



TO :

DATE : Oct. 14, 2011

SAMSUNG TFT-LCD

MODEL NO. : LTN140AT22-P

NOTE : Extension code [-P]
 → LTN140AT22- **P**
 Surface type [**Glare**]

Any modification of Spec is not allowed without Samsung's permission
The information described in this SPEC is preliminary and can be changed without prior notice.

Application Engineering Group
 Samsung Display Co., Ltd.

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REVISION HISTORY

Approval

Date	Revision No.	Page	Summary
Aug. 17. 2011	A00	All	The specification of LTN140AT22-P model was issued first.
Aug, 23, 2011	A01	P12,14	Modified Errata
Aug, 30, 2011	A02	P12	Added BACK-LIGHT UNIT Power Consumption Value.
Oct. 06, 2011	A03	P10, 12 P28	Updated Logic and Back Light Power consumption Updated General Precautions comment
Oct. 14, 2011	A04	All	Product revision code was updated as P** to P**

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GENERAL DESCRIPTION

DESCRIPTION

LTN140AT22 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 14.0" contains 1366 x 768 pixels and can display up to 262,144 colors. 6 O'clock direction is the optimum viewing angle.

FEATURES

- High contrast ratio
- HD (1366 x 768 pixels) resolution
- Low power consumption
- Fast response time
- LED Back Light with embedded LED Driver
- DE (Data enable) only mode
- 3.3V LVDS Interface
- Onboard EEDID chip
- Green product (RoHS compliant)

APPLICATIONS

- Notebook PC
- If the usage of this product is not for PC application, but for others, please contact Samsung

GENERAL INFORMATION

Item	Specification	Unit	Note
Display area	309.399(H) x 173.952(V) (14.0" HD diagonal)	mm	
Driver element	a-Si TFT active matrix		
Display colors	262,144		
Number of pixel	1366 x 768	pixel	16:9
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.2265(H) x 0.2265(V) (TYP.)	mm	
Display Mode	Normally white		
Surface treatment	Haze 0, Hard-Coating 3H		

Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	323.0	323.5	324.0	mm	(1)
	Vertical (V)	191.5	192.0	192.5	mm	
	Depth (D)	-	-	5.2	mm	
Weight		-	330	350	g	

Note (1) Measurement condition of outline dimension

. Equipment : Bernier Calipers

. Push Force : 500g · f (minimum)

1. ABSOLUTE MAXIMUM RATINGS

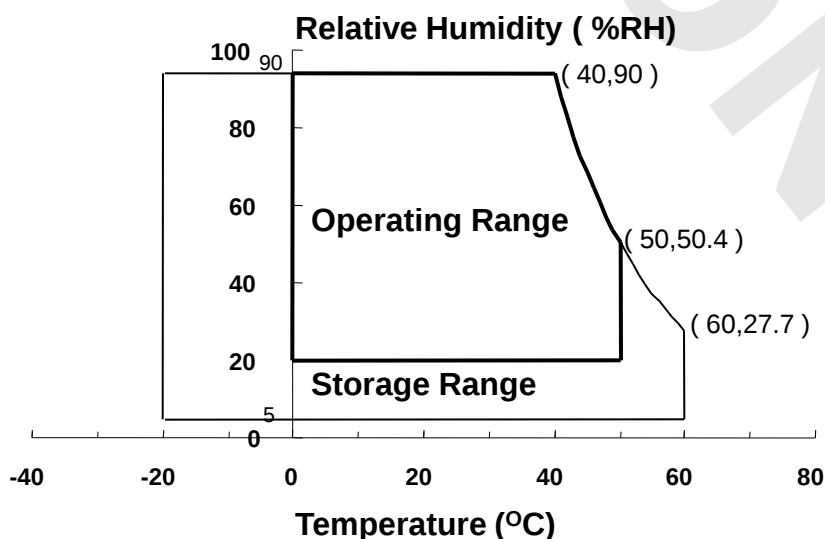
1.1 ENVIRONMENTAL ABSOLUTE RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Storage temperate	TSTG	-20	60	°C	(1)
Operating temperate (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) Temperature and relative humidity range are shown in the figure below.

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



(2) 2ms, half sine wave, one time for $\pm X$, $\pm Y$, $\pm Z$.

(3) 5 - 500 Hz, random vibration, 30min for X, Y, Z.

(4) At testing Vibration and Shock, the fixture in holding the Module to be tested have to be hard and rigid enough so that the Module would not be twisted or bent by the fixture.

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1.2 ELECTRICAL ABSOLUTE RATINGS

(1) TFT LCD MODULE

$V_{DD}=3.3V$, $V_{SS}=GND=0V$

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	$V_{DD}-0.3$	$V_{DD}+0.3$	V	(1)
Logic Input Voltage	V_{IN}	$V_{DD}-0.3$	$V_{DD}+0.3$	V	(1)

Note (1) Within T_a ($25 \pm 2\text{ }^{\circ}\text{C}$)

(2) BACK-LIGHT UNIT

$T_a=25 \pm 2\text{ }^{\circ}\text{C}$, Duty = 100%

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Current	I_L	-	25	-	mA	(1)
LED Voltage	F_L	3.0	3.2	3.4	V	(1)

Note (1) Permanent damage to the device may occur if maximum values are exceeded
Functional operation should be restricted to the conditions described under normal operating conditions.

2. OPTICAL CHARACTERISTICS

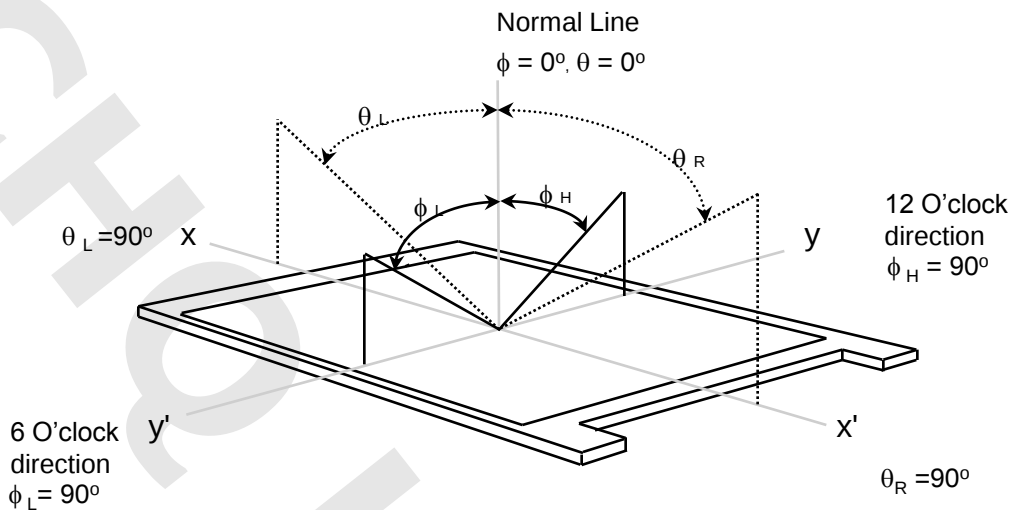
The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (5).
Measuring equipment : TOPCON SR-3

* Ta = 25 ± 2 °C, V_{DD}=3.3V, f_v= 60Hz, f_{DCLK} = 78.05MHz, IF = 25 mA

Item		Symbol	Condition	Min.	Typ.	Max	Unit	Note
Contrast Ratio (5 Points)		CR	Normal Viewing Angle $\phi = 0$ $\theta = 0$	500	-	-	-	(1), (2), (5)
Response Time at Ta (Rising + Falling)		T _{RT}		-	16	25	msec	(1), (3)
Average Luminance of White (5 Points)		Y _{L,AVE}		190	220	-	cd/m ²	IF=25mA (1), (4)
Color Chromaticity (CIE)	Red	R _X		-0.03	0.585	+0.03	-	(1), (5) SR-3
		R _Y			0.355			
	Green	G _X			0.350			
		G _Y			0.580			
	Blue	B _X			0.165			
		B _Y			0.125			
	White	W _X			0.313			
		W _Y	0.329					
Color Gamut				45	-	%		
Viewing Angle	Hor.	θ_L	CR ≥ 10 At center	40	-	-	Degrees	(1), (5) SR-3
		θ_H		40	-	-		
	Ver.	ϕ_H		15	-	-		
		ϕ_L		30	-	-		
13 Points White Variation		δ_L		-	-	1.7	-	(6)

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Note 1) Definition of Viewing Angle : Viewing angle range($10 \leq C/R$)

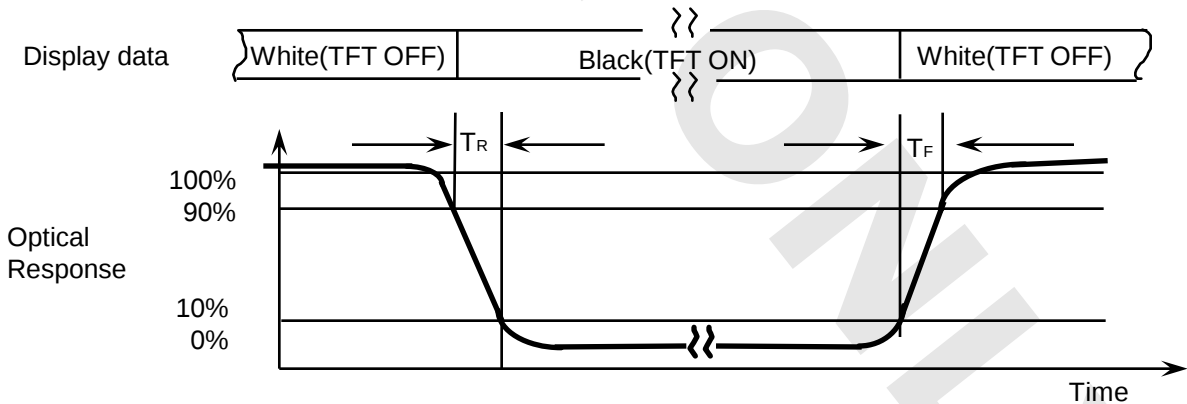


Note 2) Definition of Contrast Ratio (CR) : Ratio of gray max (Gmax) ,gray min (Gmin) at 5 points(4, 5, 7, 9, 10)

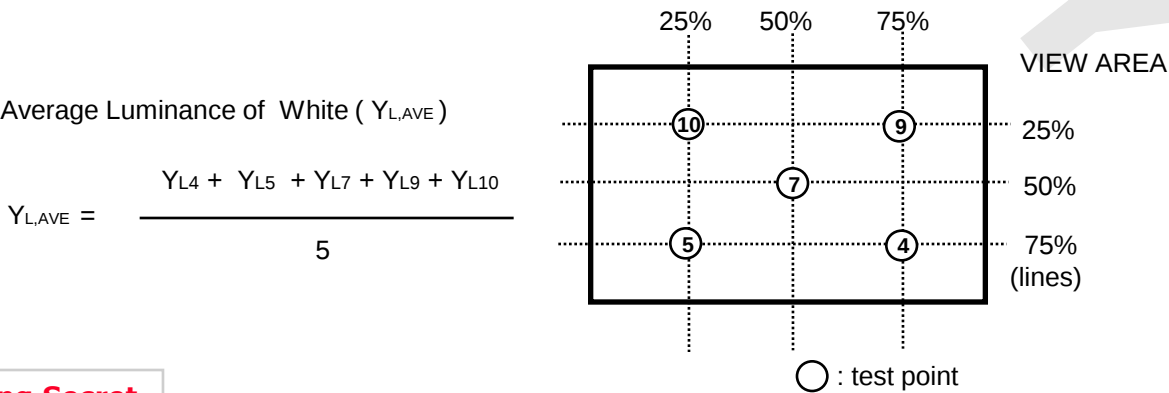
$$CR = \frac{CR(4) + CR(5) + CR(7) + CR(9) + CR(10)}{5}$$

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

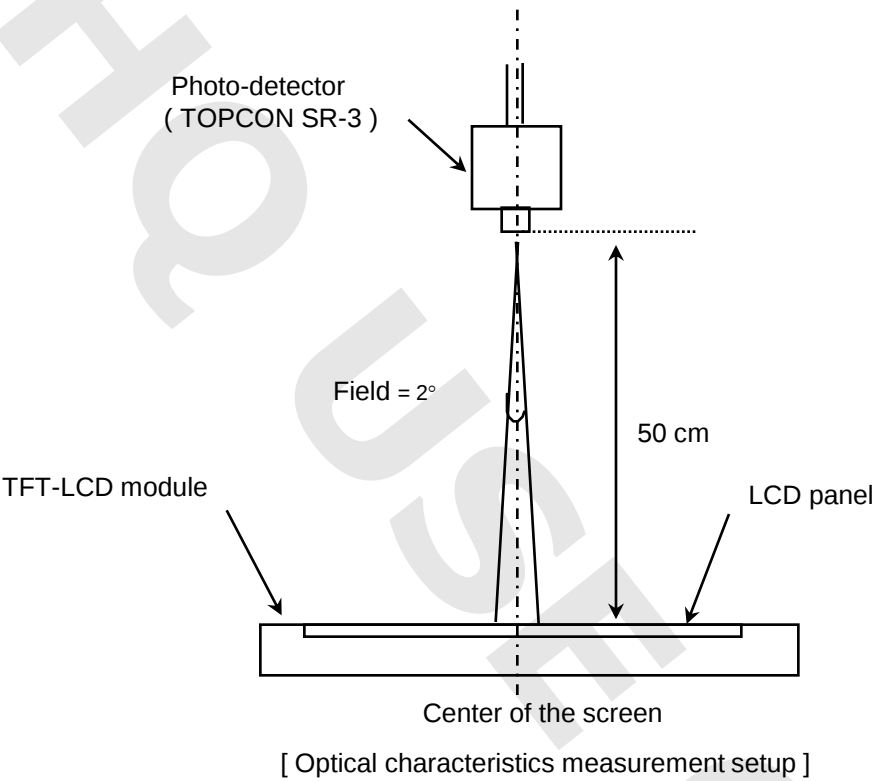
Note 3) Definition of Response time :



Note 4) Definition of Average Luminance of White : measure the luminance of white at 5 points.

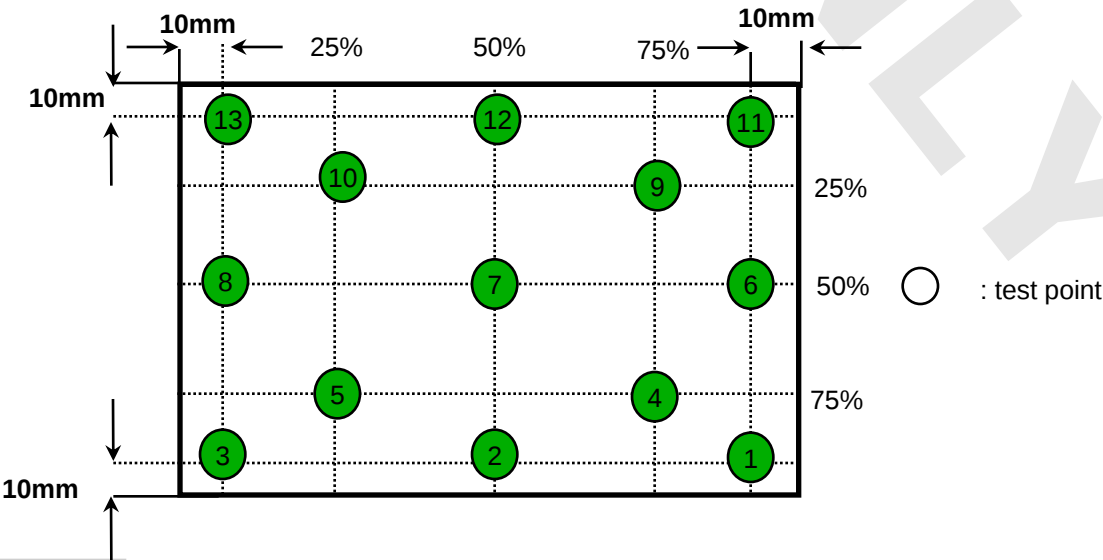


Note 5) After stabilizing and leaving the panel alone at a given temperature for 30 min , the measurement should be executed. Measurement should be executed in a stable, windless, and dark room.
30 min after lighting the backlight. This should be measured in the center of screen.
IF current : 25 mA
Environment condition : Ta = 25 ± 2 °C



Note 6) Definition of 13 points white variation (δL), CR variation(C_{VER}) [① ~ ⑬]

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



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3. ELECTRICAL CHARACTERISTICS

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3.1 TFT LCD MODULE

Ta= 25 ± 2°C

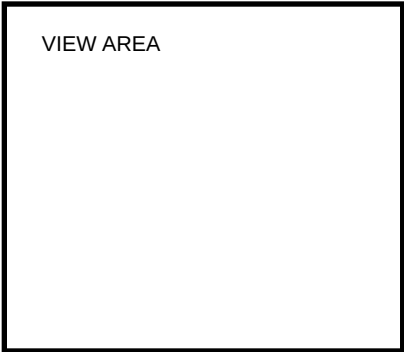
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V _{DD}	3.0	3.3	3.6	V	
Differential Input Voltage for LVDS Receiver Threshold	High	V _{IH}	-	-	+100	mV	V _{CM} = +1.2V
	Low	V _{IL}	-100	-	-	mV	
Vsync Frequency		f _v	-	60	-	Hz	
Main Frequency		f _{DCLK}	-	78.05	85	MHz	
Rush Current		I _{RUSH}	-	-	1.5	A	(4)
Current of Power Supply	White	I _{DD}	-	210	240	mA	(2),(3)*a
	Mosaic		-	210	240	mA	(2),(3)*b
	Black		-	210	240	mA	(2),(3)*c

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

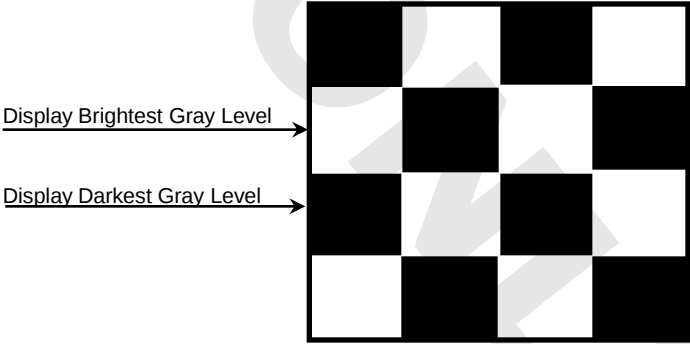
(2) f_v = 60Hz, f_{DCLK} = 78.05MHZ, V_{DD} = 3.3V , DC Current.

(3) Power dissipation pattern

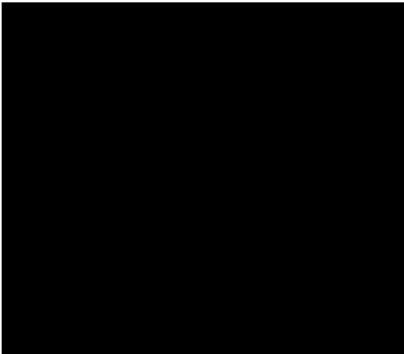
*a) White Pattern



*b) Mosaic Pattern

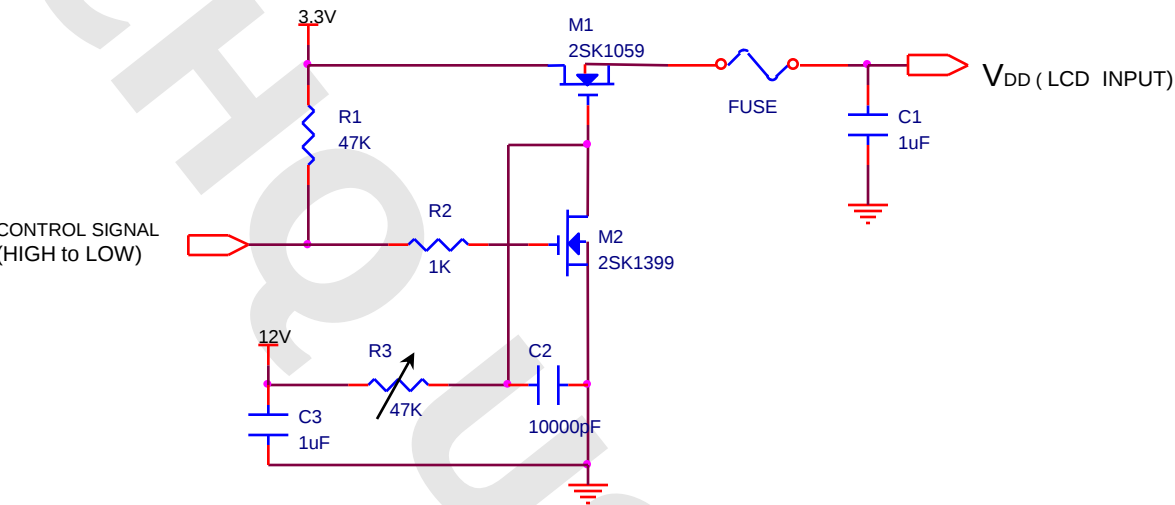


*c) Black Pattern

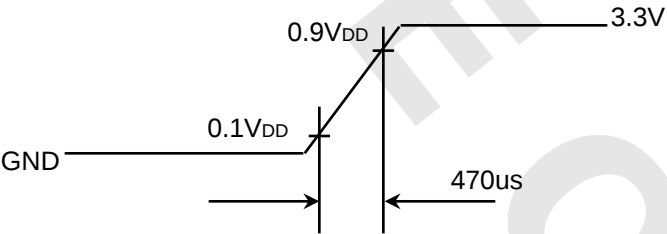


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4) Rush current measurement condition



V_{DD} rising time is 470us



3.2 BACK-LIGHT UNIT

 $T_a = 25 \pm 2 \text{ }^{\circ}\text{C}$

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Forward Current	IF		25		mA	
LED Forward Voltage	VF	3.0	3.2	3.4	V	
LED Array Voltage	VP	-	32	-	V	VF X 10LEDs
Power Consumption	P	-	3.0	3.2	W	@ Max Duty With LED Driver
Operating Life Time	Hr	10,000	-	-	Hour	(1)

Note (1) Life time (Hr) of LEDs can be defined as the time in which it continues to operate under the condition $T_a = 25 \pm 2 \text{ }^{\circ}\text{C}$ and $I_F = 25 \text{ mA}$ until one of the following event occurs.

1. When the brightness becomes 50% or lower than the original.

3.3 LED Driver

- LED Driver Manufacturer : Richtek

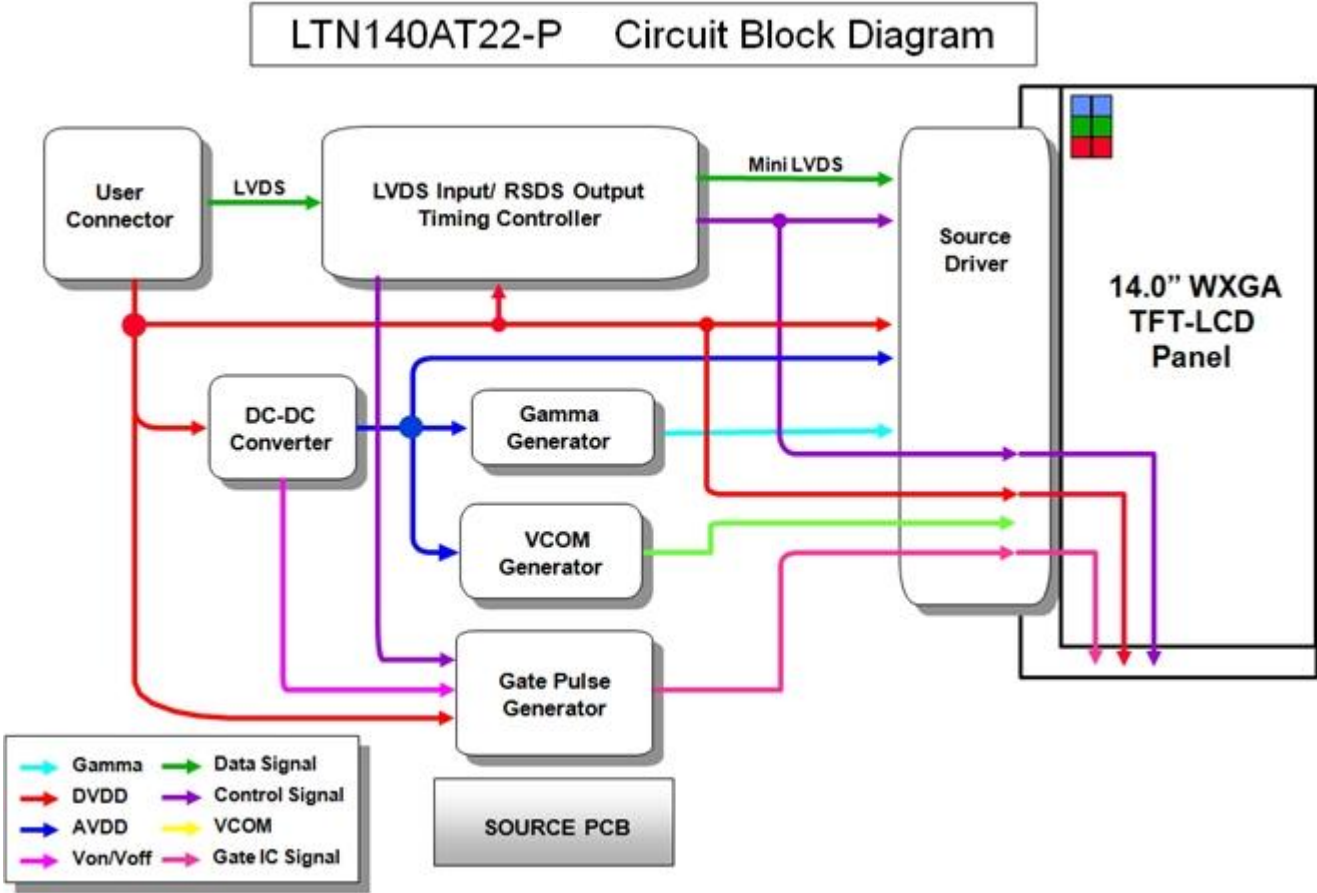
 $T_a = 25 \pm 2 \text{ }^{\circ}\text{C}$

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Input Voltage	V_{in}	7	-	21	V	
EN Control Level	ON	V_{EN}	2	-	-	V
	OFF		-	-	0.8	V
PWM Control Level	ON	V_{PWM}	2	-	-	V
	OFF		-	-	0.8	V
Burst Ratio	D	5	-	100	%	PWM freq : 200Hz~1KHz
		10	-	100	%	PWM freq : 1KHz~10KHz
External PWM Dimming Control Frequency (BLIM)	F_{BLIM}	0.2	1.6	10	KHz	BLIM=PWM 0V~3.3V

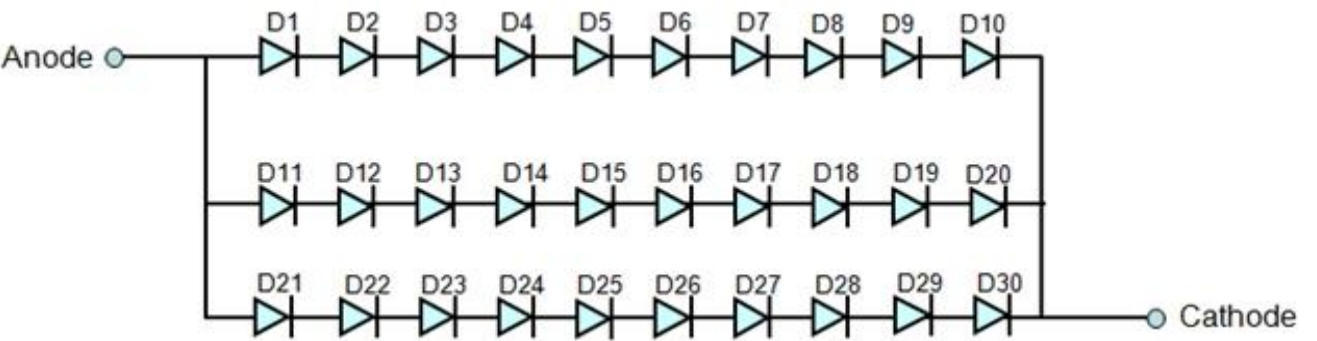
Note - Test Equipment : Fluke 45

4. BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 LED connection and placement



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5. INPUT TERMINAL PIN ASSIGNMENT

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5.1. Input Signal & Power (20455-040E-0 by I-PEX)

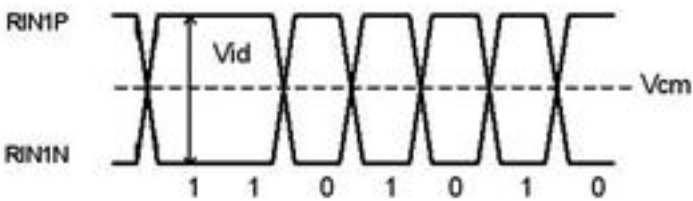
No.	Signal	Description
1	NC	No Connection
2~3	AVDD	Power Supply, 3.3V (typical)
4	DVDD	DDC 3.3V power
5	NC	No Connection
6	SCL	DDC Clock
7	SDA	DDC Data
8	Rin0-	-LVDS differential data input (R0-R5, G0)
9	Rin0+	+LVDS differential data input (R0-R5, G0)
10	GND	Ground
11	Rin1-	-LVDS differential data input (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
20~21	NC	No Connection
22	GND	Ground
23~24	NC	No Connection
25	GND	Ground
26~27	NC	No Connection
28	GND	Ground
29~30	NC	No Connection
31~33	VBL-	LED Ground
34	NC	No Connection
35	BLIM	PWM for luminance control (200~1KHz, 3.3V, 5~100%)
36	BL_Enable	BL On/Off (On:2.0~3.3V, Off: 0~0.8V)
37	NC	No Connection
38~40	VBL+	LED Power Supply 7V~21V

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5. 2 LVDS Interface

5.2.1 LVDS DC Input

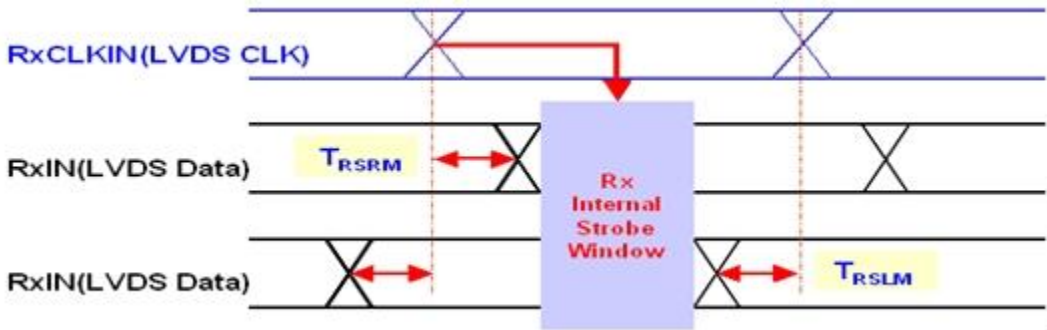
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
LVDS Differential Voltage	V _{id}	200	-	400	mV	
Input Common Mode Voltage	V _{CM}	0.4	1.2	1.6	V	



5.2.2 LVDS AC Input

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
PLL Lock Time		-	-	20	μsec	
LVDS Clock Ratio	T _{OD}	45	50	55	%	
LVDS RX Skew (Strobe) Right Margin	85MHz	T _{RSRM}	-	400	ps	(1),(2)
	50MHz		-	600	ps	(1),(2)
LVDS RX Skew (Strobe) Left Margin	85MHz	T _{RSLM}	-400	-	ps	(1),(2)
	50MHz		-600	-	ps	(1),(2)
SSC Modulation Rate		-	-	±3	%	(3)
SSC Modulation Frequency		-	-	300	KHz	(3)

Note (1) : LVDS Receiver Skew (Strobe) Margin



Note (2) : Ideal S

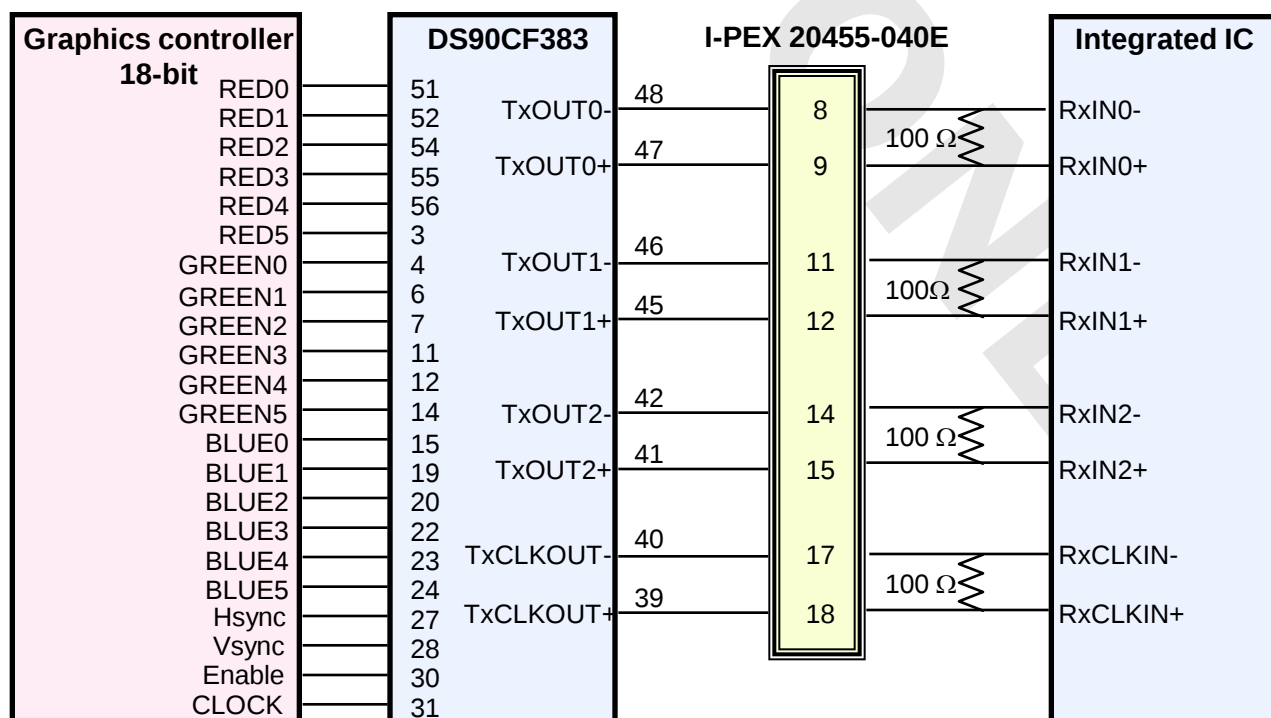


n Clock)

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5.2 LVDS Interface : Transmitter SN75LVDS86 or Compatible

Pin No.	Name	RGB Signal	Pin No.	Name	RGB Signal
51	TxIN0	R0	14	TxIN14	G5
52	TxIN1	R1	15	TxIN15	B0
54	TxIN2	R2	19	TxIN18	B1
55	TxIN3	R3	20	TxIN19	B2
56	TxIN4	R4	22	TxIN20	B3
3	TxIN6	R5	23	TxIN21	B4
4	TxIN7	G0	24	TxIN22	B5
6	TxIN8	G1	27	TxIN24	Hsync
7	TxIN9	G2	28	TxIN25	Vsync
11	TxIN12	G3	30	TxIN26	DE
12	TxIN13	G4	31	TxCLKIN	Clock

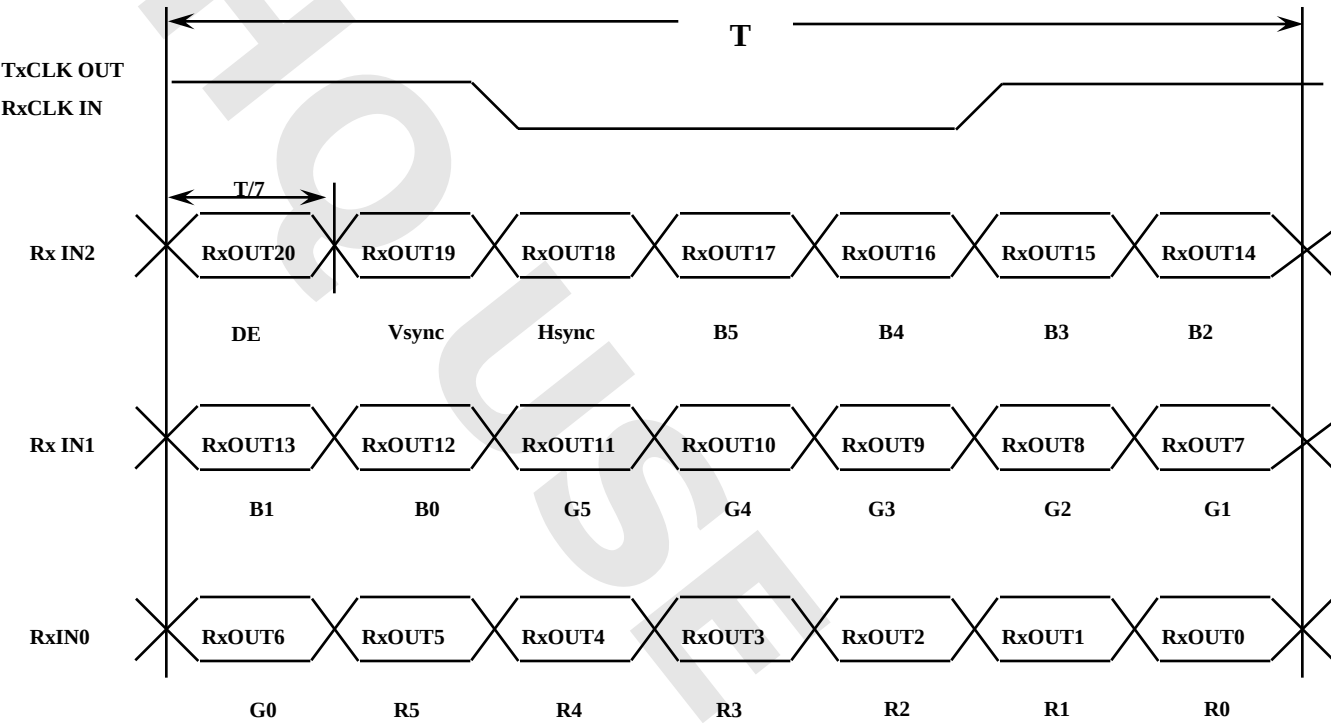
LVDS INTERFACE

Note : The LCD Module uses a 100ohm resistor between positive and negative lines of each receiver input.

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5.3 Timing Diagrams of LVDS For Transmission

LVDS Receiver : Integrated T-CON



5.4 Input Signals, Basic Display Colors and Gray Scale of Each Color

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

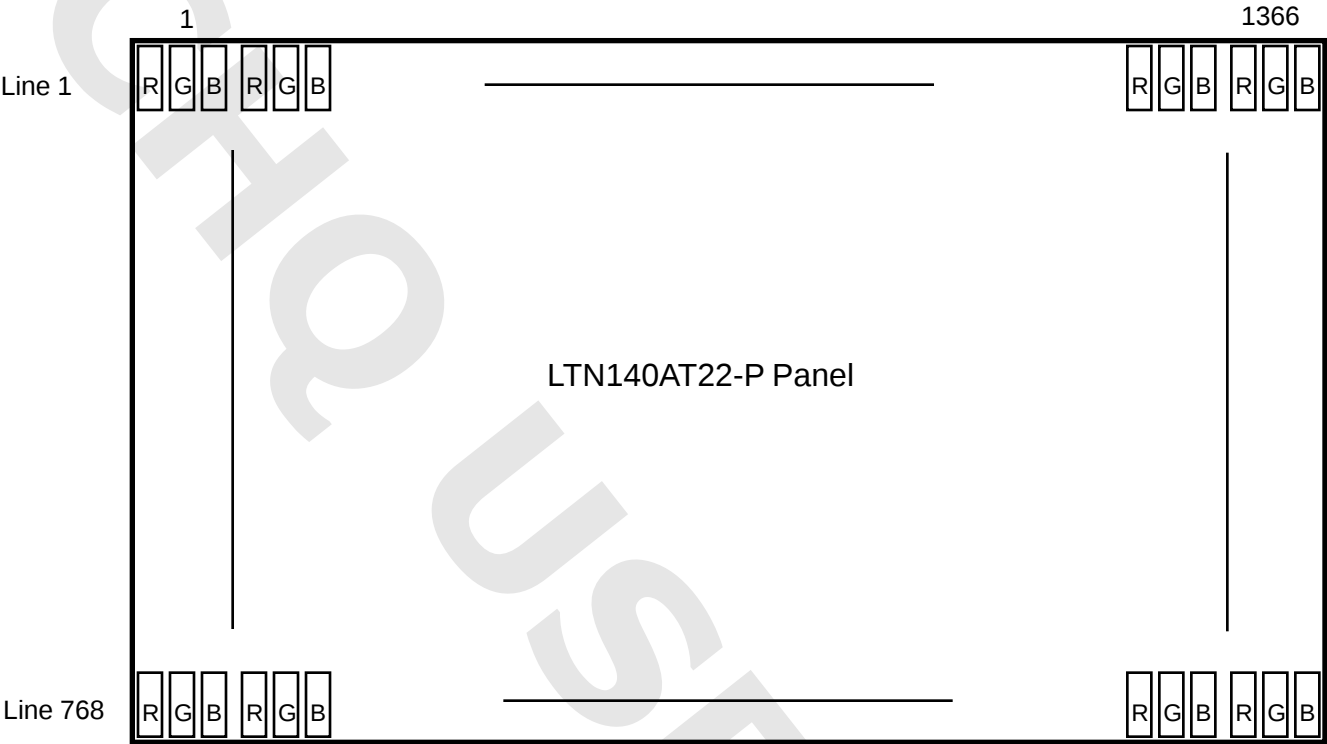
Note 1) Definition of gray :

Rn: Red gray, Gn: Green gray, Bn: Blue gray (n=gray level)

Note 2) Input signal: 0 =Low level voltage, 1=High level voltage

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5.5 Pixel Format in the display

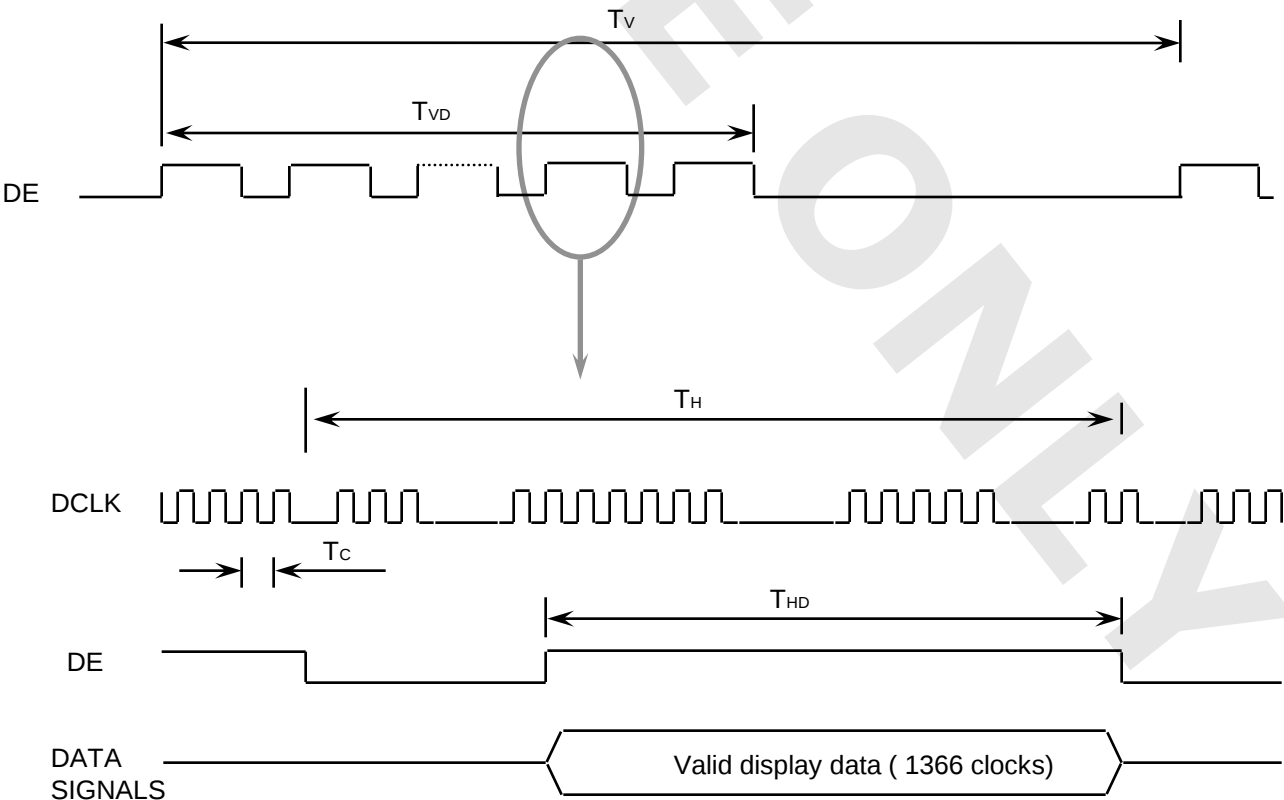


6. INTERFACE TIMING

6.1 Timing Parameters

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	TV	780	790	380	Lines	
Vertical Active Display Term	Display Period	TVD	-	768	-	Lines	
One Line Scanning Time	Cycle	TH	1440	1526	1800	Clocks	
Horizontal Active Display Term	Display Period	THD	-	1366	-	Clocks	

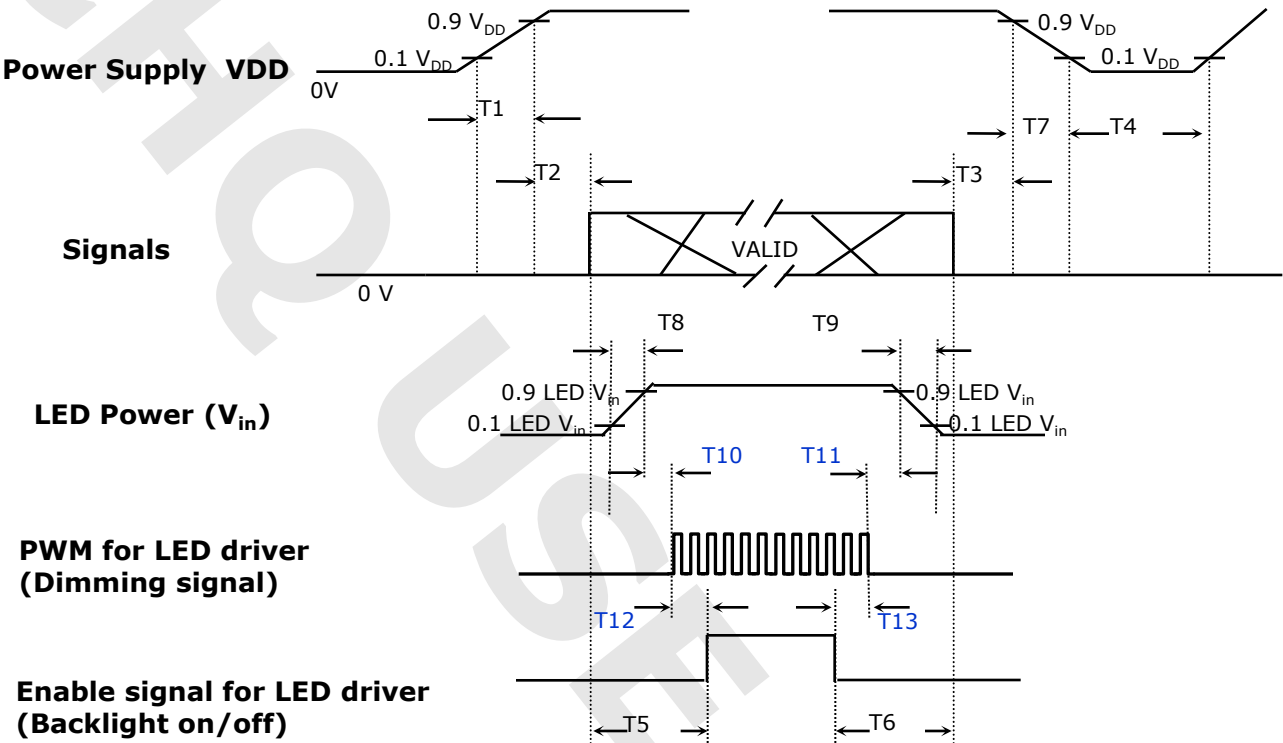
6.2 Timing diagrams of interface signal



6.3 Power ON/OFF Sequence

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: To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.



Power ON/OFF Sequence

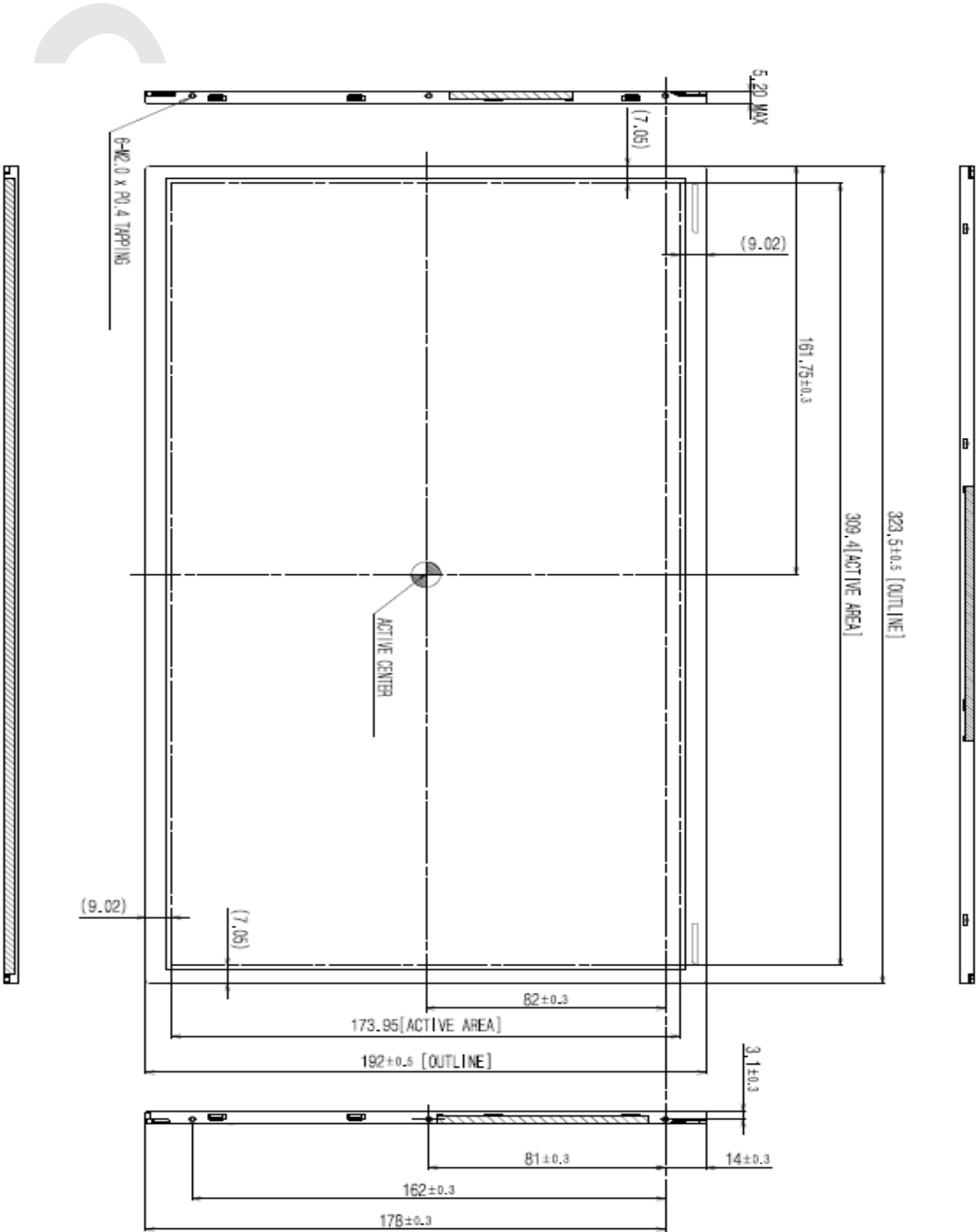
Timing (ms)	Remarks
$0.5 < T1 \leq 10$	V _{DD} rising time from 10% to 90%
$0 < T2 \leq 50$	Delay from V _{DD} to valid data at power ON
$0 < T3 \leq 50$	Delay from valid data OFF to V _{DD} OFF at power Off
$500 \leq T4$	V _{DD} OFF time for Windows restart
$200 \leq T5$	Delay from valid data to B/L enable at power ON
$200 \leq T6$	Delay from valid data off to B/L disable at power Off
$0 < T7 \leq 10$	V _{DD} falling time from 90% to 10%
$0.5 < T8 \leq 10$	LED V _{in} rising time from 10% to 90%
$0.5 < T9 \leq 10$	LED V _{in} falling time from 90% to 10%
$0 \leq T10$	Delay from LED driver Vin rising time 90% to PWM ON
$0 \leq T11$	Delay from PWM Off to LED driver Vin falling time 10%, Must Keep rule
$0 \leq T12$	Delay from PWM ON to B/L Enable ON, Must Keep rule
$0 \leq T13$	Delay from B/L Enable Off to PWM Off

Power Sequence & Timing Parameters

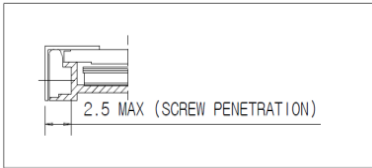
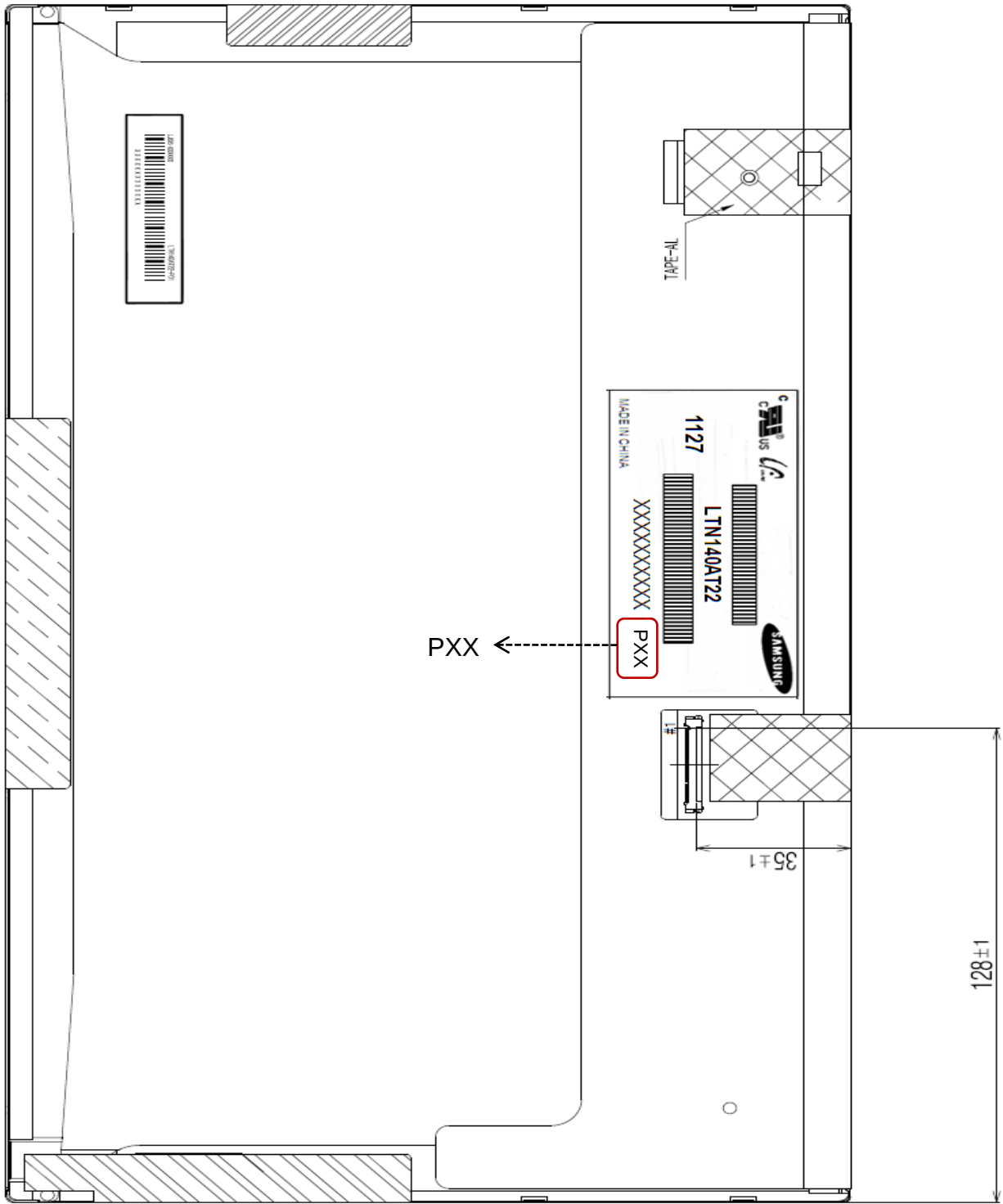
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7. Mechanical Outline Dimension (1)

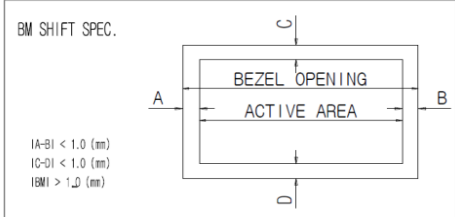
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<USER HOLE SCREW PENETRATION DEPTH>



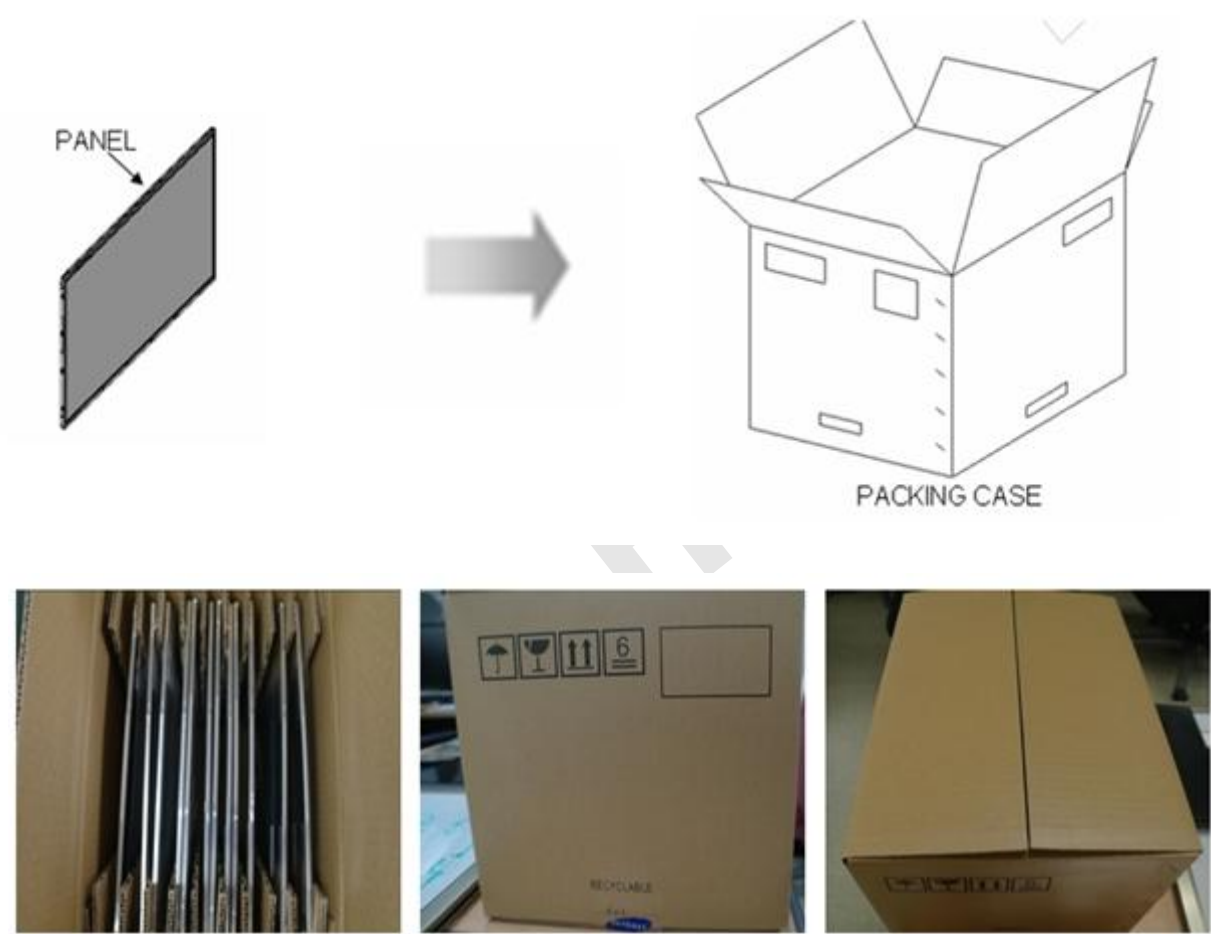
* NOTE

1. SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.
- CONNECTOR
IPEX 20455-040E-12 or Equivalent
2. CALIFERS MEASURING FORCE : 750 gf
3. USER HOLE TORQUE SPEC : 2.5kgf-cm
4. WEIGHT SPEC : 350g MAX
5. In order to avoid IC damage,
it is not allow that overlapping of cables or
antennas, camera ,WLAN,WWAN over these COF locations

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1. CARTON (Internal Package)
- (1) Packing Form

Corrugated Cardboard box and EPS form as shock absorber
- (2) Packing Method



Note (1) Total : Approx. 10.7 Kg

(2) Acceptance number of piling : 15 sets

(3) Carton size : 347.5(W) X 375(L) X 246(H)

(3)Packing Material

No	Part name	Quantity
1	Static electric protective sack	30 pcs
2	Packing case (Inner box) included shock absorber	1 set
3	Pictorial marking	2 pcs
4	Carton	1 set

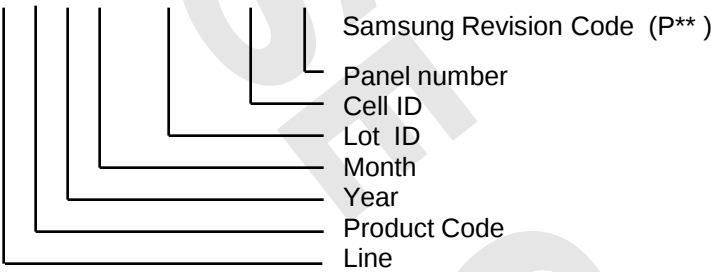
9. MARKINGS & OTHERS

A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.

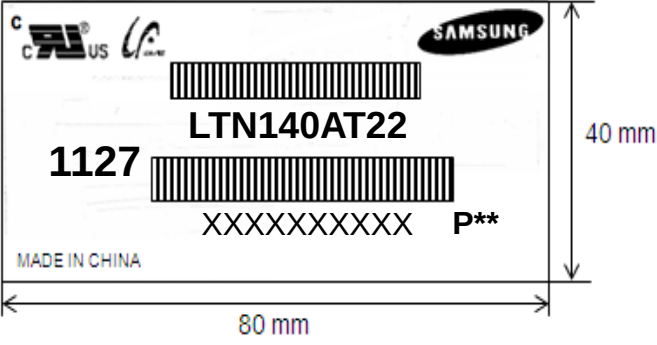
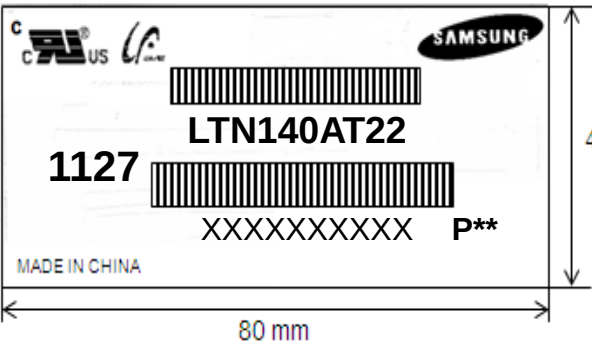
(1)Parts number : LTN140AT22

(2)Revision code : 3 letters

(3)Lot number : X X X X XXX XX X P**

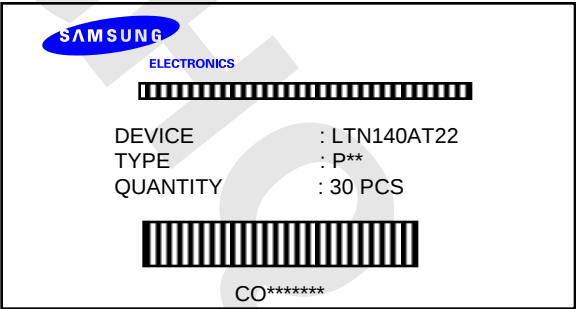


(4) Nameplate Indication

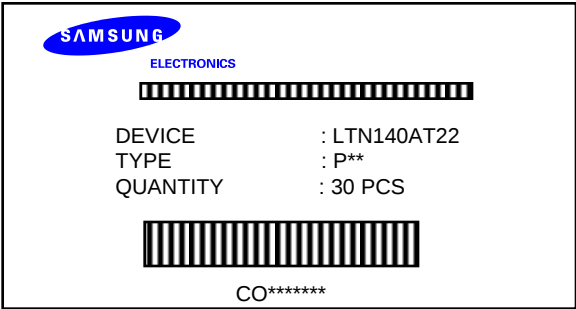


Parts name : LTN140AT22
Lot number : XXXXXXXXXXXX.
Inspected work week : 1127 (2011 year, 27th week)
Product revision Code : P**

(5) Packing small box attach



or



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 LED 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 lamp wire.
- (l) Do not adjust the variable resistor 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.

2. STORAGE

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

ITEM	Unit	Min.	Max.
Storage Temperature	(°C)	5	40
Storage Humidity	(%rH)	35	75
Storage life	12 months		
Storage Condition	- The storage room should provide good ventilation and temperature control. - Products should not be placed on the floor, but on the Pallet away from a wall. - Prevent products from direct sunlight, moisture nor water; Be cautious of a build up of condensation. - Avoid other hazardous environment while storing goods. - If products delivered or kept in conditions of over the storage period of 3 months, the recommended temperature or humidity range, we recommend you leave them at a temperature of 20 °C and a humidity of 50% for 24 hours.		

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

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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

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LTN140AT22-P EDID Sheet

Address (HEX)	FUNCTION	Value HEX	BIN	DEC	ASCII or Data	Notes
00	Header	00	00000000	0		EDID Header
01		FF	11111111	255		
02		FF	11111111	255		
03		FF	11111111	255		
04		FF	11111111	255		
05		FF	11111111	255		
06		FF	11111111	255		
07		00	00000000	0		
08	ID Manufacturer Name	4C	01001100	76	S	3 character ID
09		A3	10100011	163	E C	"SEC"
0A	ID Product Code	49	01001001	73	[I]	
0B		38	00111000	56	[8]	
0C	32-bit serial no.	00	00000000	0		
0D		00	00000000	0		
0E		00	00000000	0		
0F		00	00000000	0		
10	Week of manufacture	00	00000000	0		
11	Year of manufacture	15	00010101	21	2011	2011
12	EDID Structure Ver.	01	00000001	1	1	EDID Ver. 1.0
13	EDID revision #	03	00000011	3	3	EDID Rev. 3
14	Video input definition	80	10000000	128		
15	Max H image size	1F	00011111	31	31	31 cm(approx)
16	Max V image size	11	00010001	17	17	17 cm(approx)
17	Display Gamma	78	01111000	120	2.2	Gamma 2.2
18	Feature support	0A	00001010	10		
19	Red/green low bits	09	00001001	9		10000111
1A	Blue/white low bits	E5	11100101	229		11111110
1B	Red x/ high bits	97	10010111	151	0.590	Red x 0.615= 1001010010
1C	Red y	57	01010111	87	0.340	Red y 0.325= 0101011100
1D	Green x	54	01010100	84	0.330	Green x 0.300= 0100111101
1E	Green y	8A	10001010	138	0.540	Green y 0.570= 1000110011
1F	Blue x	27	00100111	39	0.155	Blue x 0.145= 0010011111
20	Blue y	22	00100010	34	0.135	Blue y 0.080= 0010011111
21	White x	50	01010000	80	0.313	White x 0.313= 0101000001
22	White y	54	01010100	84	0.329	White y 0.329= 0101010001
23	Established timing 1	00	00000000	0		
24	Established timing 2	00	00000000	0		
25	Established timing 3	00	00000000	0		
26	Standard timing #1	01	00000001	1		not used
27		01	00000001	1		
28	Standard timing #2	01	00000001	1		not used
29		01	00000001	1		

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2A	Standard timing #3	01	00000001	1		not used
2B		01	00000001	1		not used
2C	Standard timing #4	01	00000001	1		not used
2D		01	00000001	1		not used
2E	Standard timing #5	01	00000001	1		not used
2F		01	00000001	1		not used
30	Standard timing #6	01	00000001	1		not used
31		01	00000001	1		not used
32	Standard timing #7	01	00000001	1		not used
33		01	00000001	1		not used
34	Standard timing #8	01	00000001	1		not used
35		01	00000001	1		not used
36	Detailed timing/monitor descriptor #1	7D	01111101	125	78.05	Main clock= 78.05 MHz
37		1E	00011110	30		
38		56	01010110	86	1366	Hor active=1366 pixels
39		18	00011000	24	280	Hor blanking=160 pixels
3A		51	01010001	81		4bit : 4bit
3B		00	00000000	0	768	Vertical active=768 lines
3C		16	00010110	22	22	Vertical blanking=22 lines
3D		30	00110000	48		4bit : 4bit
3E		30	00110000	48	48	
3F		20	00100000	32	32	H sync. Width=32 pixels
40		25	00100101	37	2	V sync. Offset=2 lines
					5	V sync. Width=5 lines
41		00	00000000	0		2bit : 2bit :2bit :2bit
42		35	00110101	53	309	H image size= 309 mm(approx)
43		AE	10101110	174	174	V image size = 173 mm(approx)
44		10	00010000	16		
45		00	00000000	0		No Horizontal Border
46		00	00000000	0		No Vertical Border
47		19	00011001	25		
48	Detailed timing/monitor descriptor #2	00	00000000	0		Manufacturer Specified (Timing)
49		00	00000000	0		
4A		00	00000000	0		
4B		0F	00001111	15		
4C		00	00000000	0		
4D		00	00000000	0		Value=HSPWmin / 2
4E		00	00000000	0		Value=HSPWmax / 2
4F		00	00000000	0		Value=Thbpmin / 2
50		00	00000000	0		Value=Thbpmax / 2
51		00	00000000	0		Value=VSPWmin / 2
52		00	00000000	0		Value=VSPWmax / 2
53		00	00000000	0		Value=TVbpmin / 2
54		00	00000000	0		Value=TVbpmax / 2
55		1E	00011110	30		Thpmin=value*2 + HA pixelclks
56		B4	10110100	180		Thpmax=value*2 + HA pixelclks
57		02	00000010	2		Tvpmin=value*2 + VA lines
58		74	01110100	116		Tvpmax=value*2 + VA lines
59		00	00000000	0		Module revision

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5A	Detailed timing/monitor descriptor #3	00	00000000	0		ASCII Data String Tag
5B		00	00000000	0		
5C		00	00000000	0		
5D		FE	11111110	254		
5E		00	00000000	0		
5F		53	01010011	83	[S]	
60		41	01000001	65	[A]	
61		4D	01001101	77	[M]	
62		53	01010011	83	[S]	
63		55	01010101	85	[U]	
64		4E	01001110	78	[N]	
65		47	01000111	71	[G]	
66		0A	00001010	10	[^]	
67		20	00100000	32	[]	
68		20	00100000	32	[]	
69		20	00100000	32	[]	
6A		20	00100000	32	[]	
6B		20	00100000	32	[]	
6C	Detailed timing/monitor descriptor #4	00	00000000	0		Monitor Name Tag (ASCII)
6D		00	00000000	0		
6E		00	00000000	0		
6F		FE	11111110	254		
70		00	00000000	0		
71		4C	01001100	76	[L]	
72		54	01010100	84	[T]	
73		4E	01001110	78	[N]	
74		31	00110001	49	[1]	
75		34	00110100	52	[4]	
76		30	00110000	48	[0]	
77		41	01000001	65	[A]	
78		54	01010100	84	[T]	
79		32	00110010	50	[2]	
7A		32	00110010	50	[2]	
7B		50	01010000	80	[P]	
7C		30	00110000	48	[0]	
7D		31	00110001	49	[1]	
7E	Extension Flag	00	00000000	0		
7F	Checksum	2B	00101011	43		