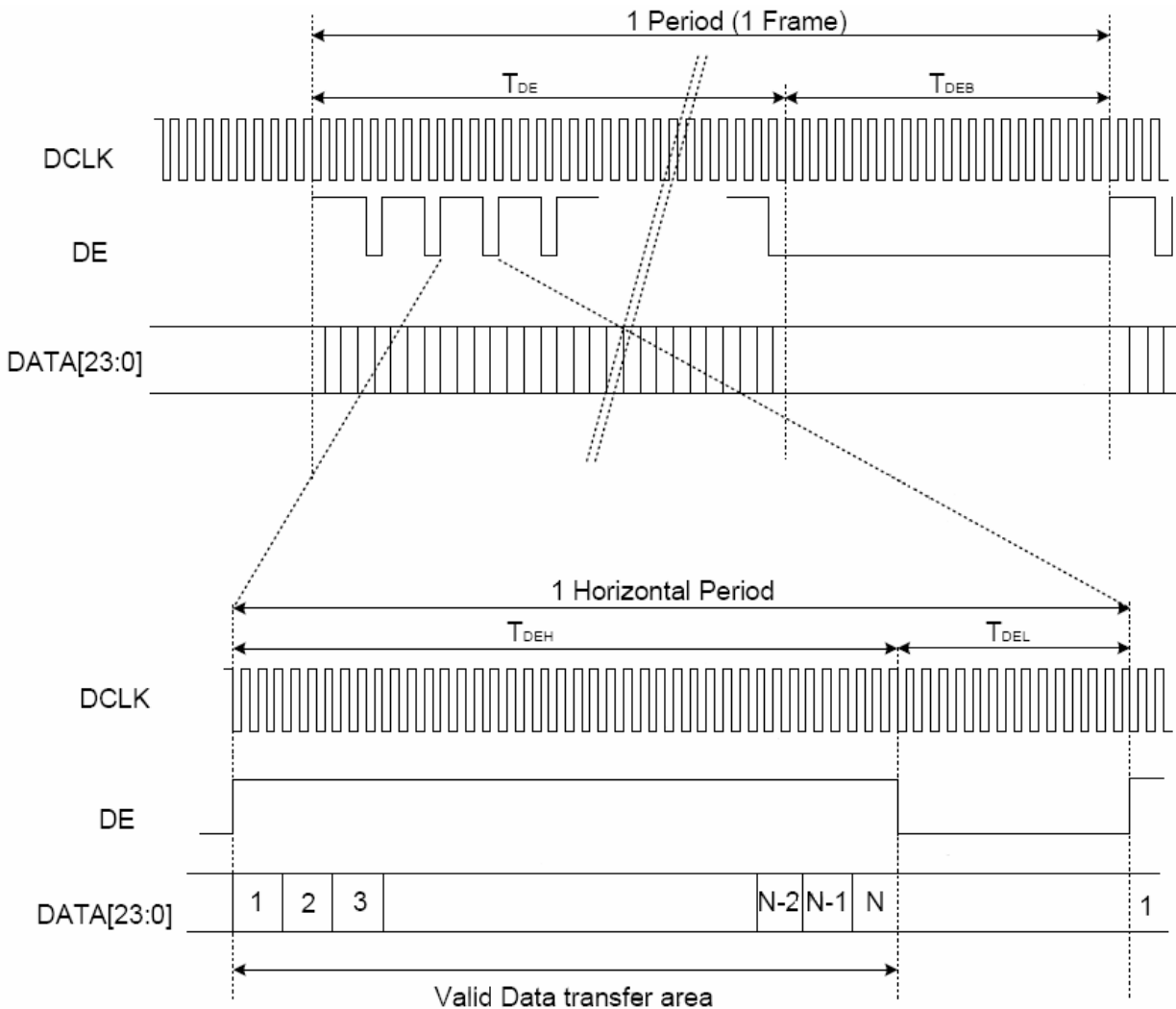
PARAMETER		SYMBOL	MIN.	TYP.	MAX	UNIT	CONDITION
Clock	Frequency	1/Tc	-	33.26	-	MHz	Note1
	Clk pulse duty	Tcwh	40	50	60	%	Note1
	Clk cycle time	Tcph	25	-	-	ns	Note1
Data	Setup time	Tdsu	6	-	-	ns	Note1
	Hold time	Tdhd	6	-	-	ns	Note1
ENAB signal	Setup time	Tesu	6	-	-	ns	Note1

Note 1: Frame rate is 60 Hz at 3.3V VCC

Clock and Data Timing Diagram



### 11.3 DE MODE DATA FORMAT



## 12. RELIABILITY TEST

ENVIRONMENTAL TEST				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	70°C	96HRS	
2	Low Temperature Storage	-20°C	96HRS	
3	High Temperature Operation	60°C	96HRS	NOTE(2)
4	Low Temperature Operation	-10°C	96HRS	NOTE(2)
5	Temperature Cycle	-10°C ← → 60°C (30min) (30min)	10CYCLE	NOTE(2)
6	High Temperature Humidity Storage	40°C 90%RH	96HRS	NOTE(2)

NOTE (1): a. THE MODULE SHOULD WORK PROPERLY.

b. BEFORE AND AFTER FUNCTION TEST, THE DIFFERENCE OF CONSUMPTIVE CURRENT SHOULD BE WITHIN 10%

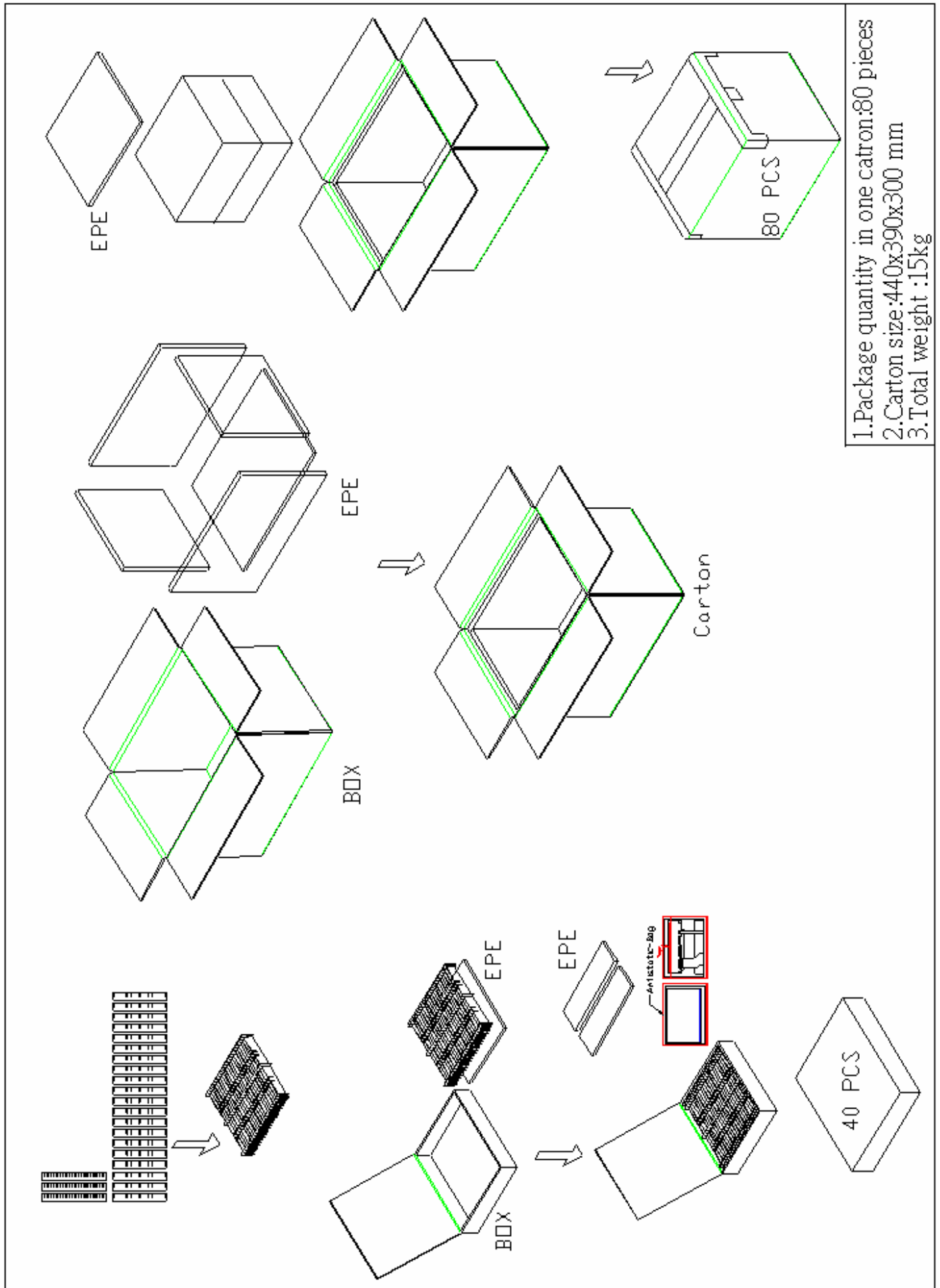
NOTE (2): a. THE MODULE SHOULD WORK PROPERLY.

b. THE MODULE WON'T BE DEFORMATIVE, COLOR CHANGEABLE OR BROKEN.

c. THE MODULES CAN'T BE APART.

NOTE (3): BEFORE COSMETIC AND FUNCTION TEST, THE PRODUCT MUST HAVE ENOUGH RECOVERY TIME, AT LEAST 2 HOURS AT ROOM TEMPERATURE.

### 13. PACKAGE INFORMATION



- 1.Package quantity in one carton:80 pieces
- 2.Carton size:440x390x300 mm
- 3.Total weight :15kg