SAMSUNG DISPLAY

Product Specification

(√) Preliminary Specification
( ) Approval Specification

The information described in this SPEC is preliminary and can be changed without prior notice

CUSTOMER	
DATE OF ISSUE	2012.10.09

MODEL NO.	LTN173KT03
EXTENSION CODE	-301

Customer Approval & Feedback

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LCD Sales & Marketing Team **Samsung Display Co., Ltd**	

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REVISION HISTORY

Date.	Rev.No.	Page	Revision Description
12/10/09	P00		Initial Release

1. GENERAL DESCRIPTION

DESCRIPTION

LTN173KT03 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as switching devices. This model is composed of a TFT LCD panel, a driver circuit and a backlight unit. The resolution of a 17.3" contains 1600 x 900 pixels and can display up to 262,144 colors. 6 O'clock direction is the optimum viewing angle.

FEATURES

High contrast ratio
HD+ (1600 x 900 pixels) resolution
High Color Gamut (Typical 60%)
Low power consumption
Fast Response
LED back light with an embedded LED driver
DE (Data enable) only mode
3.3V LVDS Interface
Onboard EDID chip

APPLICATIONS

Notebook PC
If the intent to use this product is for other purpose, please contact Samsung Display.

GENERAL INFORMATION

Item	Specification	Unit	Note
Display area	382.08(H) x 214.92(V) (17.3” HD+ diagonal)	mm	
Driver Element	a-Si TFT active matrix		
Display colors	262,144		
Number of pixel	1600 x 900	pixel	16:9
Pixel Arrangement	RGB vertical stripe		
Pixel pitch	0.2388(H) x 0.2388(V) (TYP.)	mm	
Display Mode	Normally white		
Thickness of glass	0.5	mm	
Surface treatment	Haze 25%, Hard-Coating 3H	AG	

MECHANICAL INFORMATION

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	397.6	398.1	398.6	mm	
	Vertical (V)	232.3	232.8	233.3	mm	
	Depth (D)	-	-	6.0	mm	(1)
Weight		-	-	570	g	

NOTE (1) Measuring method for thickness

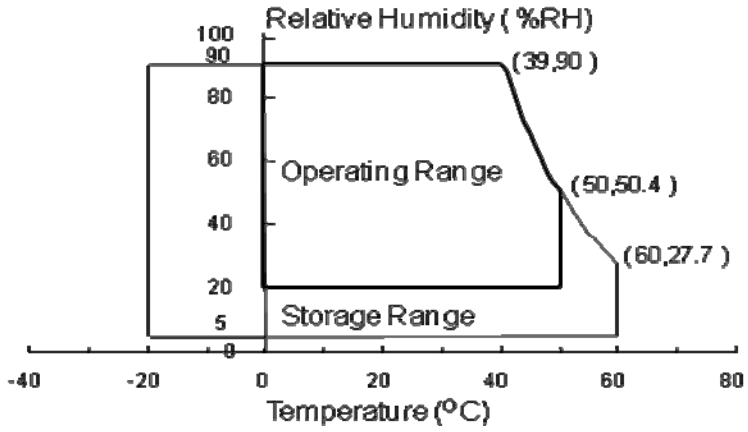
Force to be applied for measurement : The 500gf when using the height gauge.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ENVIRONMENTAL ABSOLTE RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Storage temperate	TSTG	-20	60	°C	(1)
Operating temperature (Temperature of glass surface)	TOPR	0	50	°C	(1)
Shock (non-operating)	Snop	-	240	G	(2), (4)
Vibration (non-operating)	Vnop	-	2.41	G	(3), (4)

Note (1) The range of temperature and relative humidity are shown in the graph below 90% RH Max. . (39℃ ≥ Ta) If the temperature is higher than 40 ℃, the maximum temperature of wet–bulb shall be less than 39℃. No condensation



(2) Vibrate ±X, ±Y, and ± Z axis in the shape of the half sine wave one time for 2ms .
(3) Vibrate the X, Y, and Z randomly within a 5 - 500 Hz range for 30min.
(4) When testing a vibration and a shock, the fixture, which holds the module to be tested shall be hard and rigid in order for the the module not to be twisted or bent by the fixture.

2.2 ELECTRICAL ABSOLUTE RATINGS

(1) TFT LCD MODULE

V_{LCD_VCC} =3.3V, V_{SS} = GND = 0V

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{LCD_VCC}	V_{SS} - 0.3	TBD	V	(1),(2)
LVDS Input Voltage	V_{LVDS}	V_{SS} - 0.3	TBD		

Note (1) Within Ta (25 ± 2 °C)

(2) Permanent damage to the device may occur if exceed maximum values

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(2) BACKLIGHT UNIT

VSS = GND = 0V

Item	Symbol	Min.	Max.	Unit	Note
BLU Supply Voltage	V_{BL_PWR}	V_{SS} - 0.3	TBD	V	(1), (2)
BLU Supply Current	I_{BL_PWR}	-	TBD	A	(1), (2) Vin=12V Duty 100%

Note (1) Within Ta (25 ± 2 °C)

(2) Permanent damage to the device may occur if exceed maximum values

2.3 THE OTHERS

(1) STATIC ELECTRICITY PRESSURE RESISTANCE

Item	Test Conditions	Remark
CONTACT DISCHARGE	(150pF, 330Ω, ± 8kV, 200points, 1 time/point)	Operating
AIR DISCHARGE	(150pF, 330Ω, ± 15kV, 200points, 1 time/point)	Operating

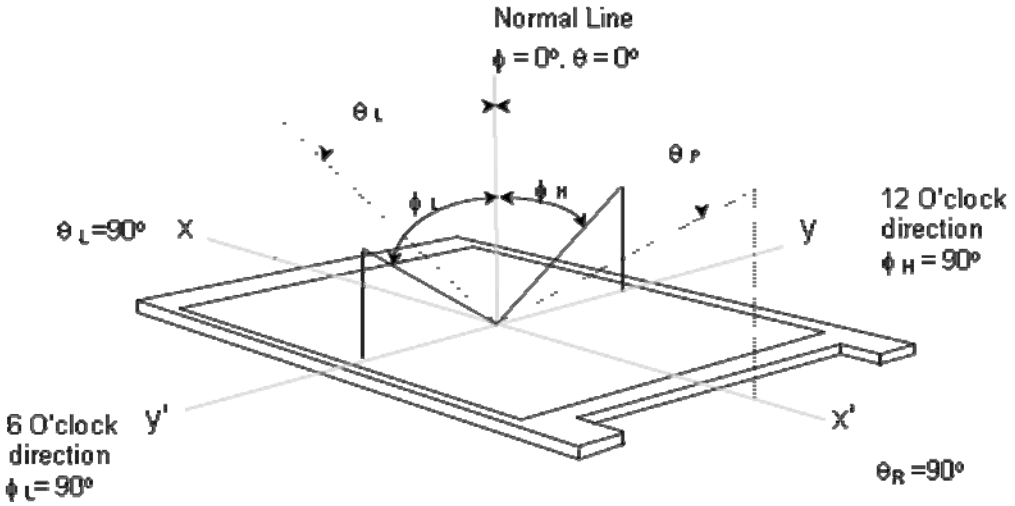
3. OPTICAL CHARACTERISTICS

The following items are measured under the stable conditions.* The optical characteristics should be measured in the dark room or the equivalent environment by the methods shown in the Note (5).
Measuring equipment : TOPCON SR-3

Ta = 25 ± 2 °C, V_{LCD_VCC} =3.3V, fv= 60Hz, fDCLK = TBDMHz, IF = 100% duty

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	Normal Viewing Angle $\phi = 0$ $\theta = 0$	300	TBD	-	-	(1),(2),(5)
Response time (Rising + Falling)		T_{RT}		-	16	25	msec	(1),(3)
Average Luminance of White (5 Points)		$Y_{L,AVE}$		TBD	200	-	cd/m^2	IF=100% Duty (1),(4)
Color Chromaticity (CIE)	Red	R_X		TBD	-	TBD		(1),(5)
		R_Y		TBD	-	TBD		
	Green	G_X		TBD	-	TBD		
		G_Y		TBD	-	TBD		
	Blue	B_X		TBD	-	TBD		
		B_Y		TBD	-	TBD		
	White	W_X		0.283	0.313	0.343		
		W_Y		0.299	0.329	0.359		
Viewing Angle	Hor.	θ_L	CR ≥ 10 At center	TBD	(45)	-	Degrees	(1),(5)
		θ_H		TBD	(45)	-		
	Ver.	ϕ_H		TBD	(15)	-		
		ϕ_L		TBD	(35)	-		
Color Gamut		CG		-	60	-	%	
White variation (13P)		δ_L		-	1.4	1.6		(6)

Note (1) The definition of viewing angle : The range of viewing angle (10 ≤ C/R)

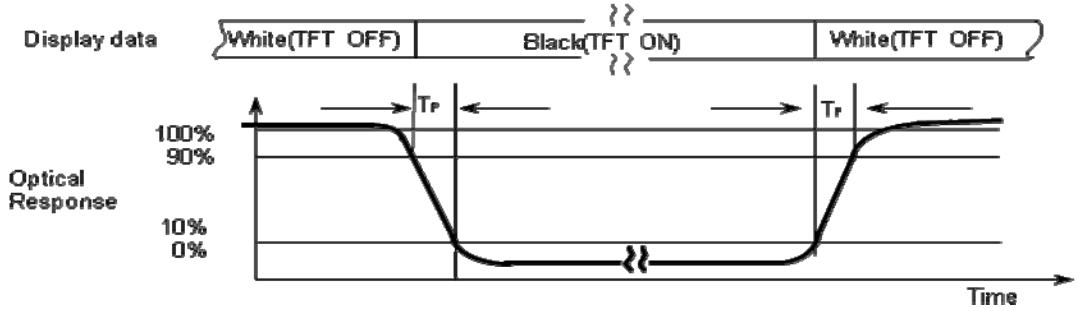


Note (2) The definition of contrast ratio (CR) : The ratio of max. gray and min gray at 5 points (4, 5, 7, 9, and10)

$$CR = \frac{CR(4) + CR(5) + CR(7) + CR(9) + CR(10)}{5}$$

Points = (4) (5) (7) (9) (10) at the figure of Note(6).

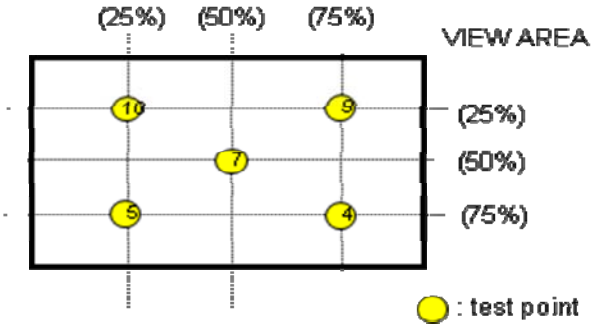
Note (3) The definition of Response time : Subtotal of the time, during which the transmission changes from 10% to 90% when the TFT turns on and off.



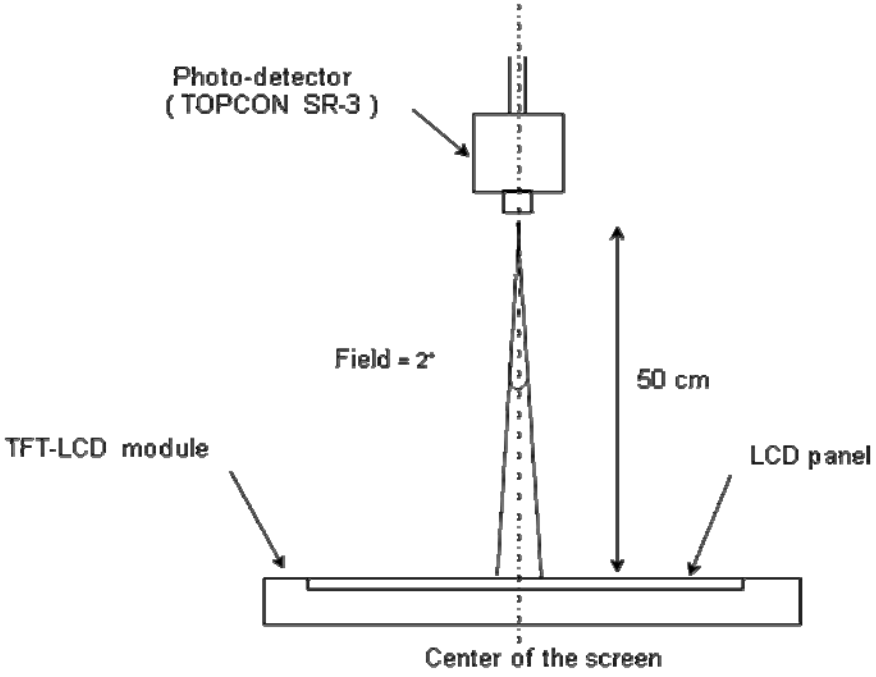
Note (4) The definition of average luminance of white : Measure the luminance of white at 5 points.

Average Luminance of White ($Y_{L,AVE}$)

$$Y_{L,AVE} = \frac{Y_{L4} + Y_{L5} + Y_{L7} + Y_{L9} + Y_{L10}}{5}$$



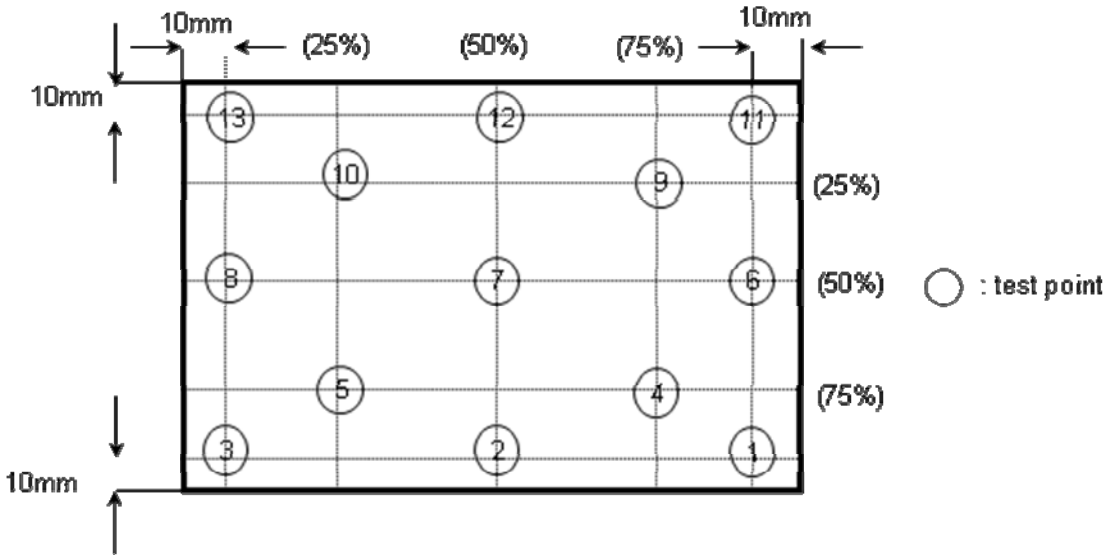
Note (5) Measure the panel, which is left for 30 min. at the normal temp. after leaving it for 30 min with turning the back light on at the rating. The measurement should be executed under the condition including the ambient temp., 25℃±2℃, the dark room, windless(removed the direct wind), and no vibration.



[Optical characteristics measurement setup]

Note (6) The definition of white variation at 13 points (δ L)

$$\delta_L = \frac{\text{Maximum luminance of 13 points}}{\text{Minimum luminance of 13 points}}$$



4. BLOCK DIAGRAM

4.1 TFT LCD MODULE

[TBD]

4.2 THE STRUCTURE OF LED PLACEMENT

(6 channels x 9ea = 54ea)

5. ELECTRICAL CHARACTERISTICS

5.1 TFT LCD MODULE

* Ta = 25 ± 2 °C

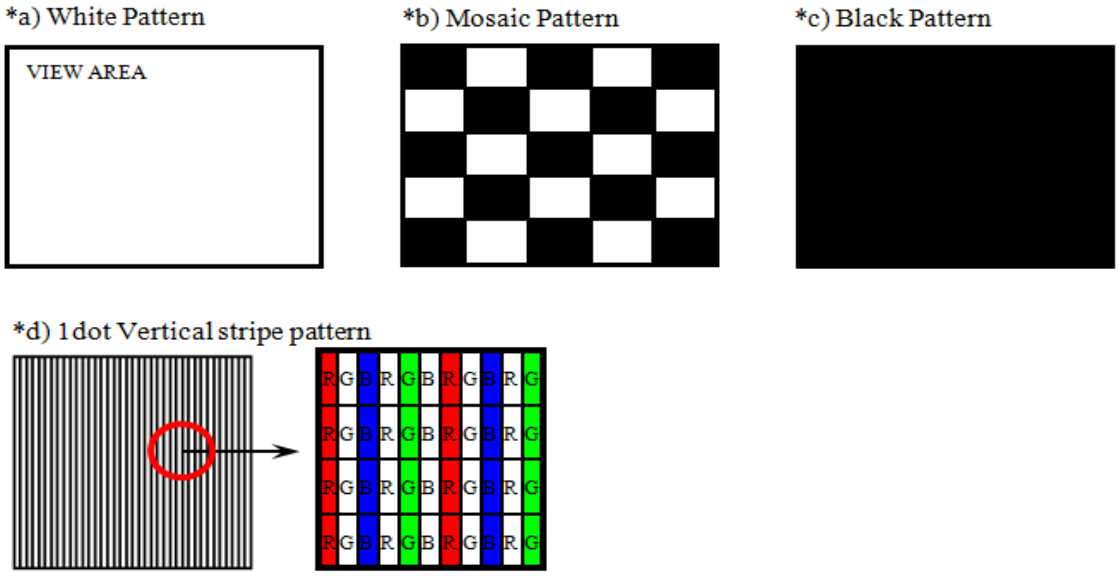
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage		V_{LCD_VCC}	(3.0)	(3.3)	(3.6)	V	
T-CON TTL Input Voltage	High	V_{IH}	0.7 V_{LCD_VCC}	-	-	V	
	Low	V_{IL}	-	-	0.3 V_{LCD_VCC}	V	
Vsync	60Hz	fv	-	60	-	Hz	
	40Hz	fv	-	40	-	Hz	(3)
Hsync	60Hz	fh	TBD	TBD	TBD	kHz	
Main Frequency	60Hz	fDCLK	TBD	TBD	TBD	MHz	
	40Hz	fDCLK	-	TBD	-	MHz	(3)
Rush Current		IRUSH	-	-	1.5	A	(5)
Input Current	White	I_{LCD_VCC}	-	TBD	-	mA	(4)
	Mosaic	I_{LCD_VCC}	-	TBD	TBD	mA	
	Black	I_{LCD_VCC}	-	TBD	-	mA	
	V.Stripe	I_{LCD_VCC}	-	TBD	-	mA	

Note (1) The data pins for display and signal pins for timing should be connected.(GND= 0V)

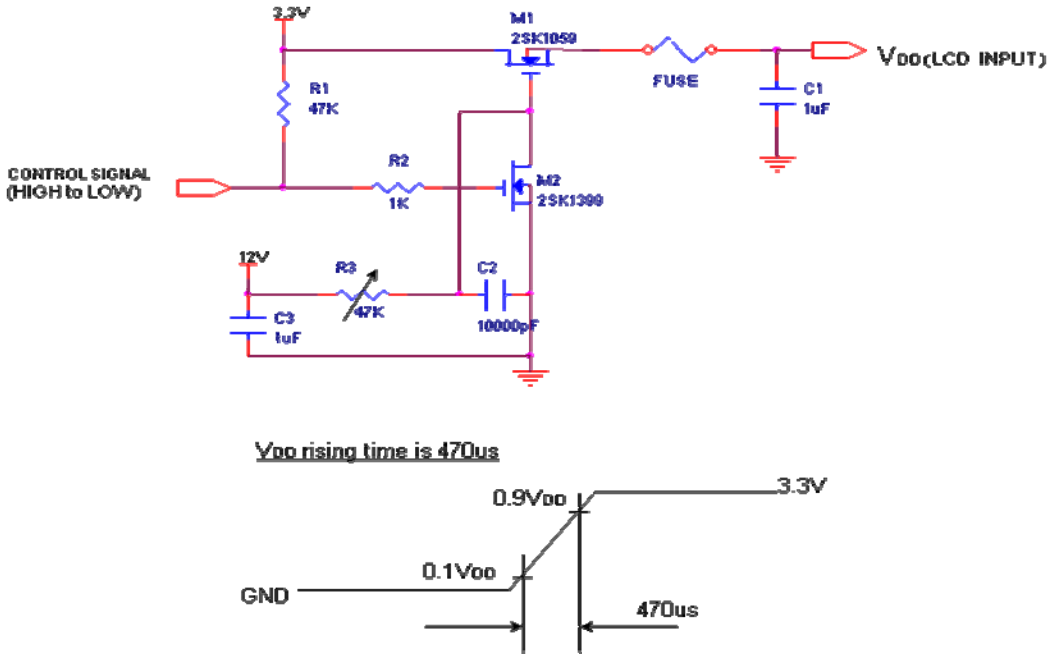
(2) fV = 60Hz, fDCLK = (TBD) MHZ, V_{LCD_VCC} = 3.3V , DC Current.

(3) In the case of 40Hz for sDRRS, FOS, Flicker & Brightness are not guaranteed, because their level might be different from 60Hz operation.

Note (4) The dissipation pattern for power



Note (5) The condition for measurement for rush current



5.2 BACK LIGHT UNIT

Ta = 25 ± 2 °C

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Forward Current	IF	-	TBD	-	mA	
LED Forward Voltage	VF	-	3.2	-	V	IF = TBDmA
LED Array Voltage	VP	-	TBD	-	V	VF * LED Counts
LED Power Consumption	P	-	TBD	TBD	W	
LED Life time	Hr	TBD	-	-	Hour	(1)
LED Counts	Q	-	54	-	EA	

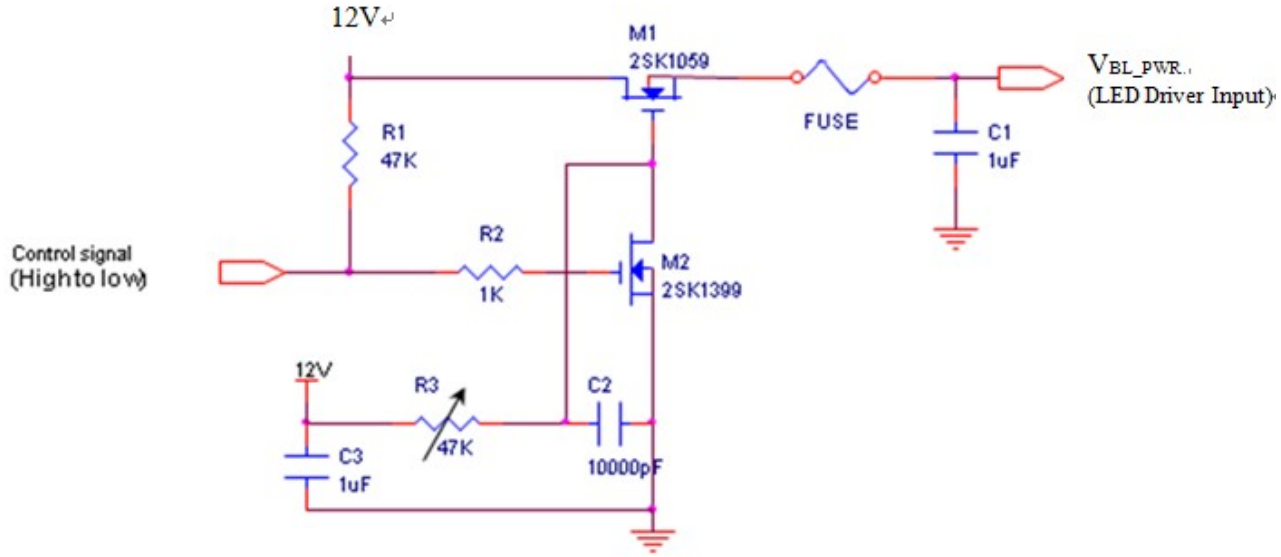
Note (1) The life time (Hr) of LEDs can be defined as the time during which it continues to operate under the condition, which the Ta is 25 ± 2 °C and IF= TBD mArms until the one of the following events occurs when the brightness becomes 50% or lower than the original..

5.3 LED DRIVER

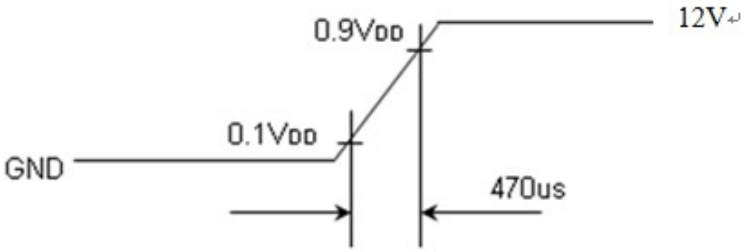
The manufacturer of LED driver: Richtek RT8510 Ta= 25 ± 2 °C

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Input Voltage		V_{BL_PWR}	(6)	(12)	(20)	V	
Input Current		I_{BL_PWR}	-	TBD	TBD	mA	Vin=12V Duty 100%
PWM duty Ratio		$D_{BL\_PWM\_DIM}$	5	-	100	%	PWM : 200Hz~2kHz
External PWM Frequency		$F_{BL\_PWM\_DIM}$	0.2	-	2	kHz	
In-Rush Current		$I_{RUSH\_BL\_PWR}$	-	-	1.5	A	(1)
EN Control Level	High	V_{BL_ENABLE}	2.0	-	5.0	V	
	Low		0.0	-	0.8	V	
PWM Control Level	HIgh	$V_{BL\_PWM\_DIM}$	2.0	-	5.0	V	
	Low		0.0	-	0.8	V	

Note (1) Rush current measurement condition



The V_{BL_PWR} rising time is 470us.



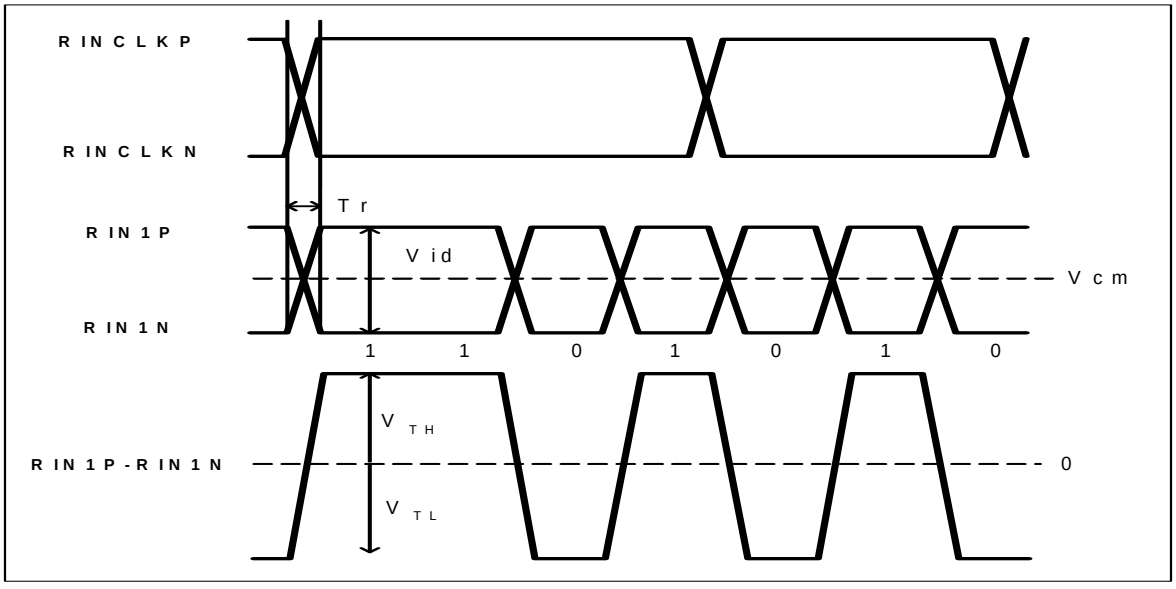
5.4 LVDS INTERFACE

LVDS DC Specifications

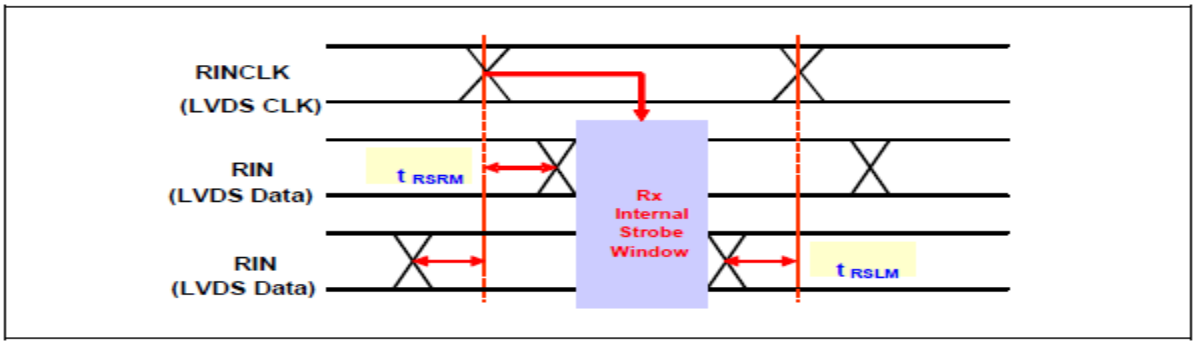
Characteristics	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential input high threshold voltage	V_{TH}	-	-	+200	mV	V_{CM} = 1.2V
Differential input low threshold voltage	V_{TL}	-200	-	-	mV	
Differential input voltage	$\|V_{ID}\|$	200	400	600	mV	
Common mode voltage	V_{CM}	0.2	1.2	1.6	V	$\|V_{ID}\|$= 200mV

LVDS AC Specifications

Characteristics		Symbol	Min.	Typ.	Max.	Unit	Remarks
ROUTCLK frequency		fRCP	(TBD)	(TBD)	(TBD)	Mhz	
LVDS RX Skew (Strobe) Right Margin	85MHz	T_{RSRM}	-	-	400	ps	
	50MHz		-	-	700	ps	
LVDS RX Skew (Strobe) Left Margin	85MHz	T_{RSLM}	-400	-	-	ps	
	50MHz		-700	-	-	ps	



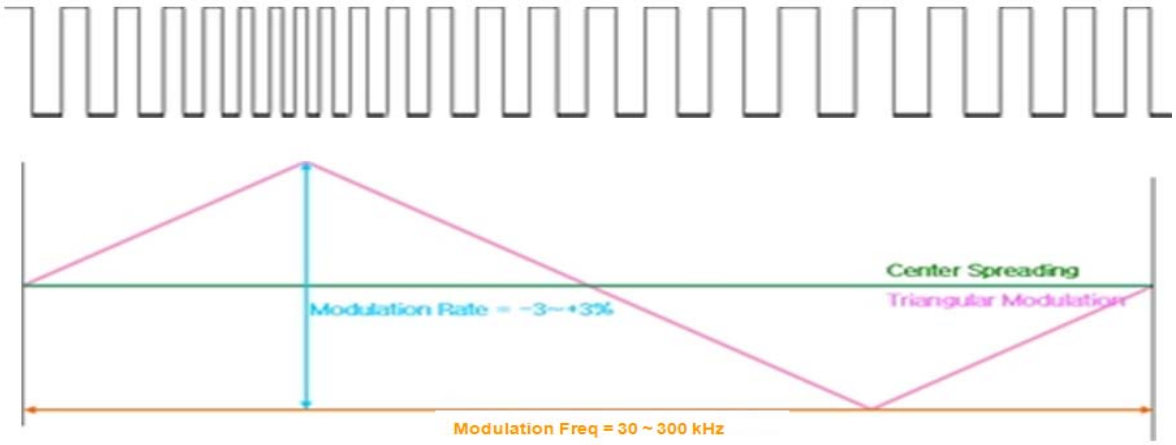
< The definition of LVDS DC characteristics >



< The definition of LVDS Receiver Skew (Strobe) Margin >

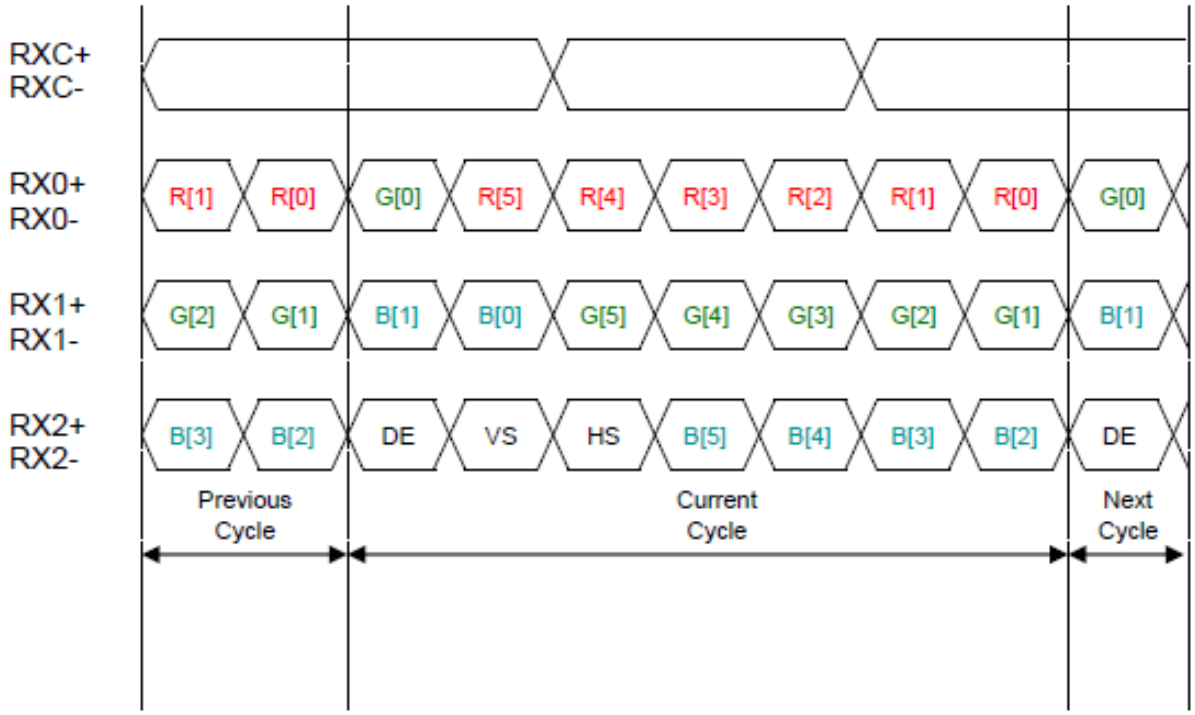
LVDS SSC Specification

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Remarks
Modulation Rate	Fmr	-3	0	+3	%	
Modulation Frequency	Fmf	30	-	300	kHz	@ MAINCLK = TBD MHz



< Definition of SSC (Spread Spectrum Clock) >

Timing diagrams of LVDS transmission

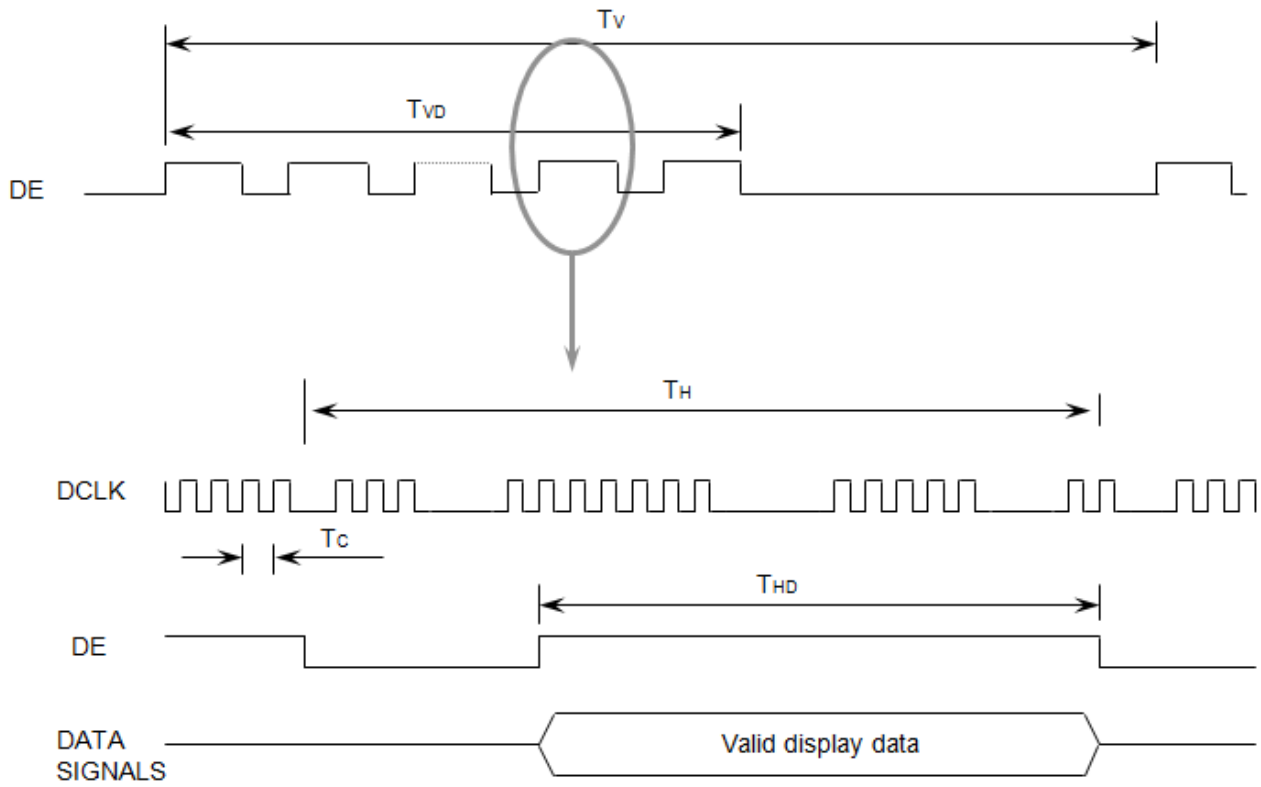


5.5 INTERFACE TIMING

5.5.1 TIMING PARAMETERS

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	T_V	TBD	TBD	TBD	Lines	
Vertical active in the display term	Display Period	T_{VD}	-	TBD	-	Lines	
Scanning time in one line	Cycle	T_H	TBD	TBD	TBD	Clocks	
Horizontal active in the display term	Display Period	T_{HD}	-	TBD	-	Clocks	

5.5.2 TIMING DIAGRAMS OF INTERFACE SIGNAL



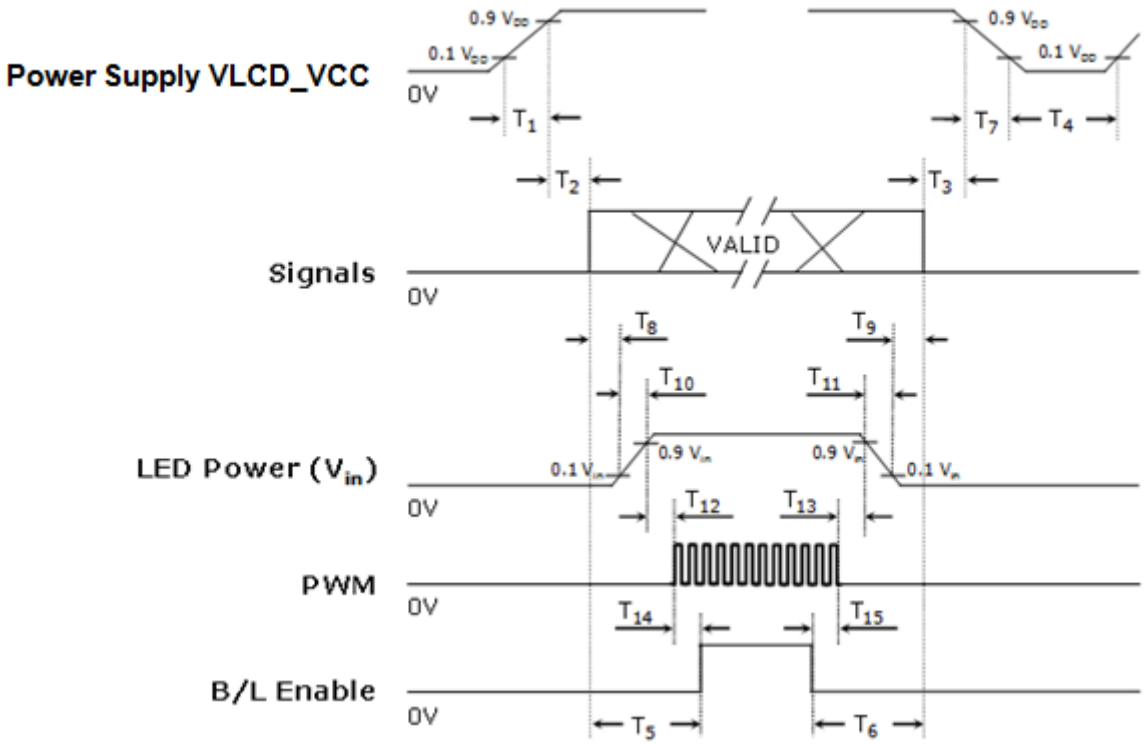
5.6 INPUT COLOR DATA MAPPING

Color	Display	Data Signal																		Gray Scale Level
		Red						Green						Blue						
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	45	B5	
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	-
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	-
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	-
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	-
	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	-
Gray Scale Of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R0
	Dark	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R1
	↑	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	R3~R60
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R61
	Light	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R62
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R63
Gray Scale Of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G0
	Dark	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	G1
	↑	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	G2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	G3~G60
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	G61
	Light	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	G62
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	G63
Gray Scale Of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B0
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	B1
	↑	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	B3~B60
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	B61
	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	B62
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	B63

Note (1) Definition of gray : Rn: Red gray, Gn: Green gray, Bn: Blue gray (n=gray level)
Note (2) Input signal: 0 =Low level voltage, 1=High level voltage

5.7 POWER ON/OFF SEQUENCE

To prevent the product from being latched up or the DC in the LCD module from starting an operation, the order to turn the power on and off should be changed to the order as shown in the diagram below.



Timing (ms)	Remarks
$0.5 < T_1 \leq 10$	VLCD_VCC rising time from 10% to 90%
$0 < T_2 \leq 50$	Interval from VLCD_VCC to valid data at power ON
$0 < T_3 \leq 50$	Interval from valid data OFF to VLCD_VCC OFF at power Off
$500 \leq T_4$	VLCD_VCC OFF time for Windows restart
$200 \leq T_5$	Interval from valid data to B/L enable at power ON
$200 \leq T_6$	Interval from valid data off to B/L disable at power Off
$0 < T_7 \leq 10$	VLCD_VCC falling time from 90% to 10%
$10 < T_8$	Interval from valid data on to LED driver Vin rising time 10%
$10 < T_9$	Interval from LED driver Vin falling time 10% to valid data Off
$0.5 < T_{10} \leq 10$	LED V_{in} rising time from 10% to 90%
$0.5 < T_{11} \leq 10$	LED V_{in} falling time from 90% to 10%
$0 < T_{12}$	Interval from LED driver Vin rising time 90% to PWM ON
$0 < T_{13}$	Interval from PWM Off to LED driver Vin falling time 90%
$0 \leq T_{14}$	Interval from PWM ON to B/L Enable ON
$0 \leq T_{15}$	Interval from B/L Enable Off to PWM Off

The backlight may be flashed if the interface signal remains floated when the above-mentioned signal becomes invalid.

Note (1) The power voltage from system shall be supplied to the input pin of LCD constantly.

(2) Enable the voltage to the LED within the range, which the LCD is operated. The screen becomes white when turning the back-light on before the LCD is operated or turning the LCD off before turning the back-light off. Operation or the LCD turns off before the back-light turns off, the display may momentarily become white.

(3) Don't leave the system at a high impedance state, which the interface signal is out for a long time after the Vcc is enabled.

(4) The T4 should be measured the module is fully discharged.

(5) The interface signal shall not maintain the high impedance when the power is on.

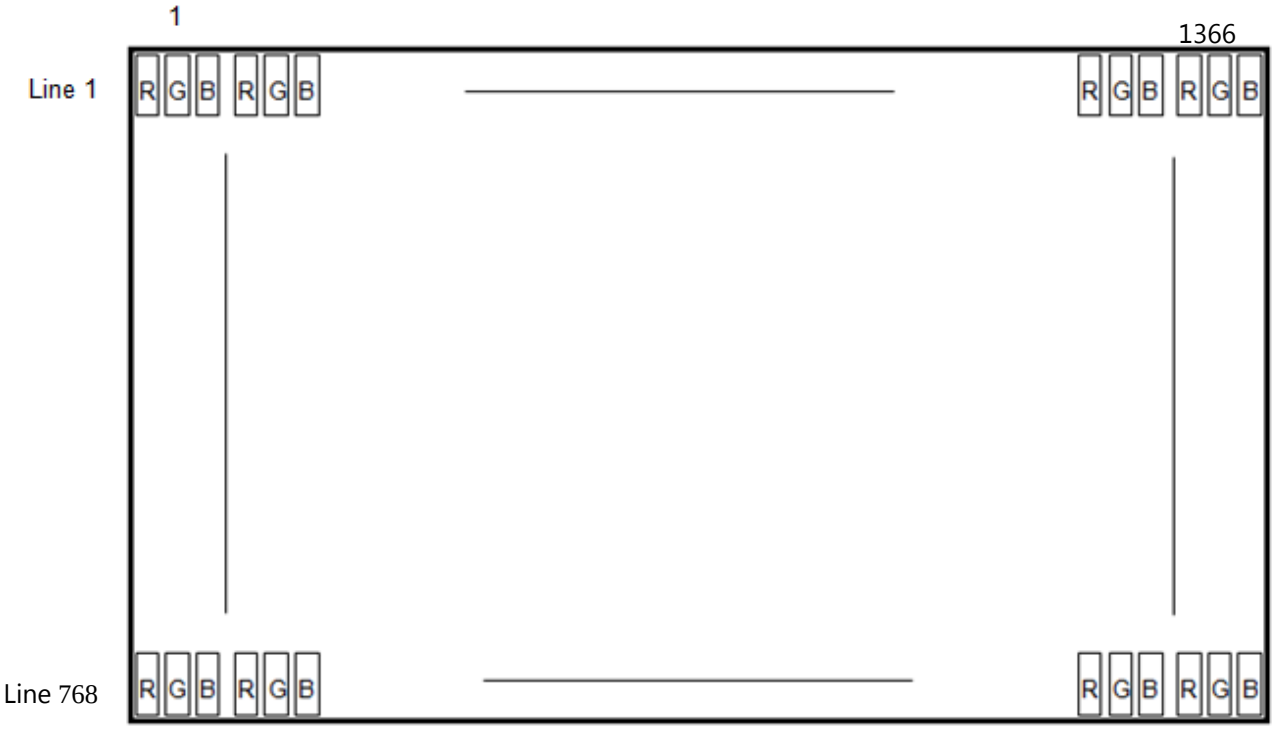
5.8 INPUT TERMINAL PIN ASSIGNMENT

5.8.1 INPUT SIGNAL & POWER

(LVDS, Connector : 20455-040E-0 , I-PEX or the equipment with the equivalent capability)

Pin	Symbol	Function
1	NC	No Connection (Reserved for supplier)
2	AVDD	Power Supply, 3.3V (typical)
3	AVDD	Power Supply, 3.3V (typical)
4	DVDD	DDC 3.3V power
5	NC	No Connection
6	SCL	DDC Clock
7	SDA	DDC Data
8	Rin0-	-LVDS differential data input (R0-R5, G0)
9	Rin0+	+LVDS differential data input (R0-R5, G0)
10	GND	Ground
11	Rin1-	-LVDS differential data input (G1-G5, B0-B1)
12	Rin1+	+LVDS differential data input (G1-G5, B0-B1)
13	GND	Ground
14	Rin2-	-LVDS differential data input (B2-B5, HS, VS, DE)
15	Rin2+	+LVDS differential data input (B2-B5, HS, VS, DE)
16	GND	Ground
17	ClkIN-	-LVDS differential clock input
18	ClkIN+	+LVDS differential clock input
19	GND	Ground
20	Even_Rin0-	-LVDS differential data input (R0-R5, G0)
21	Even_Rin0+	+LVDS differential data input (R0-R5, G0)
22	GND	Ground
23	Even_Rin1-	-LVDS differential data input (G1-G5, B0-B1)
24	Even_Rin1+	+LVDS differential data input (G1-G5, B0-B1)
25	GND	Ground
26	Even_Rin2-	-LVDS differential data input (B2-B5, HS, VS, DE)
27	Even_Rin2+	+LVDS differential data input (B2-B5, HS, VS, DE)
28	GND	Ground
29	Even_ClkIN-	-LVDS differential clock input
30	Even_ClkIN+	+LVDS differential clock input
31	VBL-	LED Ground
32	VBL-	LED Ground
33	VBL-	LED Ground
34	NC	No Connection
35	BLIM	PWM for luminance control (200~1KHz, 3.3V, 10~100%)
36	BL_Enable	BL On/Off (On:2.0~3.3V, Off: 0~0.5V)
37	NC	No Connection
38	VBL+	LED Power Supply 6V~20V
39	VBL+	LED Power Supply 6V~20V
40	VBL+	LED Power Supply 6V~20V

6. PIXEL FORMAT

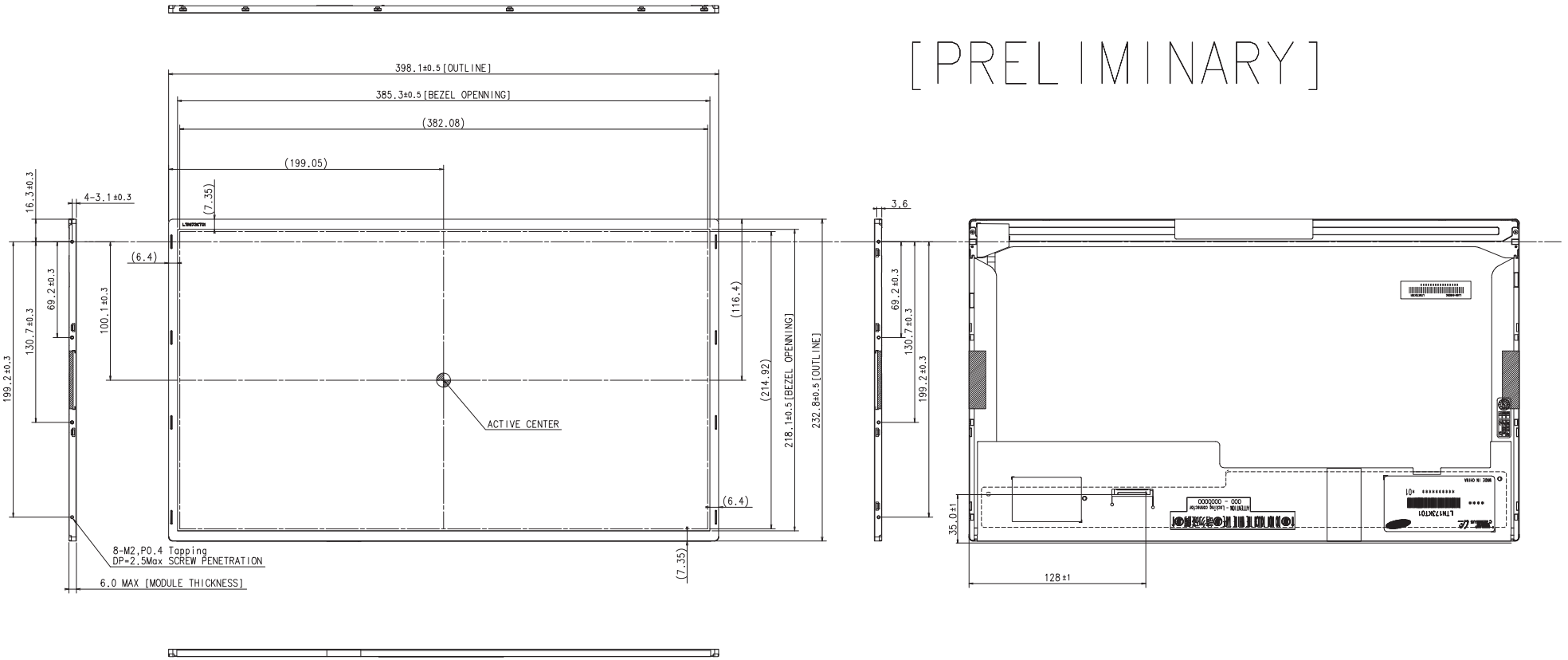


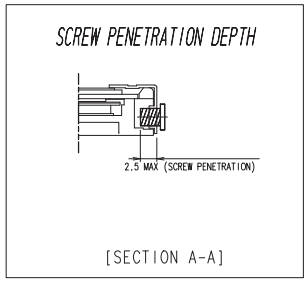
7. OUTLINE DIMENSION

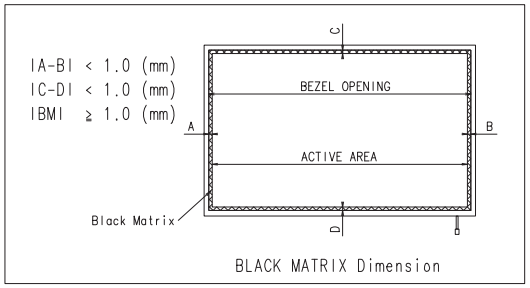
Refer to the next page

NO	PART NAME	CODE NO	SPECIFICATION	Q'TY	SPEC NO.	REMARK
1	OUTLINE					

[PRELIMINARY]







* NOTE

1. SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.
   - MAKER : I-PEX
   - PART NO : 20455-040E-02
2. LED CONNECTOR FOR BACKLIGHT TO BE SPECIFIED AS BELOW.
   - MAKER : UJU
   - PART NO : PF050-010B-C11
3. CALIFERS MEASURING FORCE :750 ± 250 gf
4. ALLOWED DEPTH OF USERHOLE SCREW INSERTION IS 2.5mm MAX
5. WEIGHT: 570g MAX.
6. IN ORDER TO AVOID IC DAMAGE, IT IS NOT ALLOWED TO HAVE SUCH OVERLAPPINGS AS CABLES OR ANTENNAS, CAMERA, WLAN, WWAN OVER THESE COF LOCATIONS.

REV	DATE	DESCRIPTION OF REVISION	REASON	CHK'D BY
UNIT	mm	DRA'N BY	DES'D BY	CHK'D BY	APP'D BY		
SCALE	1/1	J.W.LEE				MODEL NAME	LTN173KT01-K01/101
GENERAL TOLERANCE	±0.5	2008.07.27				PART/SHEET NAME	OUTLINE DIMENSION	SHEET 1/1
SAMSUNG ELECTRONICS						SPEC. NO	CODE NO.	-	VER. 000

8. RELIABILITY TEST

Item		Condition	Time/Cycle
HTOL		55 ℃	500 hrs
LTOL		-5 ℃	500 hrs
HTS		70 ℃	500 hrs
LTS		-25 ℃	500 hrs
THB		50 ℃, 90%	500 hrs
WHTS		60 ℃, 75%	500 hrs
T/C		-40 ℃/30min ~ 65 ℃/30min	50 cycles
ESD	Non-operating	CDM : 150pF, 330Ω, 9point, 3 times/point	±10kV
	Operating	Contact : 150 pF, 330Ω, 100point, once/point	±8kV
		Air(non-contact) : 150pF, 330Ω, 100point, once/point	±15kV
Box Vibration (Non-operating)		5~200Hz, 1.05Grms, 2hr/Y	1time
Shock (Non-operating)		240G, 2msec, ±XYZ	30min/axis
HINGE		10~170˚, Open/Close 2sec, Pause1sec	30Kcycle
Altitude		-40~50℃, 0~45,000ft	72.5Hr

[Result Evaluation Criteria]

Under the display quality test conditions with normal operation state,
these should be no change which may affect practical display functions.

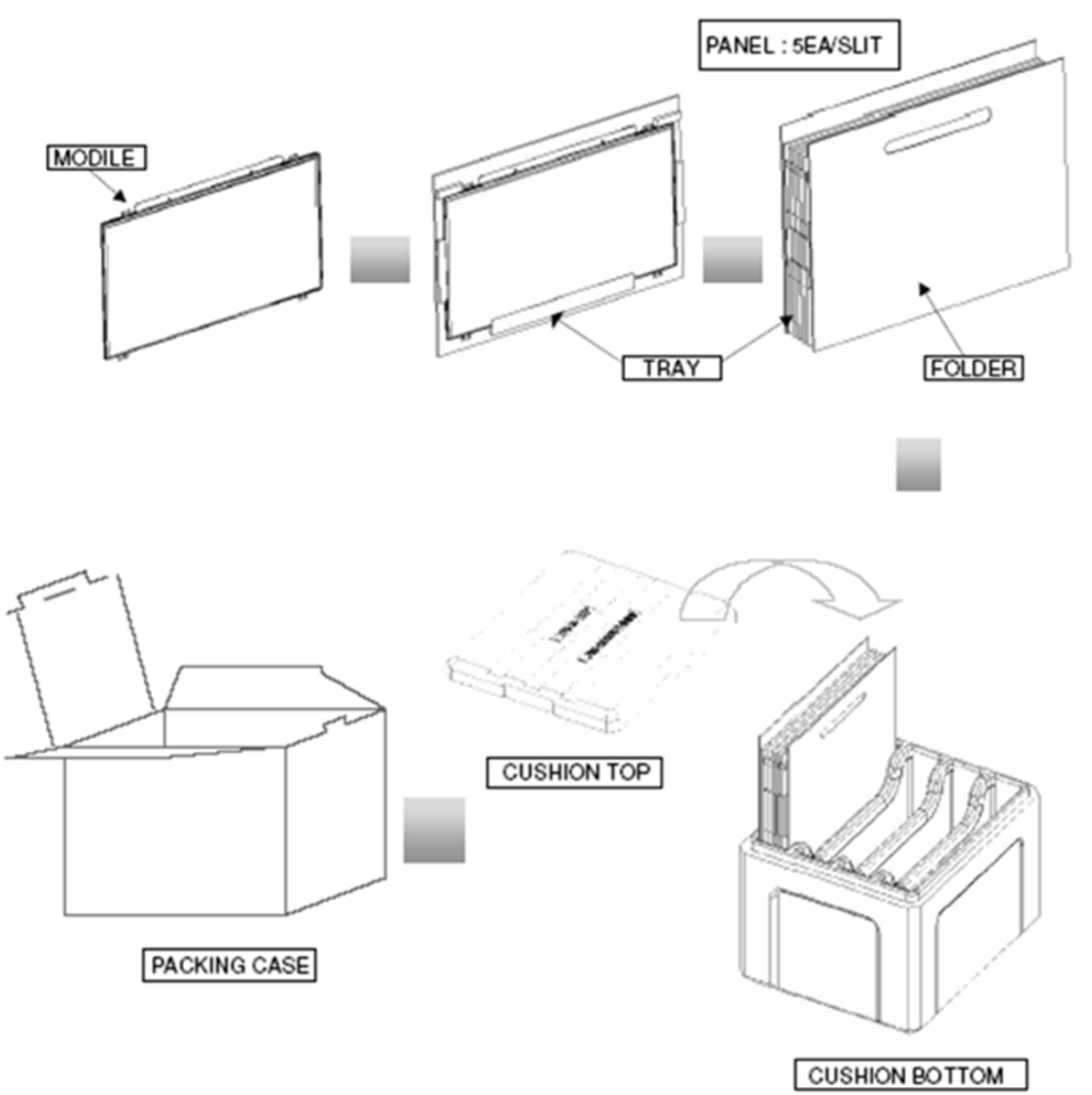
9. PACKING

9.1 CARTON

(1) Packing Form

Corrugated Cardboard box and Corrupad form as shock absorber.

(2) Packing Method



Note 1)Total Weight : Approximately 15 kg

2) Acceptance number of piling : 20 EA

3) Carton size : W359*L463*H333

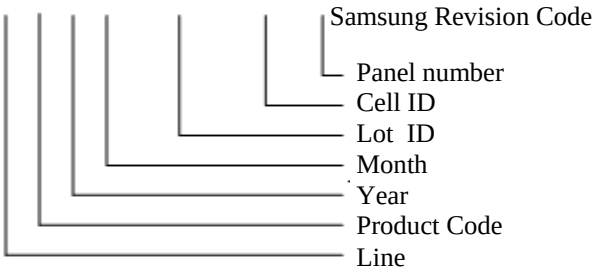
(3) Packing Material

No	Part name	Quantity
1	Static electric protective sack	20 pcs
2	Packing case (Inner box) included shock absorber	1 set
3	Pictorial marking	2
4	Carton	1 set

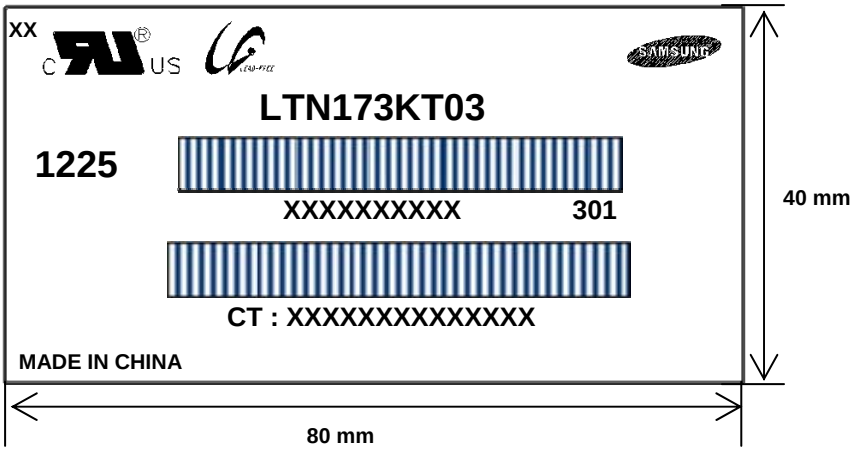
9.2 MARKING

A nameplate is affixed to the specified location on each product.

(1)Parts number : LTN173KT03-301
(2)Revision code : 3 letters
(3)Lot number : X X X X XXX XX X 301

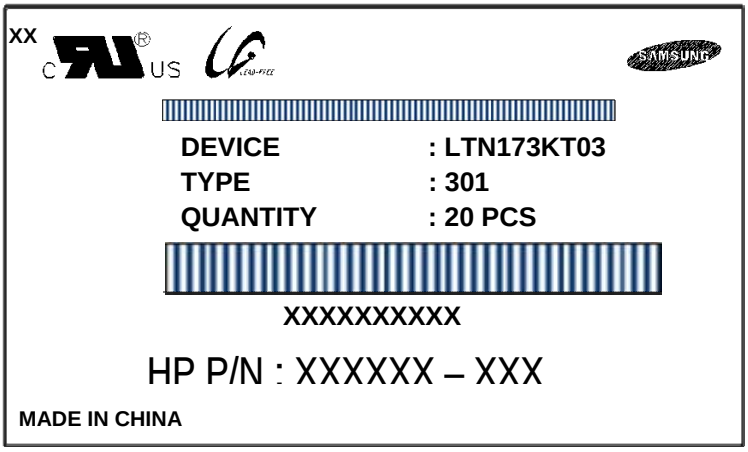


(4) Nameplate Indication



Parts name : LTN173KT03
Lot number : XXXXXXXXXX
Inspected work week : 1225 (2012 year 25th week)
Product Revision Code : 301
CT code : XXXXXXXXXXXXXX

(5) Packing small box attach



10. GENERAL PRECAUTIONS

10.1 HANDLING

(a) When the module is assembled, It should be attached to the system firmly using every mounting holes. Be careful not to twist and bend the modules.

(b) Refrain from strong mechanical shock and / or any force to the module. In addition to damage, this may cause improper operation or damage to the module and CCFT back-light.

(c) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch the surface harder than a HB pencil lead.

(d) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, Staining and discoloration may occur.

(e) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(f) The desirable cleaners are water, IPA (Isoprophyl Alcohol) or Hexane. Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(g) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth .In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

(h) Protect the module from static , it may cause damage to the C-MOS Gate Array IC.

(i) Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(j) Do not disassemble the module.

(k) Do not pull or fold the LED FPC.

(l) Do not touch any component which is located on the back side.

(m) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(n) Pins of I/F connector shall not be touched directly with bare hands.

10.2 STORAGE

We highly recommend to comply with the criteria in the table below.

ITEM	Unit	Min.	Max.
Storage Temperature	(℃)	5	40
Storage Humidity	(%rH)	35	75
Storage Life	12 months		
Storage Condition	- The storage room should be equipped with a good ventilation facility, which has a temperature controlling system. - Products should be placed on the pallet, which is away from the wall not on the floor. - Prevent products from being exposed to the direct sunlight, moisture, and water.; Be cautious not to pile the products up. - Avoid storing products in the environment, which other hazardous material is placed. - If products are delivered or kept in the storage facility more than 3 months,we recommend you to leave products under the condition including a 20℃ temperature and a humidity of 50% for 24 hours. - If you store semi-manufactured products for more than 3 months, bake the products under the condition including the 50℃ temp. and the 10% humidity for 24hrs after being used.		

10.3 OPERATION

(a) Do not connect, disconnect the module in the " Power On" condition.

(b) Power supply should always be turned on/off by following item 6.3 " Power on/off sequence ".

(c) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

(d) The FPC cable between the LED chips and its converter power supply shall be a minimized length and be connected directly .The longer cable between the back-light and the converter may cause lower luminance of light source (LED).

(e) The standard limited warranty is only applicable when the module is used for general notebook applications. If used for purposes other than as specified, SEC is not to be held reliable for the defective operations. It is strongly recommended to contact SEC to find out fitness for a particular purpose.

10.4 OTHERS

(a) Ultra-violet ray filter is necessary for outdoor operation.

(b) Avoid condensation of water. It may result in improper operation or disconnection of electrode.

(c) Do not exceed the absolute maximum rating value. (the supply voltage variation, input voltage variation, Variation in part contents and environmental temperature, so on) Otherwise the module may be damaged.

(d) If the module displays the same pattern continuously for a long period of time, it can be the situation when The image “sticks” to the screen.

(e) This module has its circuitry PCB’s on the rear side and should be handled carefully in order not to be stressed.

11. EDID

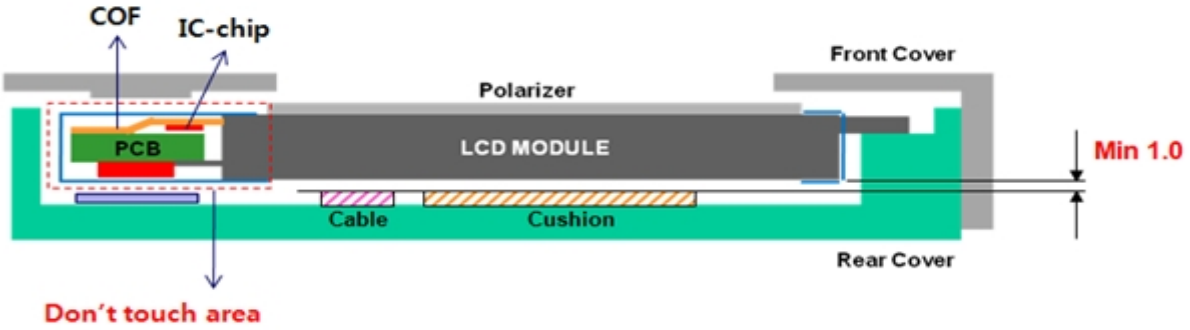
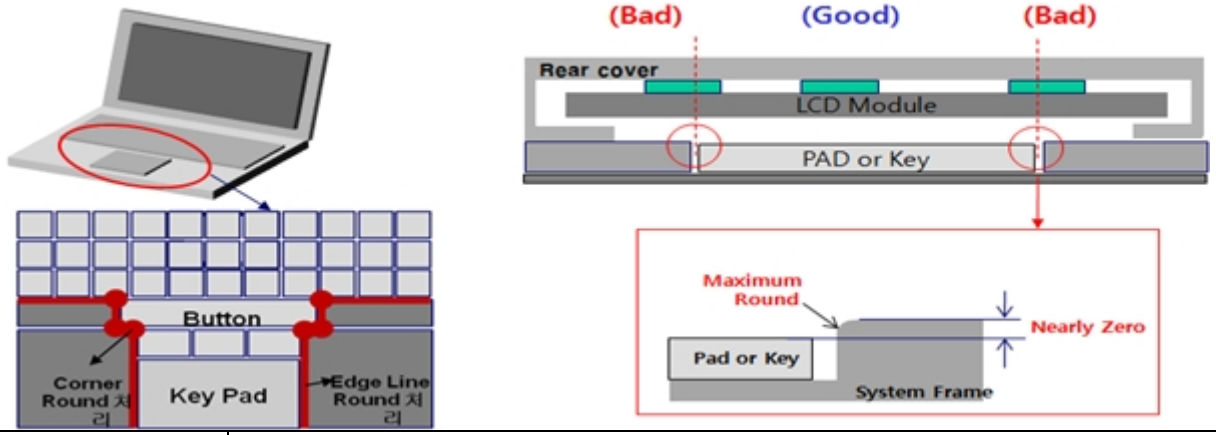
[TBD]

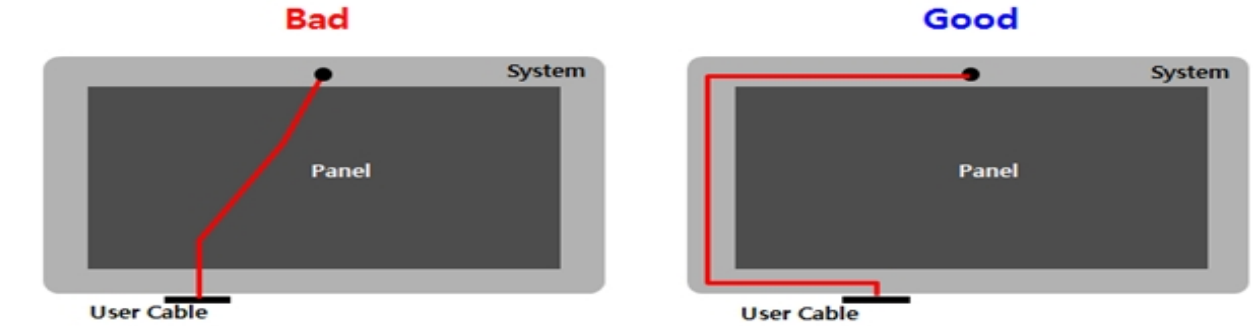
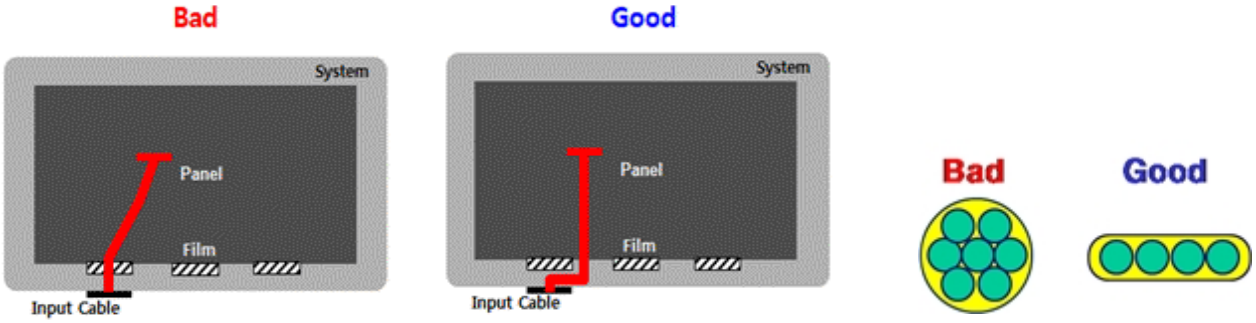
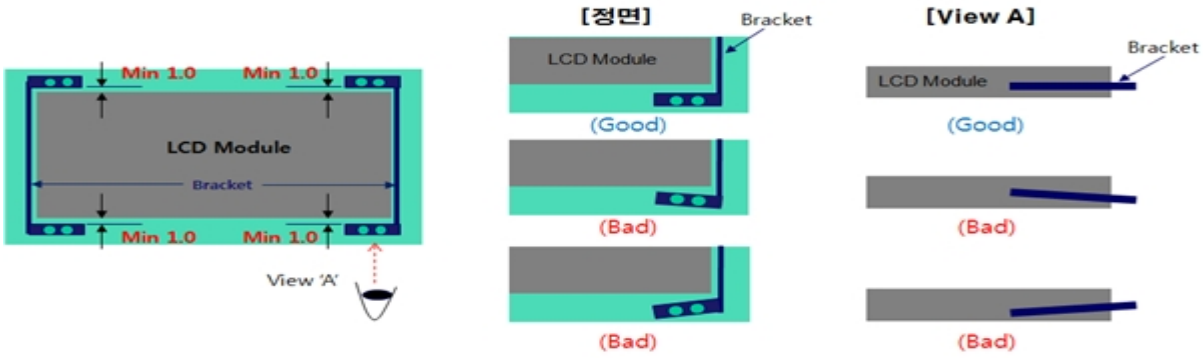
[TBD]

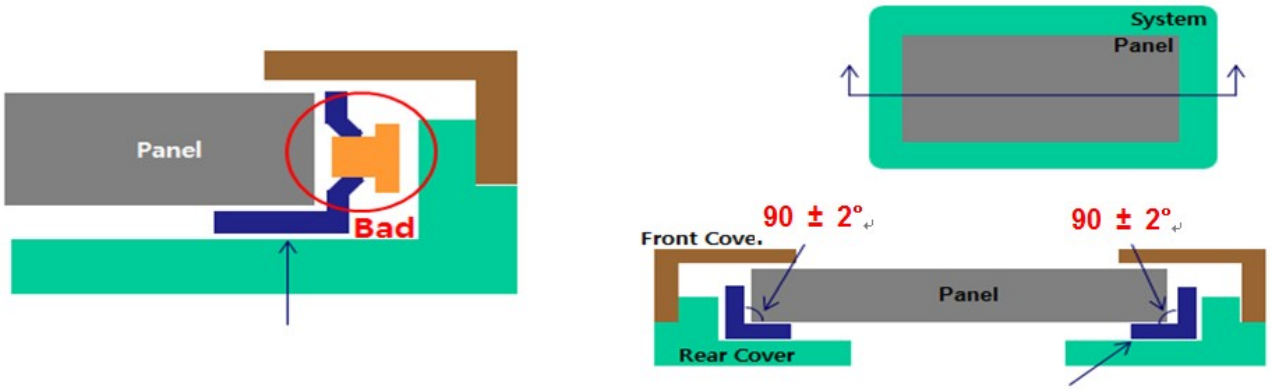
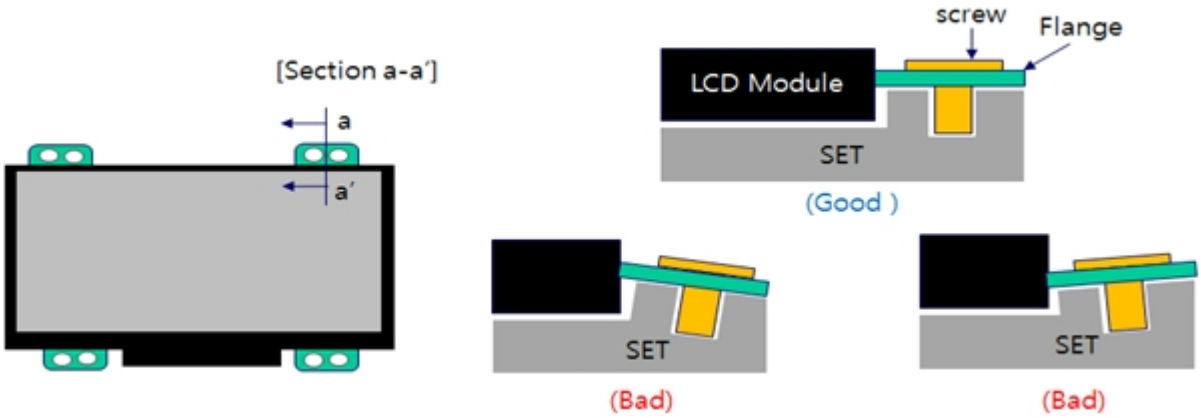
[TBD]

12. APPENDIX

12.1 SYSTEM DESIGN GUIDE

1	[Common]Gap in the rear of display
	Prevent the product from being defected resulted from the interference and the lack of gap between the rear cover of system and the LCD module.
	
Recommendation	A. The gap between the rear cover of system and the rear of LCD module : Min. 1.0mm B. Based on the size of part in a maximum size between the rear cover of system and the LCD module. : Min. 1.0mm (※ Based on the maximum thickness of module, which the tolerance is considered.)
Risk factor	Pooling / White Spot / Being divided
2	[Common] The shape of key pad of system
	Prevent the product from being defected resulted from the shape of key pad in the system.
	
Recommendation	A. Make the shape of frame, which surrounds the key pad as round as possible. B. Prevent the product from being defected resulted from the pressurization by attaching the sponge on the cover of system not to be overlapped with the position of the frame around key pad. C. Prevent the product from being defected, which is resulted from the pressurization from outside by eliminating the difference in height between the key pad and the frame around key pad.
Risk factor	White Spot / Black Spot / Being broken in glass.

3	[Common] The arrangement of user cable (Camera, Antenna)
	Prevent the product from being defected resulted from the user cable arranged on the rear of module.
	
Recommendation	A. Arrange the user cable in the side not in the rear(the active area) of LCD module.
Risk factor	Pooling / White Spot
4	[Common] The arrangement of input cable
	Prevent the product from being defected resulted from the overlapping between the input cable and the film of LCD module .
	
Recommendation	A. Arrange the input cable not to be overlapped with the COF film. B. Minimization of the height of input cable and making the COF film flat.
Risk factor	A/D (The damaged COF film is cracked., The chip is broken.)
5	[ELS] Gap between the bracket and the LCD Module
	Prevent the LCD module from being interfered when testing the product in terms of the performance of hinge and the occurrence of twist.
	
Recommendation	A. Secure the min. 1.0mm distance between the bracket and the LCD module at 4 corners of screen respectively. B. Control the angle of bracket on the system.

6	[ELS] Suggestion on the angle of bracket Prevent the product from being defected resulted from the changed top chassis by the angle and the shape of bracket on the system.
	
Recommendation	A. Don't form the bracket hole. B. Control the angle in the event that the bracket, which has L-shape is applied. (90 ± 2°)
Risk factor	Pooling / Light leakage
7	[UMS] Control the angle of the connected part on the user flange Prevent the user flange from not being placed horizontally, which is caused when the LCD module, which is structured in UMS is assembled.
	
Recommendation	A. Prevent the product from being pooled resulted from the changed user flange created when assembling the LCD module to the system. B. Insert the screw to the hole of flange vertically when LCD module is assembled to the system.
Risk factor	Pooling