SAMSUNG ELECTRONICS

Approval

TO :

DATE : Sep 26, 2010

SAMSUNG TFT-LCD

MODEL NO. : LTN141BT08-003

NOTE : Green product (Complied with RoHS requirement)
Surface type [**ARC150T**]

Any Modification of Spec is not allowed without SEC' permission

APPROVED BY : J.H. Oh

PREPARED BY : **LCD Application Engineering Part , TCS Team**

SAMSUNG ELECTRONICS CO., LTD.

wise view™

Approval

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REVISION HISTORY

Approval

Date	Revision No.	Page	Summary
July 6. 2009	P00	All	Preliminary spec of LTN141BT08-001 for Shin-2 was issue first. Lenovo's product code P/N : 42T0635 FRU : 42T0636 H/C : 1ZFKS
Nov 18. 2009	A00	-	Model name chanaged. (LTN141BT08-001 → LTN141BT08-002) Label specification was changed. Lenovo P/N : 42T0635 → 27R2484 FRU P/N : 42T0636 → 27R2485 New H/C : 1ZFKS → 1ZH2C
Dec 1. 2009	A01	13 21	Connector number of block diagram was updated. Power On/Off sequence was updated.

GENERAL DESCRIPTION

DESCRIPTION

LTN141BT08-002 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching devices. This model is composed of a TFT LCD panel, a driver circuit and a backlight unit. The resolution of a 14.1" contains 1,440 x 900 pixels and can display up to 262,144 colors. 6 O'clock direction is the Optimum viewing angle.

FEATURES

- Thin and light weight
- High contrast ratio, high aperture structure
- Wide XGA+ (1440x900 pixels) resolution
- Fast Response Time
- Low power consumption
- LED Back Light
- DE (Data enable) only mode.
- 3.3V LVDS Interface
- On board EDID chip
- Auto Recovery Function
- RoHS Compliance
- Color Gamut 45%

APPLICATIONS

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

GENERAL INFORMATION

Item	Specification	Unit	Note
Display area	303.48(H) x 189.6(V) (14.1” diagonal)	mm	
Driver element	a-Si TFT active matrix		
Display colors	262,144		
Number of pixel	1440 x RGB(3) x 900	pixel	16 : 10
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.21075(H) x 0.21075(V) (TYP.)	mm	120DPI
Display Mode	Normally white		
Surface treatment	Haze 40, Hard-Coating 2H, ARC150T		

Mechanical Information

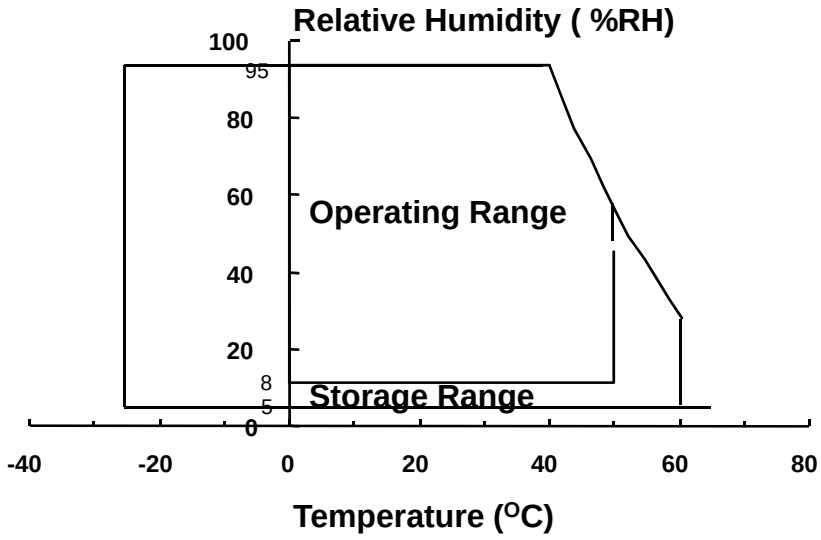
Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	314.3	314.8	315.3	mm	
	Vertical (V)	203.0	203.5	204.0	mm	
	Depth (D)	-	3.3	3.5	mm	Excluding tape thickness
		-	3.6	3.8	mm	Including tape thickness
Weight		-	278	295	g	

1. ABSOLUTE MAXIMUM RATINGS

1.1 ENVIRONMENTAL ABSOLUTE RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Storage temperate	T_{STG}	-20	60	°C	(1)
Operating temperate (Temperature of glass surface)	T_{OPR}	0	50	°C	(1)
Shock (non-operating)	Snop	-	210	G	(2),(5)
			50		(3),(5)
Vibration (non-operating)	Vnop	-	2.41	G	(4),(5)

Note (1) Temperature and relative humidity range are shown in the figure below.
95 % RH Max. (40 ^{O}C $\geq$ Ta)
Maximum wet - bulb temperature at 39 ^{O}C or less. (Ta > 40 ^{O}C) No condensation.
(2) 3ms, half sine wave, one time for ±X,±Y,±Z.
(3) 18ms, Trapezoidal wave, one time for ±X,±Y,±Z.
(4) 5~500 Hz, Random vibration, 30 min for X,Y,Z.
(5) 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.



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 Ta (25 ± 2 ^{O}C)

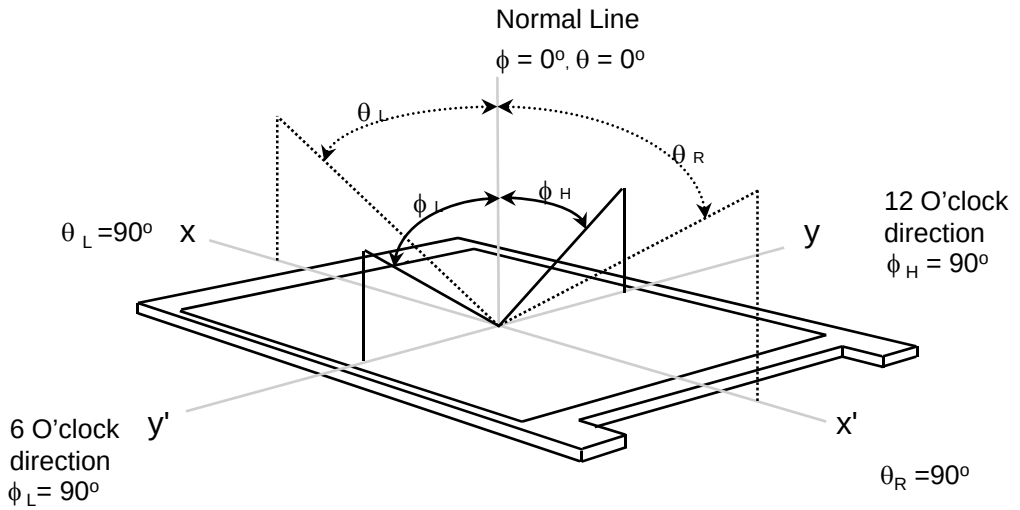
2. OPTICAL CHARACTERISTICS

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, fv= 60Hz, f_{DCLK} = 106.89MHz, IF = 17.0 mArms

Item		Symbol	Condition	Min.	Typ.	Max	Unit	Note
Contrast Ratio (5 Points)		CR	Normal Viewing Angle $\phi = 0$ $\theta = 0$	180	250	-	-	(1), (2), (5)
Response Time at 25℃	Rising	T_R+T_f		-	16	25	msec	(1), (3)
	Falling							
Average Luminance of White (5P average)		$Y_{L,AVE}$		250	300	-	cd/m^2	IF=17.0mA (1), (4)
Color Chromaticity (CIE)	Red	R_X		0.547	0.577	0.607	-	(1), (5) SR-3
		R_Y		0.306	0.336	0.366		
	Green	G_X		0.300	0.330	0.360		
		G_Y		0.518	0.548	0.578		
	Blue	B_X		0.112	0.142	0.172		
		B_Y		0.090	0.120	0.150		
	White	W_X		0.283	0.313	0.343	-	(7)
		W_Y		0.299	0.329	0.359		
Viewing Angle	Hor.	θ_L	CR ≥ 10	-	45	-	Degrees	(1), (5) SR-3
		θ_H		-	45	-		
	Ver.	ϕ_H		-	15	-		
		ϕ_L		-	35	-		
13 Points White Variation		δ_L		60%	-	-	-	(6)
5 Points White Variation		δ_L		80%	-	-	-	(6)

Note 1) Definition of Viewing Angle : Viewing angle range(10 ≤ C/R, 100 ≤ C/R)

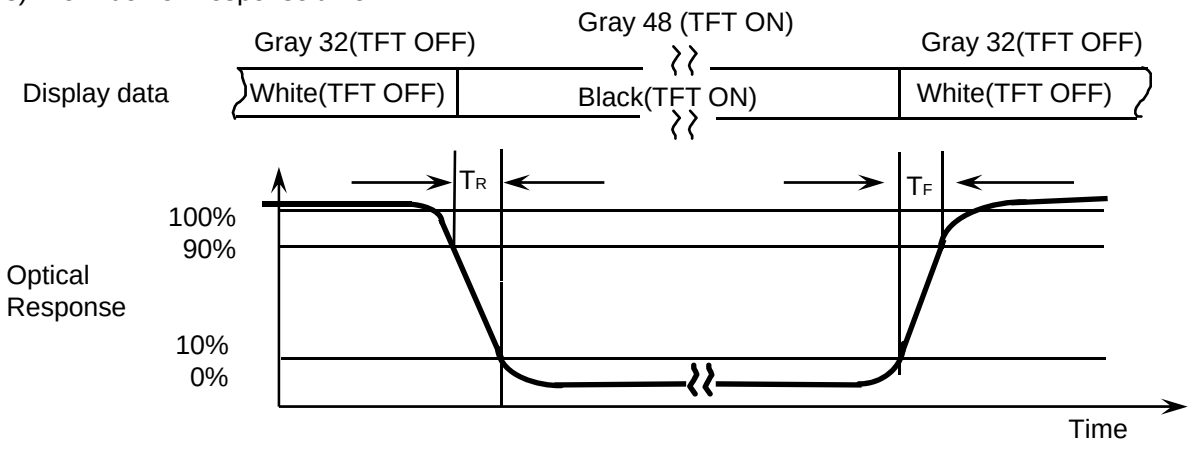


Note 2) Definition of Contrast Ratio (CR) : Ratio of gray max (Gmax) ,gray min (Gmin) at 5 points(4, 5, 7, 9, 10)

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

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

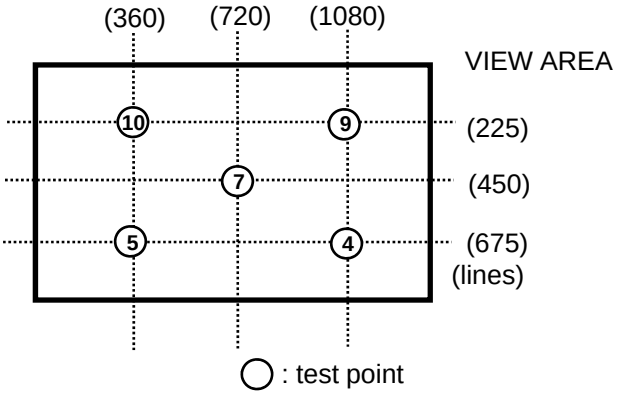
Note 3) Definition of Response time :



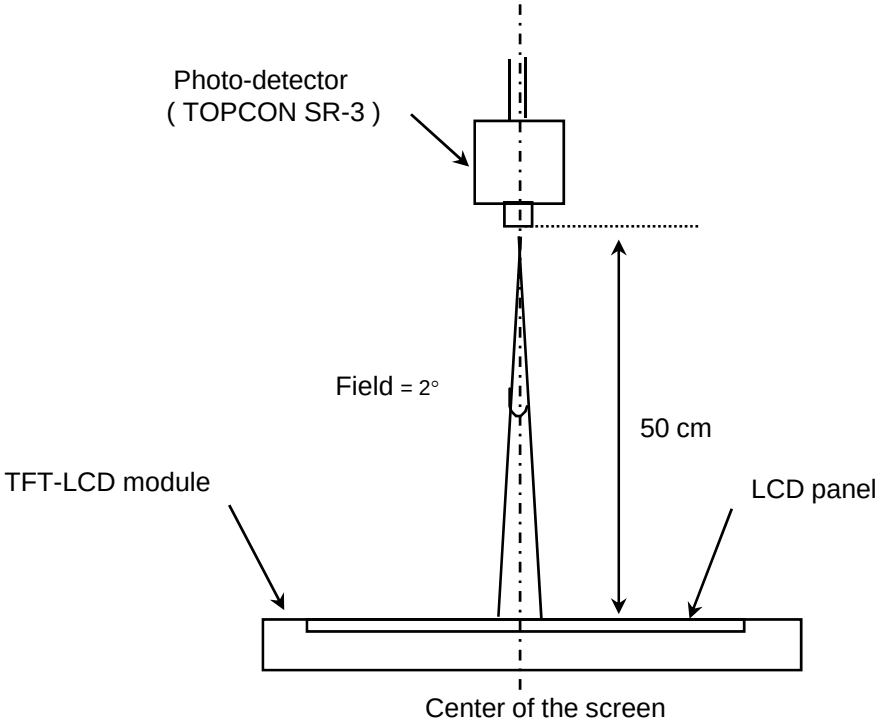
Note 4) Definition of Average Luminance of White : measure the luminance of white at center points.

Average Luminance of White (Y_L)

$Y_L = Y_{L7}$



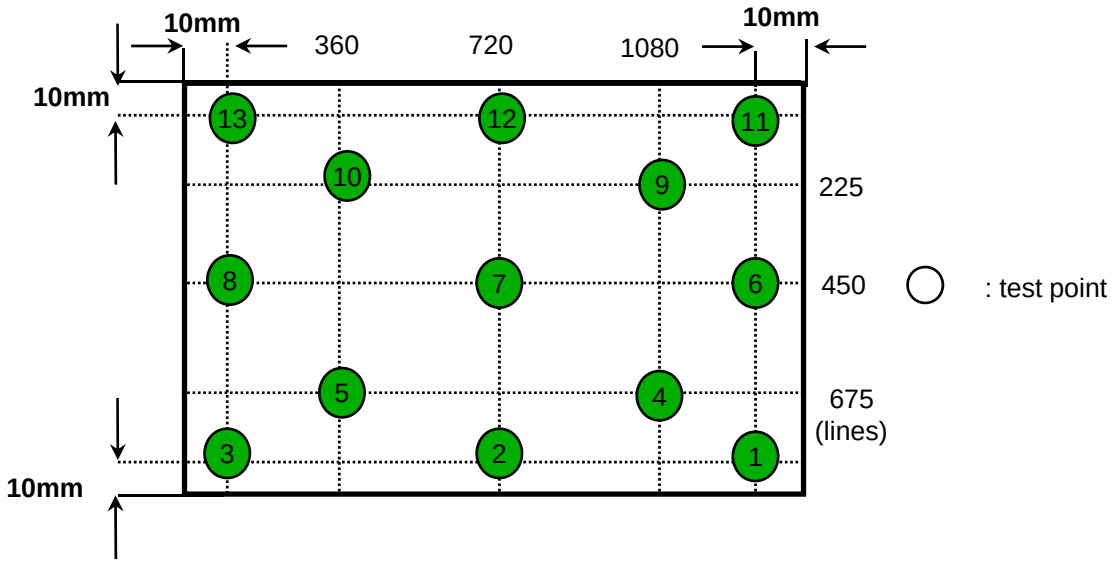
Note 5) After stabilizing and leaving the panel alone at a given temperature for 30 min , the measurement should be executed. Measurement should be executed in a stable, windless,and dark room.
30 min after lighting the backlight. This should be measured in the center of screen.
Lamp current : 17mA
Environment condition : Ta = 25 ± 2 °C



[Optical characteristics measurement setup]

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

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



3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Ta= 25 ± 2°C

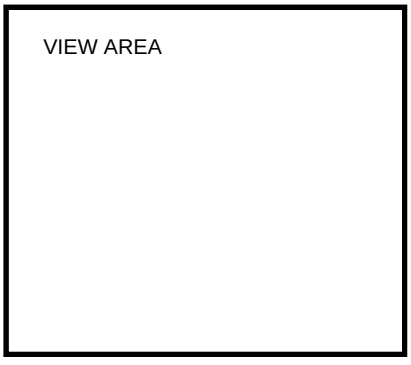
ITEM			SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Voltage of Power Supply			V_{DD}	3.0	3.3	3.6	V	
Differential Input Voltage for LVDS Receiver Threshold		High	V_{IH}	-	-	+100	mV	V_{CM}=+1.2V
		Low	V_{IL}	-100	-	-	mV	
Vsync Frequency	60Hz	Hsync Freq	F_H	53.0	55.56	65	KHz	
		Main Freq	F_{DCLK}	95.3	106.89	125	MHz	
	50Hz	Hsync Freq	F_H	40.2	51.3	55	KHz	
		Main Freq	F_{DCLK}	65.12	89.26	106.7	MHz	
	40Hz	Hsync Freq	F_H	36.24	41.04	44	KHz	
		Main Freq	F_{DCLK}	57.84	71.4	85.36	MHz	
Rush Current			I_{RUSH}	-	-	1.5	A	(4)
Current of Power Supply		White	I_{DD}	-	420	-	mA	(2),(3)*a
		Mosaic		-	505	-	mA	(2),(3)*b
		WinXP Pattern		-	495	-	mA	(2),(3)*c
		Max Pattern (1dot Inversion)		-	606	620	mA	(2),(3)*d

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

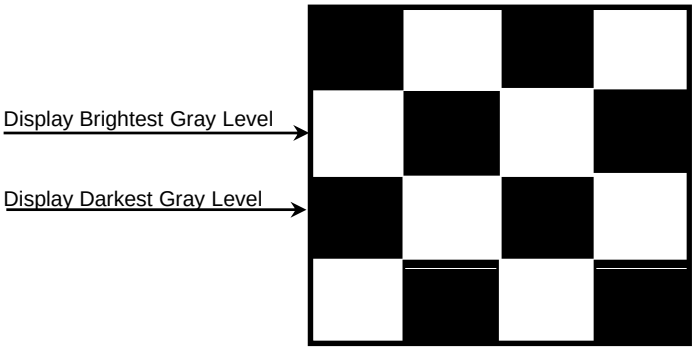
(2) f_V = 60Hz, f_{DCLK} = 101.56MHZ, V_{DD} = 3.3V , DC Current.

(3) Power dissipation pattern

*a) White Pattern

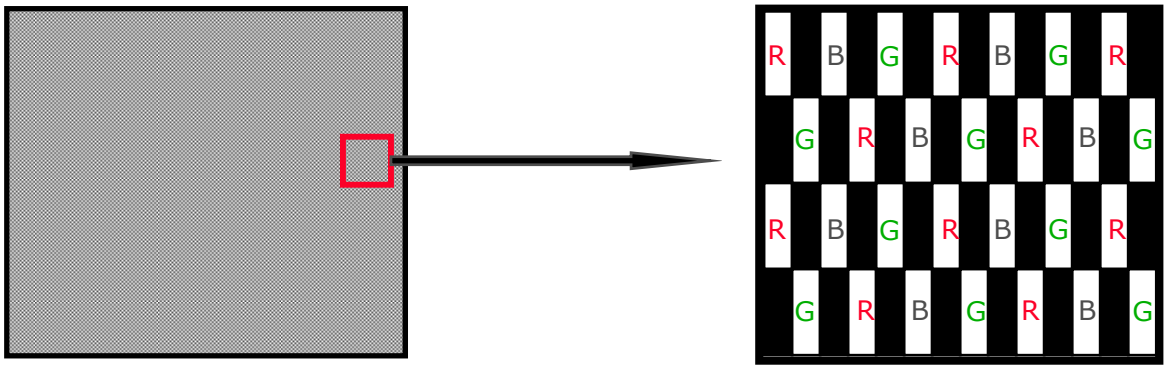


*b) Mosaic Pattern

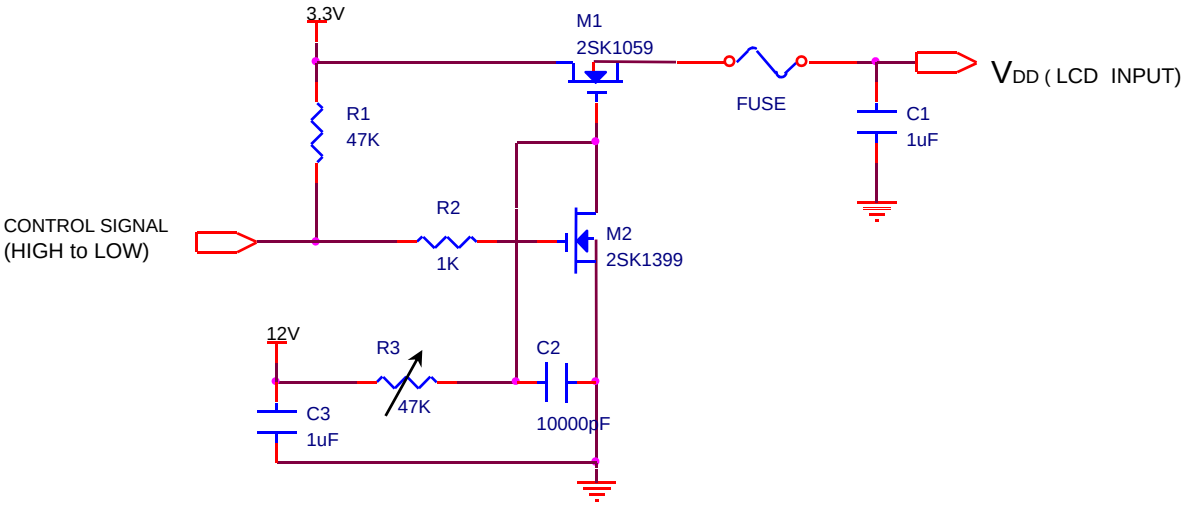


*c) WinXP Pattern

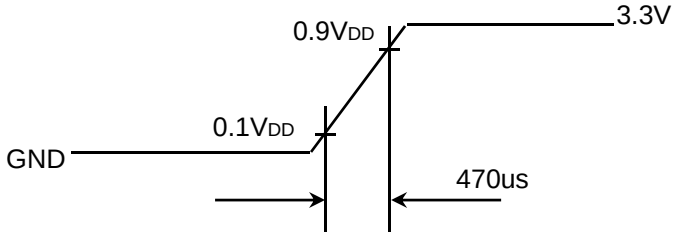
*d) 1dot Inversion Pattern



4) Rush current measurement condition



VDD rising time is 470us



3.2 BACK-LIGHT UNIT

White LED chip P/N (Supplier) : NNSW108T (Nichia co,)

Ta= 25 ± 2 °C

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Forward Current	IF	-	17	20	mA	60 ea
LED Forward Voltage	VF	-	3.2	3.5	V	
LED Array Voltage	VP	-	32.0	35	V	VF X 6 LEDs
Power Consumption	P	-	3.46	4.2	W	IF X VF X 60LEDs 6 parallel, 10 serial
Operating Life Time	Hr	10,000	-	-	Hr	(1)

Note (1) Life time (Hr) of LEDs can be defined as the time in which it continues to operate under the condition Ta= 25 ± 2 °C and IF = 17.0 mArms until one of the following event occurs.
- When the brightness becomes 50% or lower than the original.

3.3 LED driver

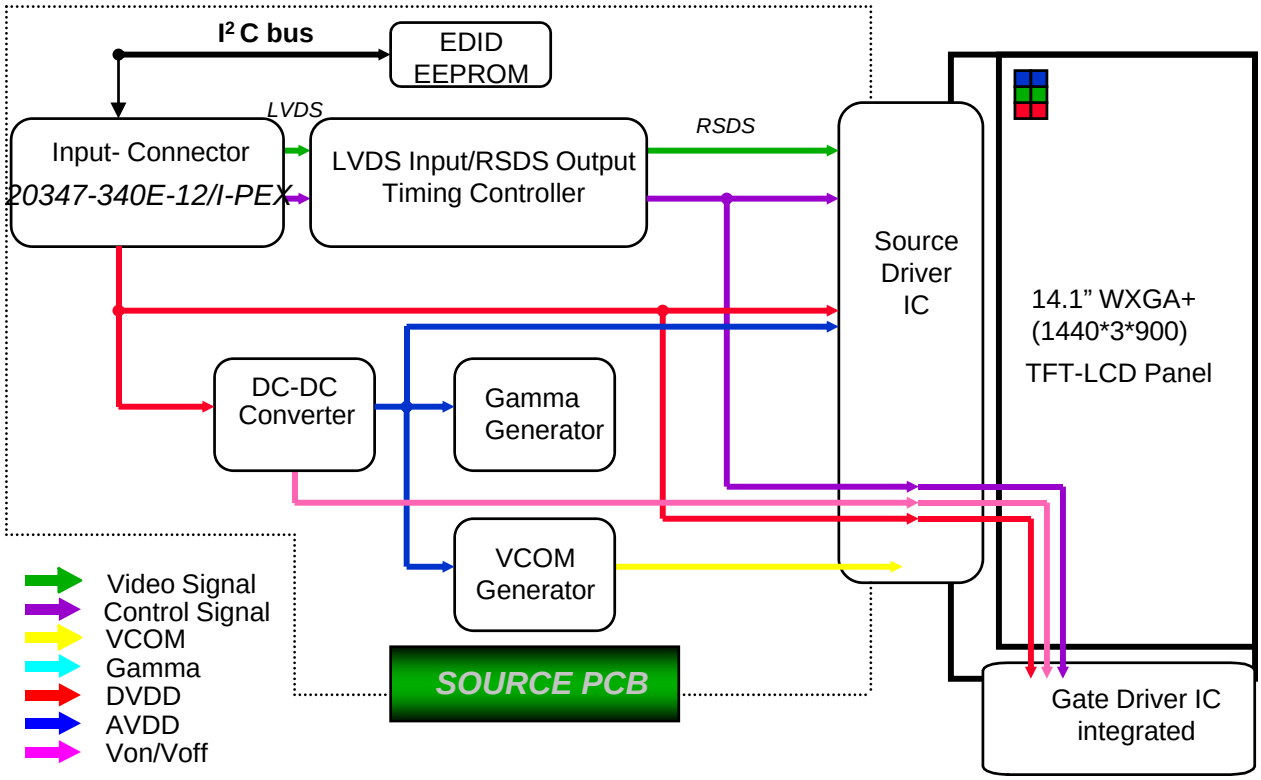
LED driver Manufacturer : PM6600 (ST)

Item	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Input Voltage	Vin	4.7	-	28	V	
Output Voltage	Lo	-	-	40	V	
Output PWM Frequency	Fpwm	100	-	320	Hz	(1)
Adjustable Switching Frequecy	Fsw	200	-	1000	KHz	
FSW Sync Input Duty Cycle	D	-	-	40	%	
Rows Output Maximun Current	Ir	-	-	30	mA	

Note (1) LED driver can be dimmed via a PWM signal (1% dimming duty-cycle can be managed).

4. BLOCK DIAGRAM

4.1 TFT LCD Module



5. INPUT TERMINAL PIN ASSIGNMENT

5.1. Input Signal & Power (LVDS, Connector : I-PEX, 20347-340E-12)

No.	Symbol	Function	Polarity	Remarks
1	VSS	Ground		
2	VDD	Power supply +3.3V		
3	VDD	Power supply +3.3V		
4	VDD	Power supply +3.3V		
5	VEDID	DDC 3.3V Power		
6	WPN	WPN		
7	CLK EDID	Data for clock		
8	Data EDID	Data for EDID		
9	O_RxIN0-	LVDS Differential Data INPUT (Odd R0-R5,G0)	Negative	
10	O_RxIN0+	LVDS Differential Data INPUT (Odd R0-R5,G0)	Positive	
11	VSS	Ground		
12	O_RxIN1-	LVDS Differential Data INPUT (Odd G1-G5,B0-B1)	Negative	
13	O_RxIN1+	LVDS Differential Data INPUT (Odd G1-G5,B0-B1)	Positive	
14	VSS	Ground		
15	O_RxIN2-	LVDS Differential Data INPUT (Odd B2-B5,Sync,DE)	Negative	
16	O_RxIN2+	LVDS Differential Data INPUT (Odd B-B5,Sync,DE)	Positive	
17	VSS	Ground		
18	O_RxCLK-	LVDS Differential Data INPUT (Odd Clock)	Negative	
19	O_RxCLK+	LVDS Differential Data INPUT (Odd Clock)	Positive	
20	VSS	Ground		
21	E_RxIN0-	LVDS Differential Data INPUT (Even R0-R5,G0)	Negative	
22	E_RxIN0+	LVDS Differential Data INPUT (Even R0-R5,G0)	Positive	
23	VSS	Ground		
24	E_RxIN1-	LVDS Differential Data INPUT (Even G1-G5,B0-B1)	Negative	
25	E_RxIN1+	LVDS Differential Data INPUT (Even G1-G5,B0-B1)	Positive	
26	VSS	Ground		
27	E_RxIN2-	LVDS Differential Data INPUT (Even B2-B5,Sync,DE)	Negative	
28	E_RxIN2+	LVDS Differential Data INPUT (Even B2-B5,Sync,DE)	Positive	
29	VSS	Ground		
30	E_RxCLK-	LVDS Differential Data INPUT (Even Clock)	Negative	
31	E_RxCLK+	LVDS Differential Data INPUT (Even Clock)	Positive	
32	PWM	LED PWM		
33	LED_EN	LED Enable		
34	GND	GND		
35	GND	GND		
36	GND	GND		
37	VBL	7V ~ 21V LED Power		
38	VBL	7V ~ 21V LED Power		
39	VBL	7V ~ 21V LED Power		
40	VBL	7V ~ 21V LED Power		

5.2 LVDS Interface : Transmitter DS90C363 or Compatible

LVDS for Odd pixel

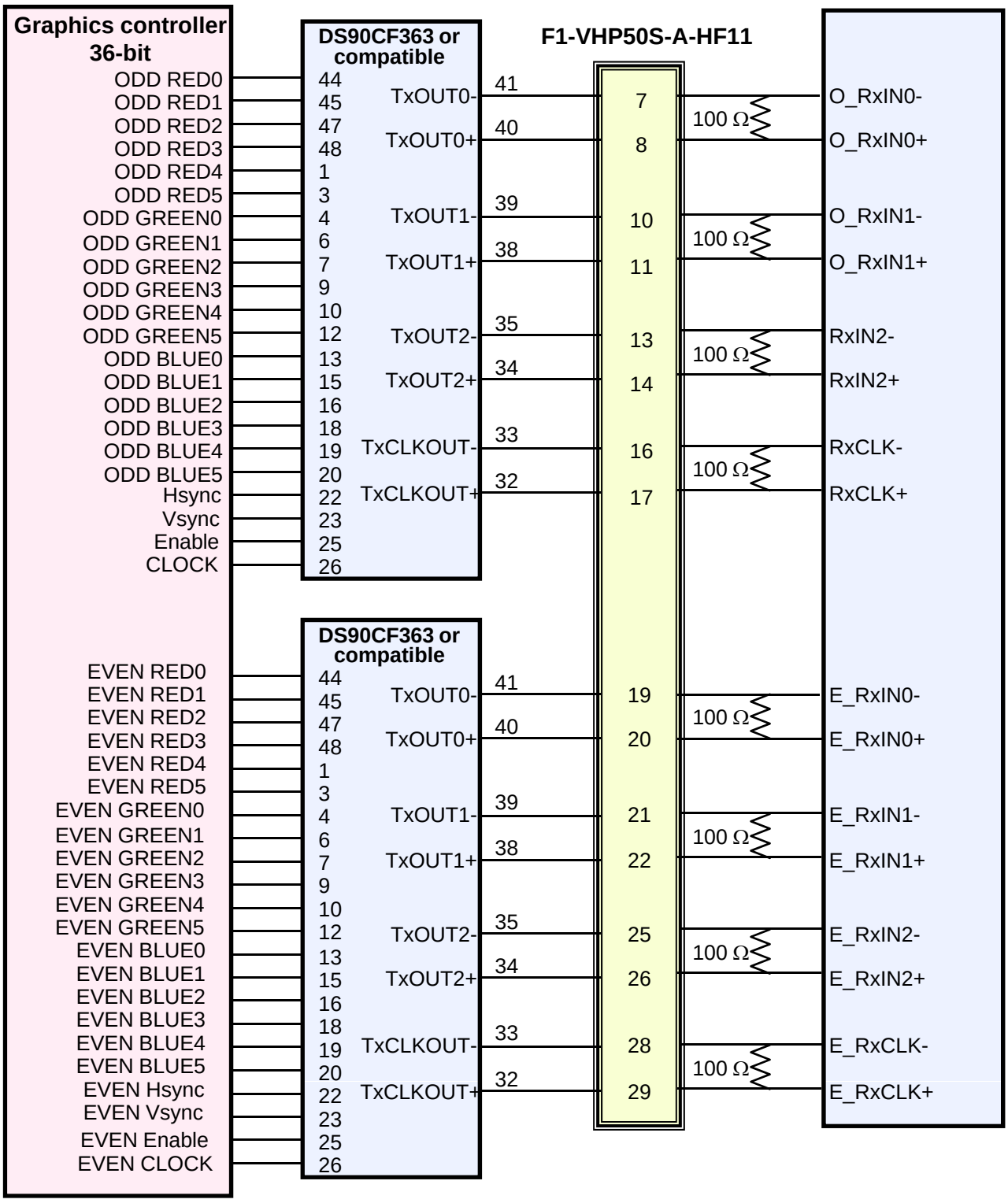
Pin No.	Name	RGB Signal	Pin No.	Name	RGB Signal
44	TxIN0	RO0	12	TxIN11	GO5
45	TxIN1	RO1	13	TxIN12	BO0
47	TxIN2	RO2	15	TxIN13	BO1
48	TxIN3	RO3	16	TxIN14	BO2
1	TxIN4	RO4	18	TxIN15	BO3
3	TxIN5	RO5	19	TxIN16	BO4
4	TxIN6	GO0	20	TxIN17	BO5
6	TxIN7	GO1	22	TxIN18	Hsync
7	TxIN8	GO2	23	TxIN19	Vsync
9	TxIN9	GO3	25	TxIN20	DE
10	TxIN10	GO4	26	TxCLK IN	Clock

LVDS for Even pixel

Pin No.	Name	RGB Signal	Pin No.	Name	RGB Signal
44	TxIN0	RE0	12	TxIN11	GE5
45	TxIN1	RE1	13	TxIN12	BE0
47	TxIN2	RE2	15	TxIN13	BE1
48	TxIN3	RE3	16	TxIN14	BE2
1	TxIN4	RE4	18	TxIN15	BE3
3	TxIN5	RE5	19	TxIN16	BE4
4	TxIN6	GE0	20	TxIN17	BE5
6	TxIN7	GE1	22	TxIN18	N/C
7	TxIN8	GE2	23	TxIN19	N/C
9	TxIN9	GE3	25	TxIN20	N/C
10	TxIN10	GE4	26	TxCLK IN	Clock

Approval

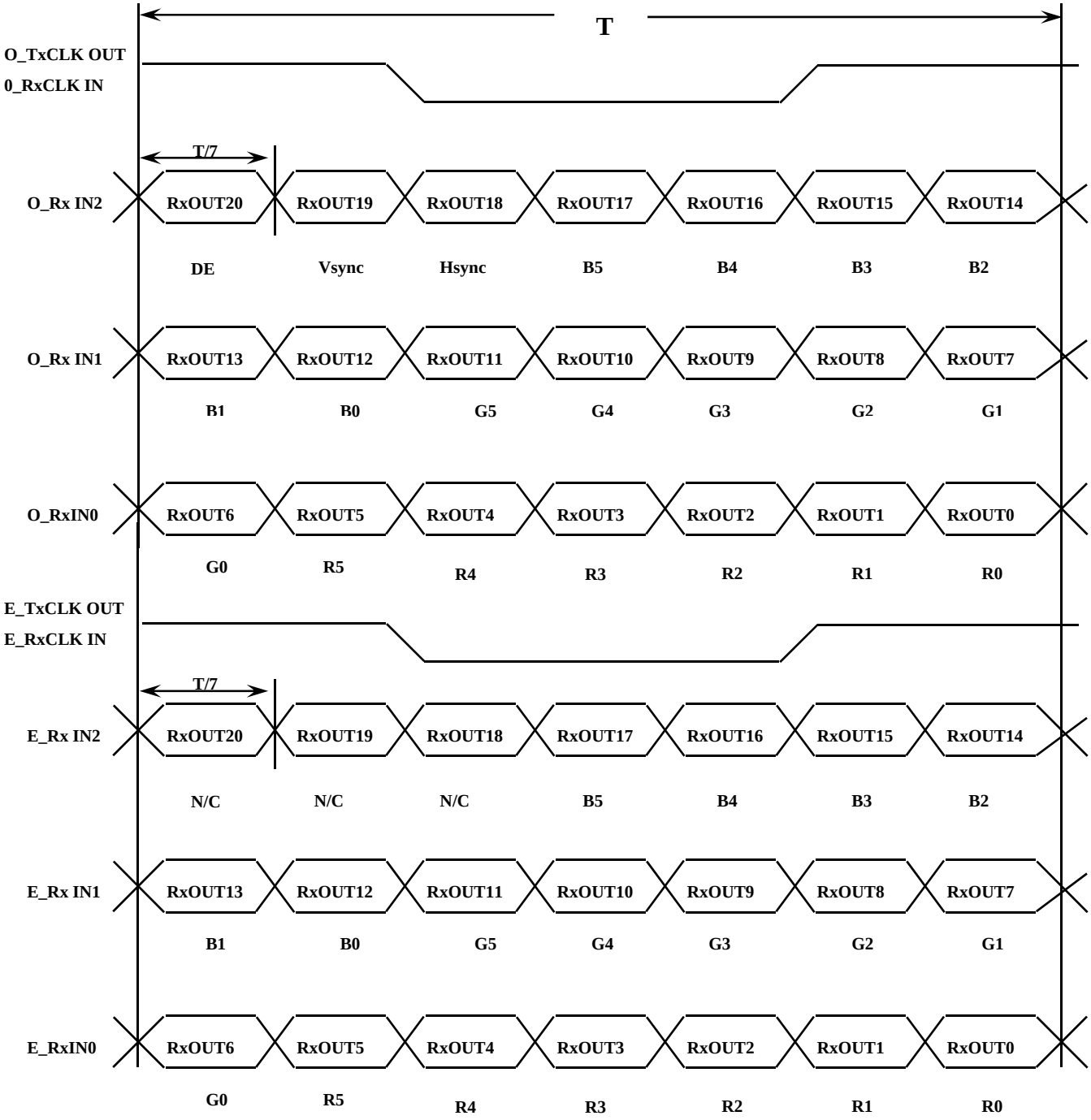
LVDS Interface



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

5.3 Timing Diagrams of LVDS For Transmission

LVDS Receiver : Integrated T-CON

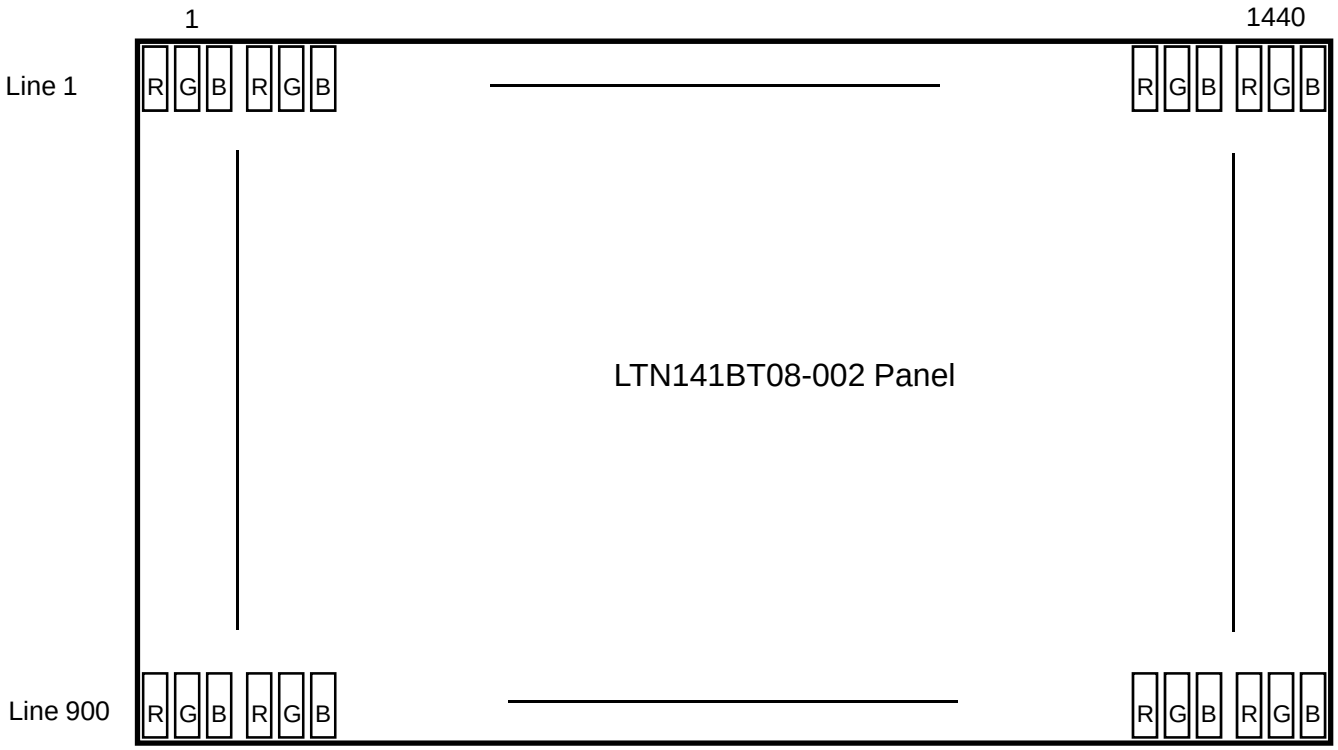


5.4 Input Signals, Basic Display Colors and Gray Scale of Each Color

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

5.5 Pixel Format in the display

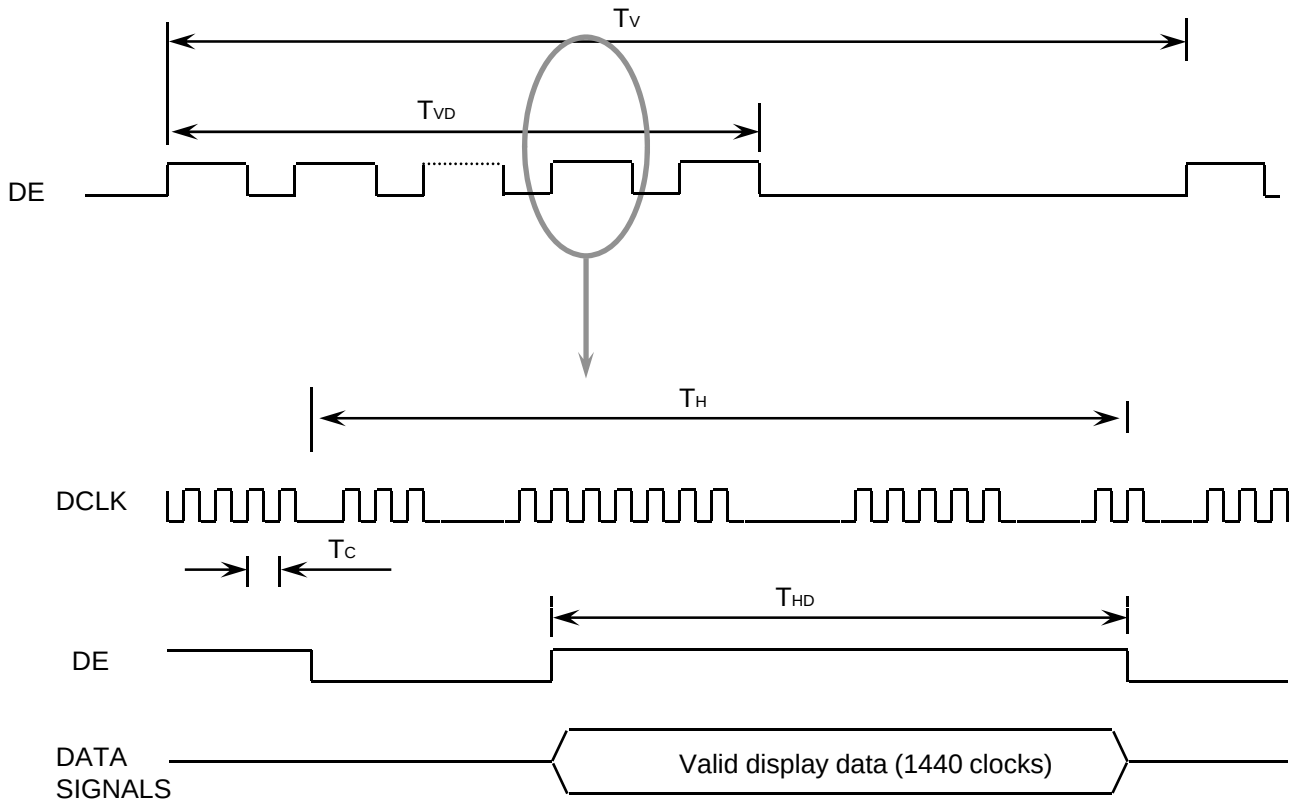


6. INTERFACE TIMING

6.1 Timing Parameters

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	TV	905	926	1100	Lines	
Vertical Active Display Term	Display Period	TVD	-	900	-	Lines	
One Line Scanning Time	Cycle	TH	1596	1924	1940	Clocks	
Horizontal Active Display Term	Display Period	THD	-	1440	-	Clocks	

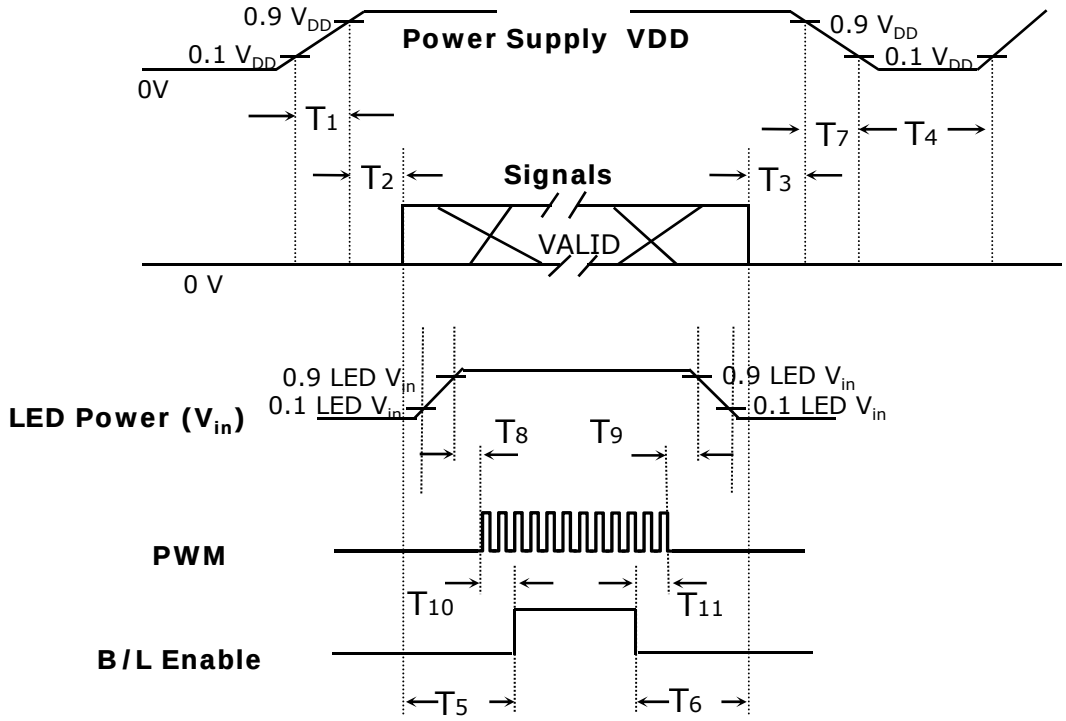
6.2 Timing diagrams of interface signal



6.3 Power ON/OFF Sequence

: 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
$0.5 < T_1 \leq 10$	V_{DD} rising time from 10% to 90%
$0 < T_2 \leq 50$	Delay from V_{DD} to valid data at power ON
$0 < T_3$	Delay from valid data OFF to V_{DD} OFF at power Off
$150 \leq T_4$	V_{DD} OFF time for Windows restart
$200 \leq T_5$	Delay from valid data to B/L enable at power ON
$0 \leq T_6$	Delay from valid data off to B/L disable at power Off
$0 < T_7 \leq 10$	V_{DD} falling time from 90% to 10%
$0 < T_8$	Delay from LED driver Vin rising time 90% to PWM ON
$0 < T_9$	Delay from PWM Off to LED driver Vin falling time 10%
$0 < T_{10}$	Delay from PWM ON to B/L Enable ON
$0 < T_{11}$	Delay from B/L Enable Off to PWM Off

Timing Parameters and definition

7. Mechanical Outline Dimension

Approval

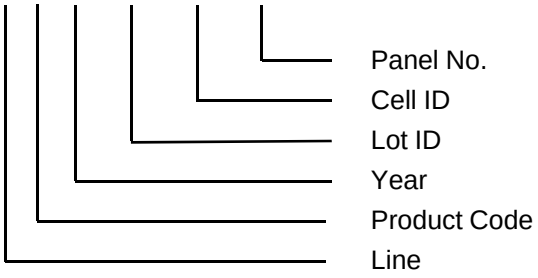
[Refer to the next page]

This page will be replaced with the outline drawing after producing PDF file.

8. Product Markings and Others

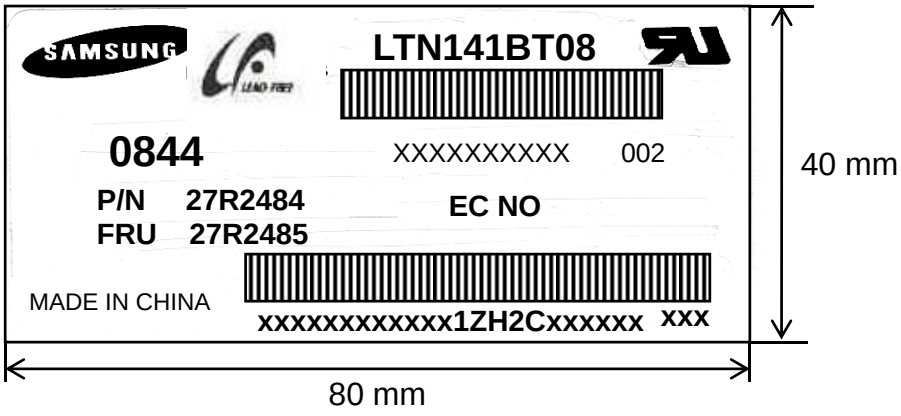
A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.

(1)Parts number : LTN141BT08-002
(2)Revision : One letter
(3)Control code : One letter
(4)Lot number : X X X XXX XX XX



NOTE 1). This code indicating year is omitted in the products of SESL site.

(5) Product Label Definition



TFT-LCD Product name	: LTN141BT08
Lot number	: XXXXXXXXXX
Revision Code	: 002
Inspected work week	: 0844(2008 Year, 44th week)
P/N	: Lenovo Part Number (27R2484)
EC NO	: Engineering Change Number (Blank)
FRU	: Field Replaceable Unit Part Number(27R2485)
Header Code	: 1ZH2C (one Z H two C)

9. GENERAL PRECAUTIONS

1. Handling

(a) When the module is assembled, It should be attached to the system firmly using selected 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 backlight.

(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

(a) Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C and relative humidity of less than 70%.

(b) Do not store the TFT-LCD module in direct sunlight.

(c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

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 cable between the backlight connector and its inverter power supply shall be a minimized length and be connected directly . The longer cable between the backlight and the inverter may cause lower luminance of lamp(CCFT) and may require higher startup voltage(Vs).

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.

10. EDID

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	30	00110000	48	L	3 character ID
					E	
09		AE	10101110	174	N	"LEN" as an end-customer
0A	ID Product Code	36	00110110	54		#WXGA+ LED
0B		40	01000000	64		
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	12	00010010	18	2008	2008
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	1E	00011110	30	30	30 cm(approx)
16	Max V image size	13	00010011	19	19	19 cm(approx)
17	Display Gamma	78	01111000	120	2.2	Gamma 2.2
18	Feature support	EA	11101010	234		
19	Red/green low bits	E5	11100101	229		10000111
1A	Blue/white low bits	95	10010101	149		11111110
1B	Red x/ high bits	93	10010011	147	0.577	Red x 0.577= 10010011
1C	Red y	56	01010110	86	0.338	Red y 0.338= 01010110
1D	Green x	4F	01001111	79	0.310	Green x 0.310= 01001111
1E	Green y	90	10010000	144	0.563	Green y 0.563= 10010000
1F	Blue x	28	00101000	40	0.158	Blue x 0.158= 00101000
20	Blue y	28	00101000	40	0.157	Blue y 0157= 00101000
21	White x	50	01010000	80	0.313	White x 0.313= 01010000
22	White y	54	01010100	84	0.329	White y 0.329= 01010100
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		
2A	Standard timing #3	01	00000001	1		not used
2B		01	00000001	1		
2C	Standard timing #4	01	00000001	1		not used
2D		01	00000001	1		
2E	Standard timing #5	01	00000001	1		not used
2F		01	00000001	1		
30	Standard timing #6	01	00000001	1		not used
31		01	00000001	1		
32	Standard timing #7	01	00000001	1		not used
33		01	00000001	1		
34	Standard timing #8	01	00000001	1		not used
35		01	00000001	1		
36	Detailed timing/monitor descriptor #1	C1	11000001	193	106.89	Main clock= 106.89 MHz (@60Hz)
37		29	00101001	41		
38		A0	10100000	160	1440	Hor active=720*2 pixels
39		E4	11100100	228	484	Hor blanking=388pixels
3A		51	01010001	81		4bit : 4bit
3B		84	10000100	132	900	Vertcal active=900 lines
3C		1A	00011010	26	26	Vertical blanking=26 lines
3D		30	00110000	48		4bit : 4bit
3E		30	00110000	48	48	Hor sync. Offset=48 pixels
3F		20	00100000	32	32	H sync. Width=32 pixels
40		36	00110110	54	3 6	V sync. Offset=3 lines V sync. Width=6 lines
41		00	00000000	0		2bit : 2bit :2bit :2bit
42		2F	00101111	47	303	H image size= 303 mm(approx)
43		BE	10111110	190	190	V image size = 190 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	DE	11011110	222	89.26	Main clock= 89.26 MHz (@50Hz)
49		22	00100010	34		
4A		A0	10100000	160	1440	Hor active=720*2 pixels
4B		2C	00101100	44	300	Hor blanking=300 pixels
4C		51	01010001	81		4bit : 4bit
4D		84	10000100	132	900	Vertcal active=900 lines
4E		7E	01111110	126	126	Vertical blanking=126 lines
4F		30	00110000	48		4bit : 4bit
50		30	00110000	48	48	Hor sync. Offset=48 pixels
51		20	00100000	32	32	H sync. Width=32 pixels
52		36	00110110	54	3 6	V sync. Offset=3 lines V sync. Width=6 lines
53		00	00000000	0		2bit : 2bit :2bit :2bit
54		2F	00101111	47	303	H image size= 303 mm(approx)
55		BE	10111110	190	190	V image size = 190 mm(approx)
56		10	00010000	16		
57		00	00000000	0		No Horizontal Border
58		00	00000000	0		No Vertical Border
59		19	00011001	25		

5A	descriptor #3	00	00000000	0		Manufacturer Specified (Timing)
5B		00	00000000	0		
5C		00	00000000	0		
5D		0F	00001111	15		
5E		00	00000000	0		
5F		95	10010101	149		(Horizontal active pixel /8)-31
60		0A	00001010	10		Image Aspect Ratio(16:10)
61		32	00110010	50		Low Refresh Rate #1(50Hz)
62		95	10010101	149		(Horizontal active pixel /8)-31
63		0A	00001010	10		Image Aspect Ratio(16:10)
64		28	00101000	40		Low Refresh Rate #1(40Hz)
65		1E	00011110	30		Brightness(1/10nit)
66		09	00001001	9		Feature flag(TN/LEDmode)
67		00	00000000	0		
68		4C	01001100	76		supplier ID "SEC"
69		A3	10100011	163		
6A		42	01000010	66	[B]	Product code "BT"
6B		54	01010100	84	[T]	(Hex, LSB first)
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		31	00110001	49	[1]	
77		42	01000010	66	[B]	
78		54	01010100	84	[T]	
79		30	00110000	48	[0]	
7A		38	00111000	56	[8]	
7B		30	00110000	48	[0]	
7C		30	00110000	48	[0]	
7D		31	00110001	49	[1]	
7E	Extension Flag	00	00000000	0		
7F	Checksum	CB	11001011	203		