SAMSUNG
ELECTRONICS

LEAD-FREE

TO   :

DATE   : Oct. 09, 2009.

SAMSUNG TFT-LCD

MODEL NO. : LTN116AT01-201

NOTE : Extension code [-2]
                   → LTN116AT01-2xx
         Surface type [**Anti-Glare**]

Any modification of Spec is not allowed without SEC's permission

APPROVED BY :

PREPARED BY :   *Mia So*

Application Engineer part 1, Device Solution (LCD)

SAMSUNG ELECTRONICS CO., LTD.

Approval

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Approval

Date	Revision No.	Page	Summary	
Oct. 09, 2009	A00	All	The Approval specification of LTN116AT01-201 was issued first.	

GENERAL DESCRIPTION

DESCRIPTION

LTN116AT01-201 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 system. The resolution of a 11.6" 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, high aperture structure
- 1366 x 768 pixels resolution
- Fast Response Time
- Low power consumption
- LED BLU Structure
- DE (Data enable) only mode.
- 3.3V LVDS Interface
- On board EDID chip
- RoHS Compliance

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	256.125(H) X 144.0(V) (14.0"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)	mm	
Display Mode	Normally white		
Glass Thickness	0.5T		
Surface treatment	Haze 25, Hard-Coating 3H		

Mechanical Information

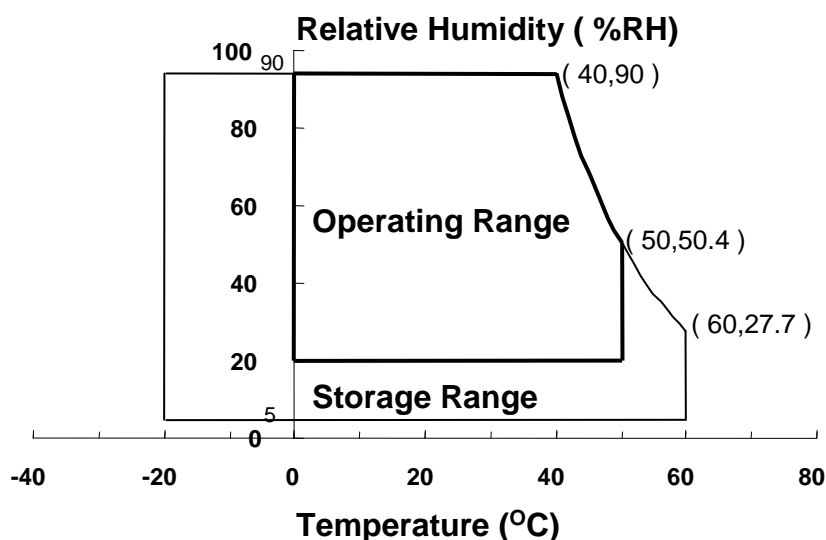|	Item	Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	267.5	268.0	268.5	mm	
	Vertical (V)	161.0	161.5	162.0	mm	
	Depth (D)	-	5.0	5.2	mm	(1)
Weight		-	240	255	g	

Note (1) Measurement condition of outline dimension
. Equipment : Vernier 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 °C $\geq$ Ta)
Maximum wet - bulb temperature at 39 °C or less. (Ta $>$ 40 °C) No condensation

Relative Humidity (%RH)

```
100 90
     90 [                    ( 40,90 )
     80 |
     60 |   Operating Range
                              ( 50,50.4 )
     40 |
                              ( 60,27.7 )
     20 |
      5 |
      0 └──────────────────────────
        -40  -20   0   20   40   60   80
        Storage Range
```

Temperature (°C)

(2) 2ms, half sine wave, one time for ±X, ±Y, ± 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.

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_{DD}	V_{DD} – 0.3	V_{DD} + 0.3	V	(1)

Note (1) Within Ta (25 ± 2 ℃)

(2) BACK-LIGHT UNIT

Ta = 25 ± 2 ℃

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Current	I_L	-	20	-	mA	(1)
LED Voltage	F_L	-	3.2	-	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.
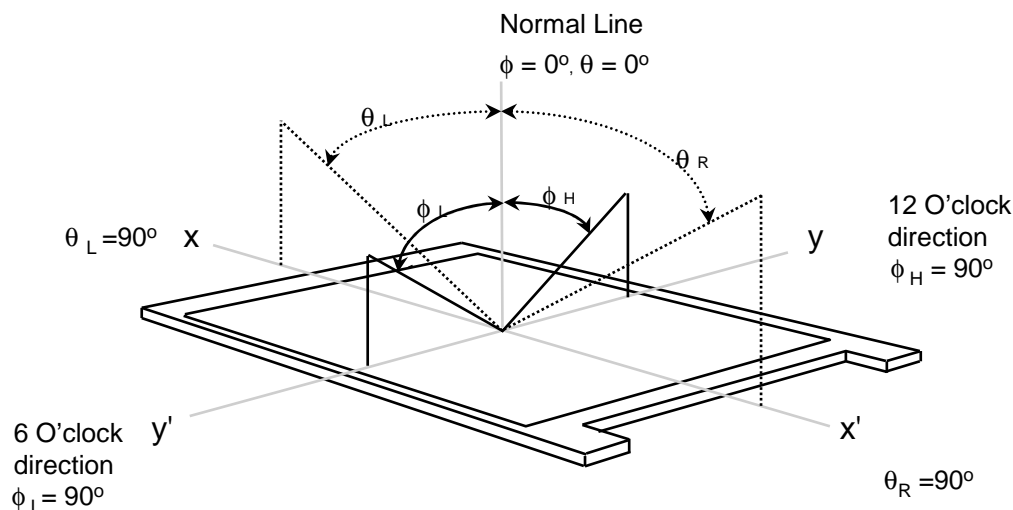
2. OPTICAL CHARACTERISTICS

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 BM-5A and PR-650

＊Ta = 25 ± 2 °C, V_{DD}=3.3V, fv= 60Hz, f_{DCLK} = 70.83MHz, I_L = 20 mA

Item		Symbol	Condition	Min.	Typ.	Max	Unit	Note
Contrast Ratio (5 Points)		CR		300	500	-	-	(1), (2), (5)
Response Time at Ta (Rising + Falling)		T_{RT}		-	16	25	msec	(1), (3)
Average Luminance of White (5 Points)		$Y_{L,AVE}$		170	200	-	cd/m^2	(1), (4)
Color Chromaticity (CIE)	Red	R_X	Normal Viewing Angle $\phi = 0$ $\theta = 0$	0.544	0.574	0.604	-	(1), (5) PR-650
		R_Y		0.309	0.339	0.369		
	Green	G_X		0.303	0.333	0.363		
		G_Y		0.556	0.576	0.606		
	Blue	B_X		0.130	0.160	0.190		
		B_Y		0.085	0.115	0.145		
	White	W_X		0.283	0.313	0.343		
		W_Y		0.299	0.329	0.359		
Viewing Angle	Hor.	θ_L	CR ≥ 10	40	45	-	Degrees	(1), (5) BM-5A
		θ_H		40	45	-		
	Ver.	ϕ_H		10	15	-		
		ϕ_L		30	35	-		
Color Gamut		CG		-	45	-	%	
13 Points White Variation		δ_L		-	-	1.7	-	(6)

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

Normal Line
$\phi = 0^{o}$, $\theta = 0^{o}$

θ_L

θ_R

ϕ_L ϕ_H

$\theta_L = 90^{o}$ x

12 O'clock direction
$\phi_H = 90^{o}$

y

6 O'clock direction
$\phi_L = 90^{o}$ y'

x'

$\theta_R = 90^{o}$

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 :

Display data   White(TFT OFF)   Black(TFT ON)   White(TFT OFF)

T_R T_F

Optical Response

100%
90%

10%
0%

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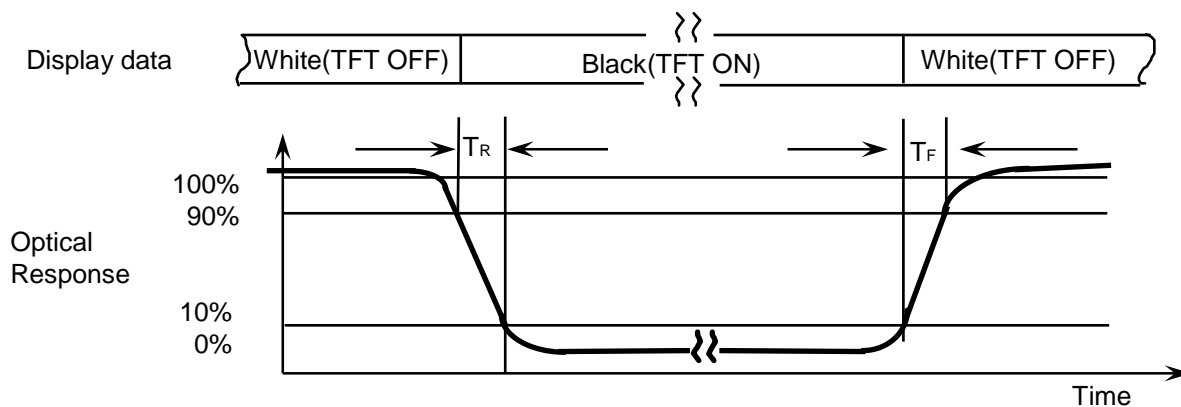
Note 4) Definition of Average Luminance of White : measure the luminance of white at 5 points.

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

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

(342)   (683)   (1024)

VIEW AREA

⑩   ⑨   (192)

⑦   (384)

⑤   ④   (576)
(lines)

◯ : test point

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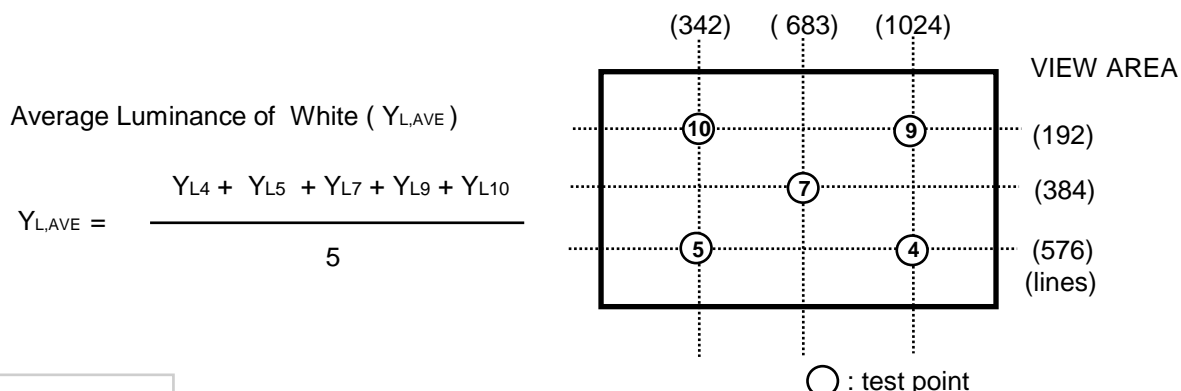
Note 5) After stabilizing and leaving the panel alone at a given temperature for 30 min , the measurement
should be executed. Measurement should be executed in a stable, windless,and dark room.
30 min after lighting the backlight. This should be measured in the center of screen.
LED current : 20mA (Inverter : SIC-130T)
Environment condition : Ta = 25 $\pm$ 2 $^\circ$C

Photo-detector
(TOPCON BM-5A
PR-650)

Field = 2°

50 cm

TFT-LCD module

LCD panel

Center of the screen

[Optical characteristics measurement setup]
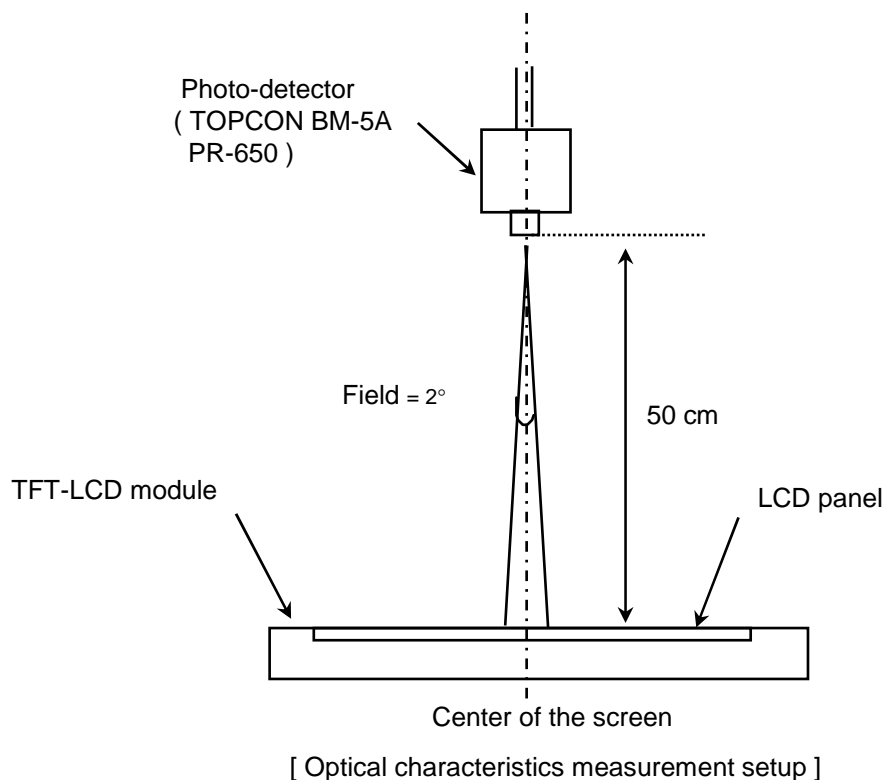
Note 6) Definition of 13 points white variation (δ L), [(1) ~ (13)]

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

10mm   342   683   1024   10mm

10mm

13   12   11

10   9   192

8   7   6   384   ◯ : test point

5   4   576
(lines)

3   2   1

10mm

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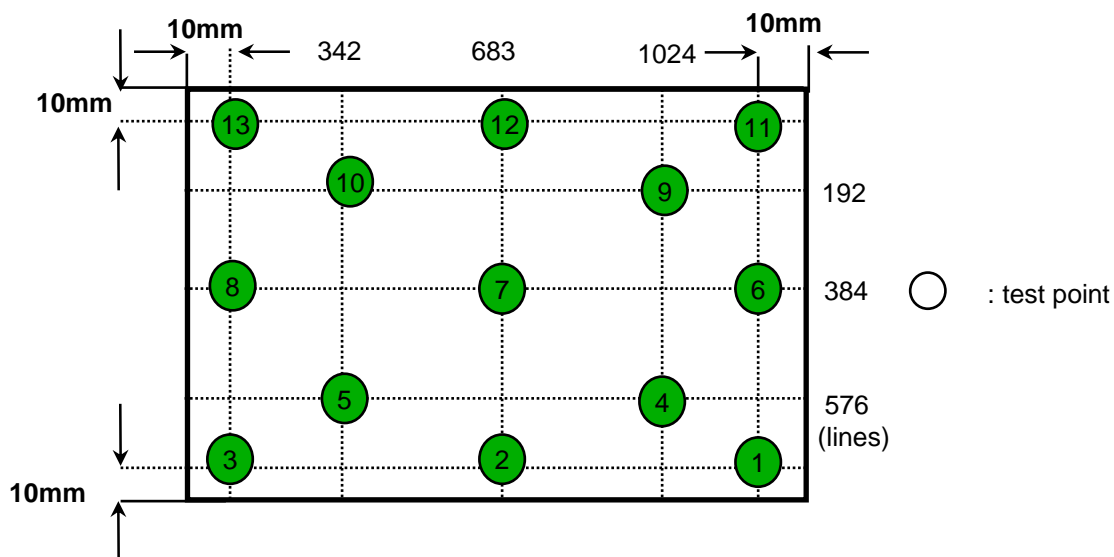
3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Ta= $25 \pm 2°C$

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		fv	-	60	-	Hz	
Hsync Frequency		f_H	-	49.8	-	KHz	Vsync=60Hz
Main Frequency		f_{DCLK}	-	70.83	-	MHz	
Rush Current		I_{RUSH}	-	-	1.5	A	(4)
Current of Power Supply	White		-	320	-	mA	(2),(3)*a
	Mosaic	I_{DD}	-	340	-	mA	(2),(3)*b
	V. Stripe		-	420	460	mA	(2),(3)*c

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

(2) fv = 60Hz, f_{DCLK} = 70.83MHZ, V_{DD} = 3.3V , DC Current.

(3) Power dissipation pattern

*a) White Pattern

*b) Mosaic Pattern

VIEW AREA

Display Brightest Gray Level

Display Darkest Gray Level
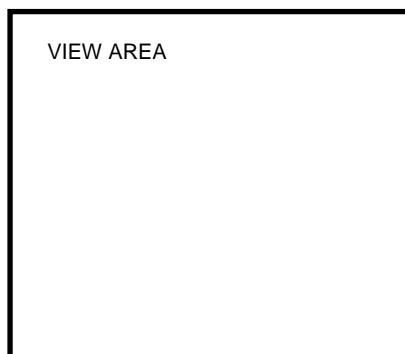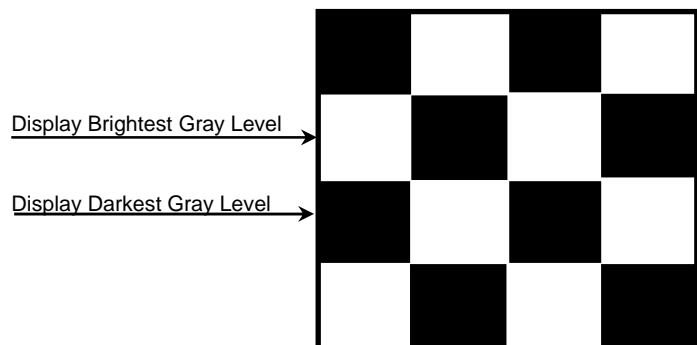
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*c) 1dot Vertical stripe pattern

R	G	B	R	G	B	R	G	B	R	G
R	G	B	R	G	B	R	G	B	R	G
R	G	B	R	G	B	R	G	B	R	G
R	G	B	R	G	B	R	G	B	R	G
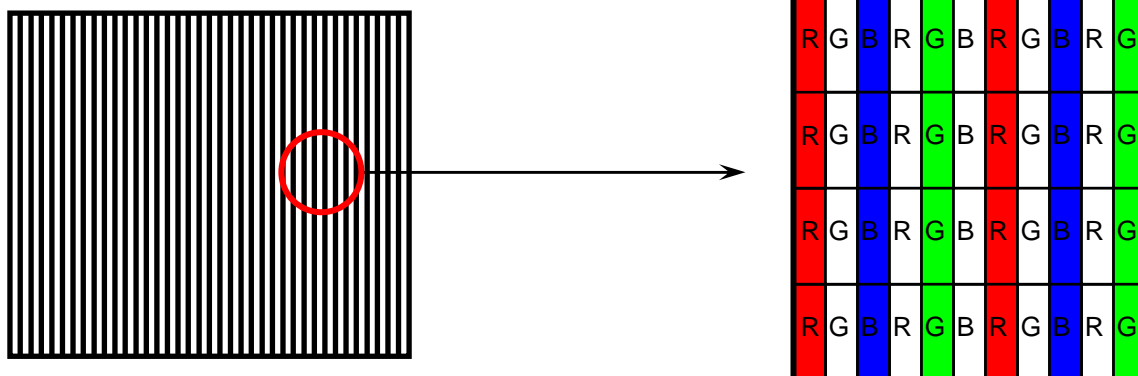
4) Rush current measurement condition

3.3V

M1
2SK1059

V_{DD} (LCD INPUT)

FUSE

R1
47K

C1
1uF

CONTROL SIGNAL
(HIGH to LOW)

R2
1K

M2
2SK1399

12V

R3
47K

C2
10000pF

C3
1uF
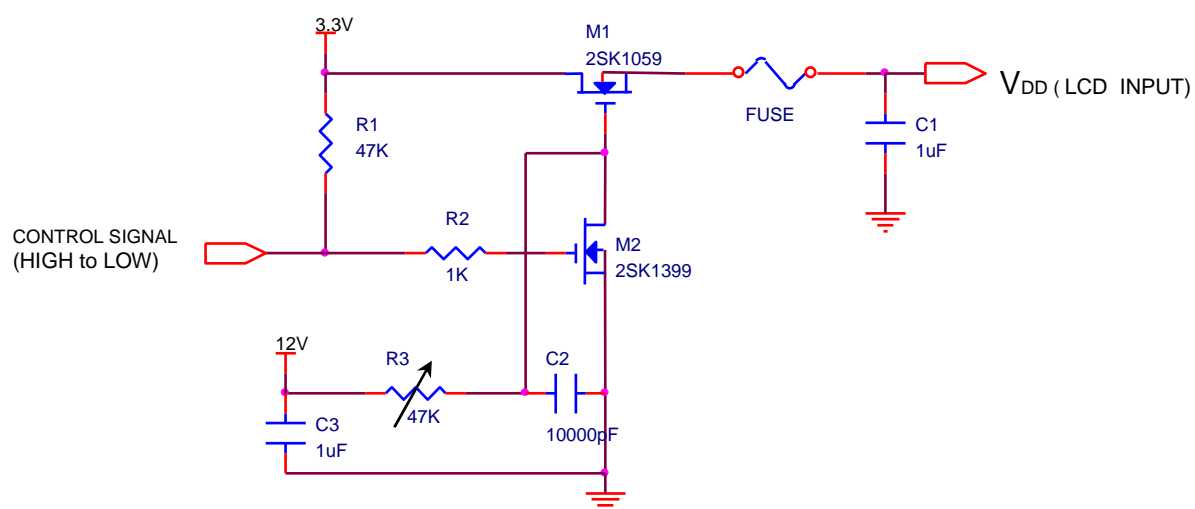
V_{DD} rising time is 470us

3.3V

0.9V_{DD}

0.1V_{DD}

GND

470us
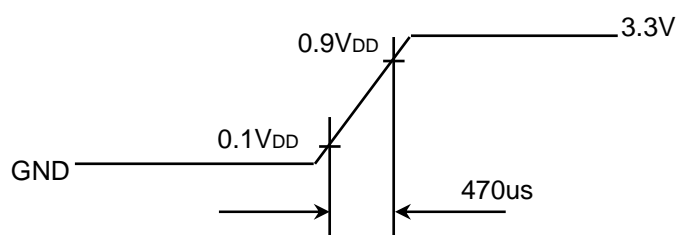
3.2 BACK-LIGHT UNIT

Ta= 25 ± 2 ℃

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Forward Current	IF	-	20	-	mA	
LED Forward Voltage	VF	-	3.2	-	V	
LED Array Voltage	VP	-	28.8	-	V	(Depend on LED #9)
Power Consumption	P	2.0	2.3	2.6	W	@200nit, W/O driver

3.3 LED Driver

- LED Driver Manufacturer : Intersil

Ta= 25 ± 2 ℃

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Input Voltage	V_{in}	7	12	21	V	
Input Current	I	-	230	-	mA	
Input Power	P_{in}	-	2.8	-	W	
Operating Frequency	F_o	0.8	1.0	1.2	MHz	600KHz Possible
Burst Ratio	D	5	-	100	%	
External PWM Dimming Control Frequency (BLIM)	F_{BLIM}	0.1	1	10	kHz	Vin=7~21V, BLIM=PWM 0V~3.3V
Efficiency	η	-	85	-	%	BLIM=100%

Note - Test Equipment : Fluke 45

4. BLOCK DIAGRAM

4.1 TFT LCD Module

Video Signal
Control Signal
VCOM
Gamma
DVDD
AVDD
Von/Voff
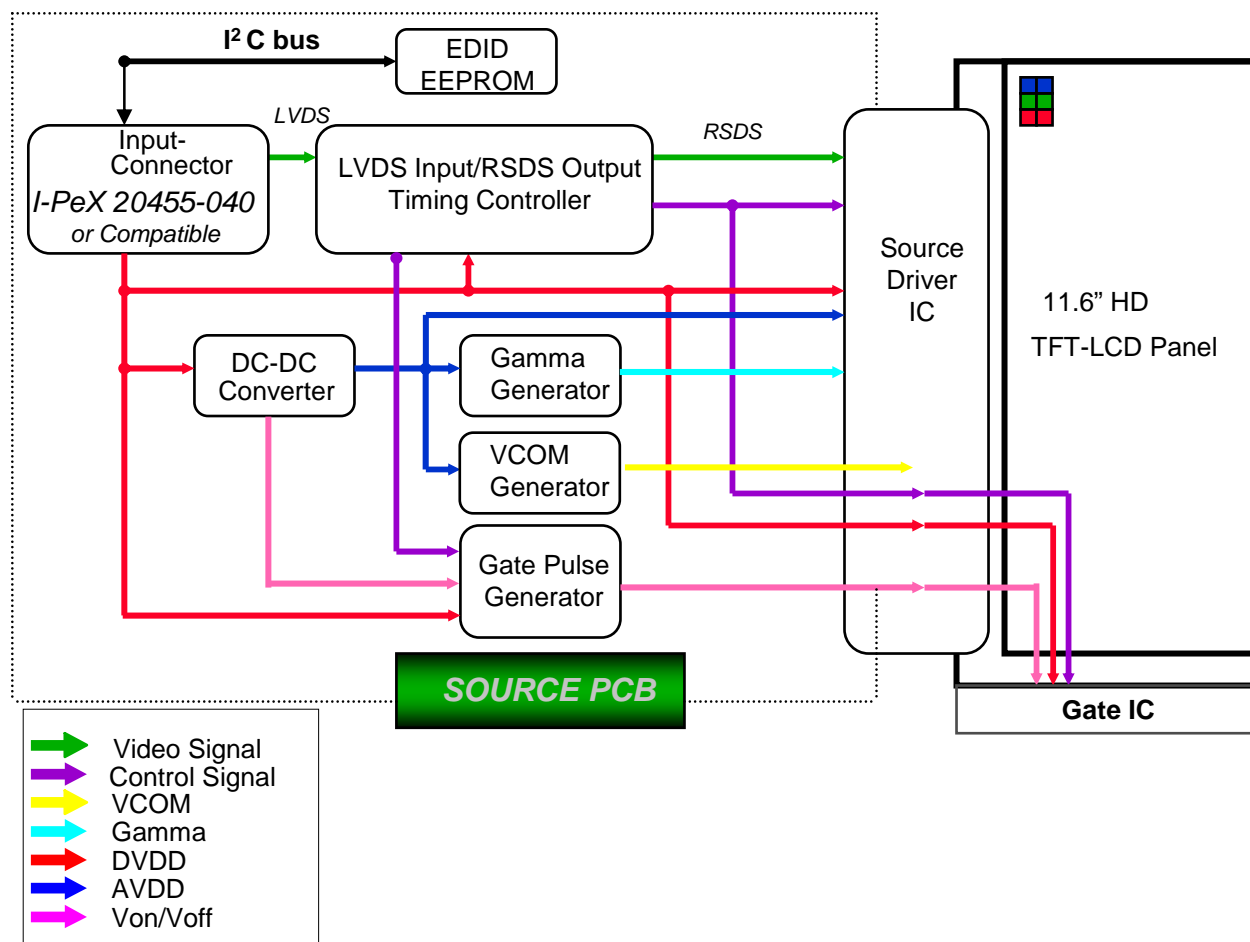
4.2 LED placement structure
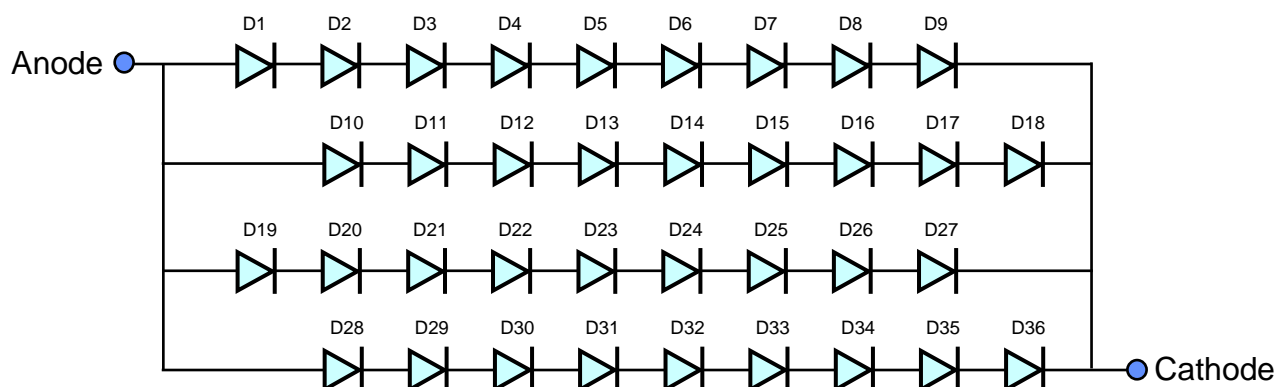
5. INPUT TERMINAL PIN ASSIGNMENT

5.1. Input Signal & Power (LVDS, Connector : I-PEX 20455-040-### or equivalent)

Pin	Symbol	Function
1	NC	no connect
2~3	VDD	Logic power 3.3V (Panel logic, BL logic)
4	VEDID	EDID 3.3V power
5	NC	no connect
6	CLK	EDID clock
7	DATA	EDID 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	CLK-	- LVDS differential clock input
18	CLK+	+ LVDS differential clock input
19	GND	Ground
20 ~ 21	NC	no connect
22	GND	Ground
23 ~ 24	NC	no connect
25	GND	Ground
26 ~ 27	NC	no connect
28	GND	Ground
29 ~ 30	NC	no connect
31 ~ 33	VLED_GND	LED Ground
34	NC	no connect
35	S_PWMIN	System PWM Signal Input
36	BL_ON	LED enable pin (+3V input, +5V tolerance)
37	NC	No connect
38~40	VLED	LED Power Supply 7V-20V

5.2 LVDS Interface : Transmitter SN75LVDS86 or Compatible

Pin No.	Name	RGB Signal	Pin No.	Name	RGB Signal
44	TxIN0	R0	12	TxIN11	G5
45	TxIN1	R1	13	TxIN12	B0
47	TxIN2	R2	15	TxIN13	B1
48	TxIN3	R3	16	TxIN14	B2
1	TxIN4	R4	18	TxIN15	B3
3	TxIN5	R5	19	TxIN16	B4
4	TxIN6	G0	20	TxIN17	B5
6	TxIN7	G1	22	TxIN18	Hsync
7	TxIN8	G2	23	TxIN19	Vsync
9	TxIN9	G3	25	TxIN20	DE
10	TxIN10	G4	26	TxCLKIN	Clock

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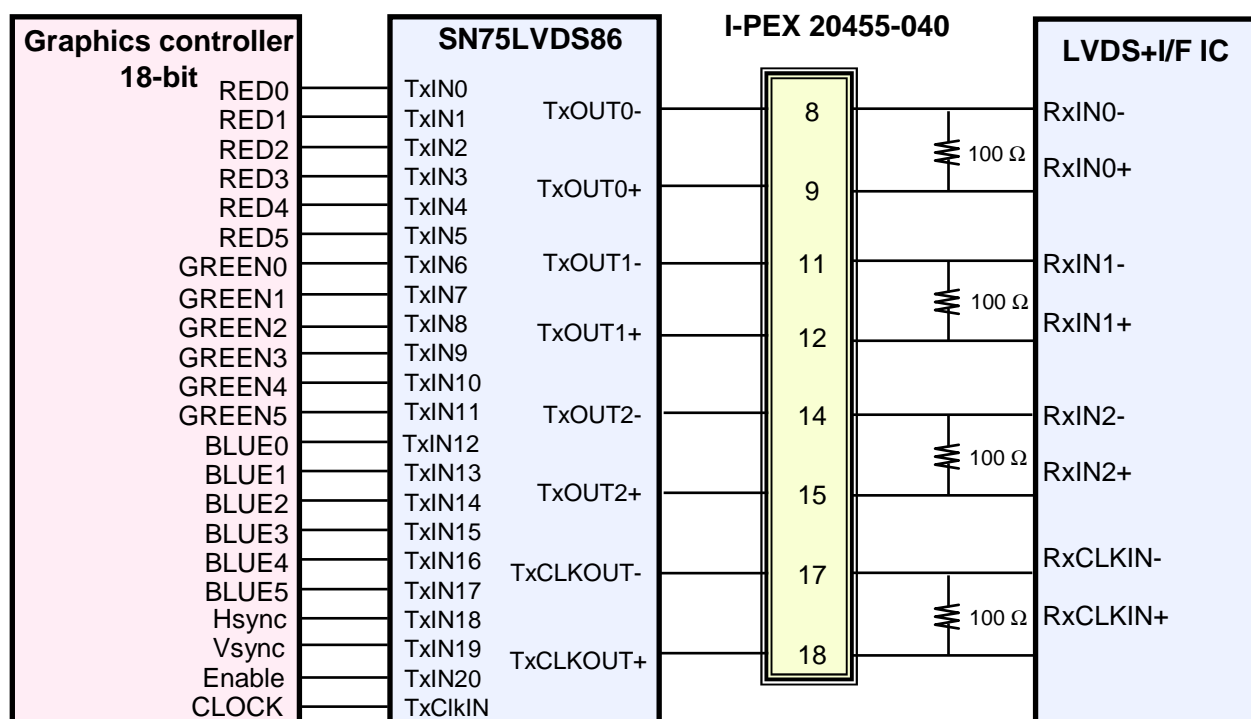
Note : The LCD Module uses a 100ohm resistor between positive and negative lines of each receiver input.

5.3 Timing Diagrams of LVDS For Transmission

LVDS Receiver : Integrated T-CON

	O_TxCLK OUT / 0_RxCLK IN							T

O_RxIN2

TxIN20	TxIN19	TxIN18	TxIN17	TxIN16	TxIN15	TxIN14
DE	Vsync	Hsync	B5	B4	B3	B2

O_RxIN1

TxIN13	TxIN12	TxIN11	TxIN10	TxIN9	TxIN8	TxIN7
B1	B0	G5	G4	G3	G2	G1

O_RxIN0

TxIN6	TxIN5	TxIN4	TxIN3	TxIN2	TxIN1	TxIN0
G0	R5	R4	R3	R2	R1	R0

T/7
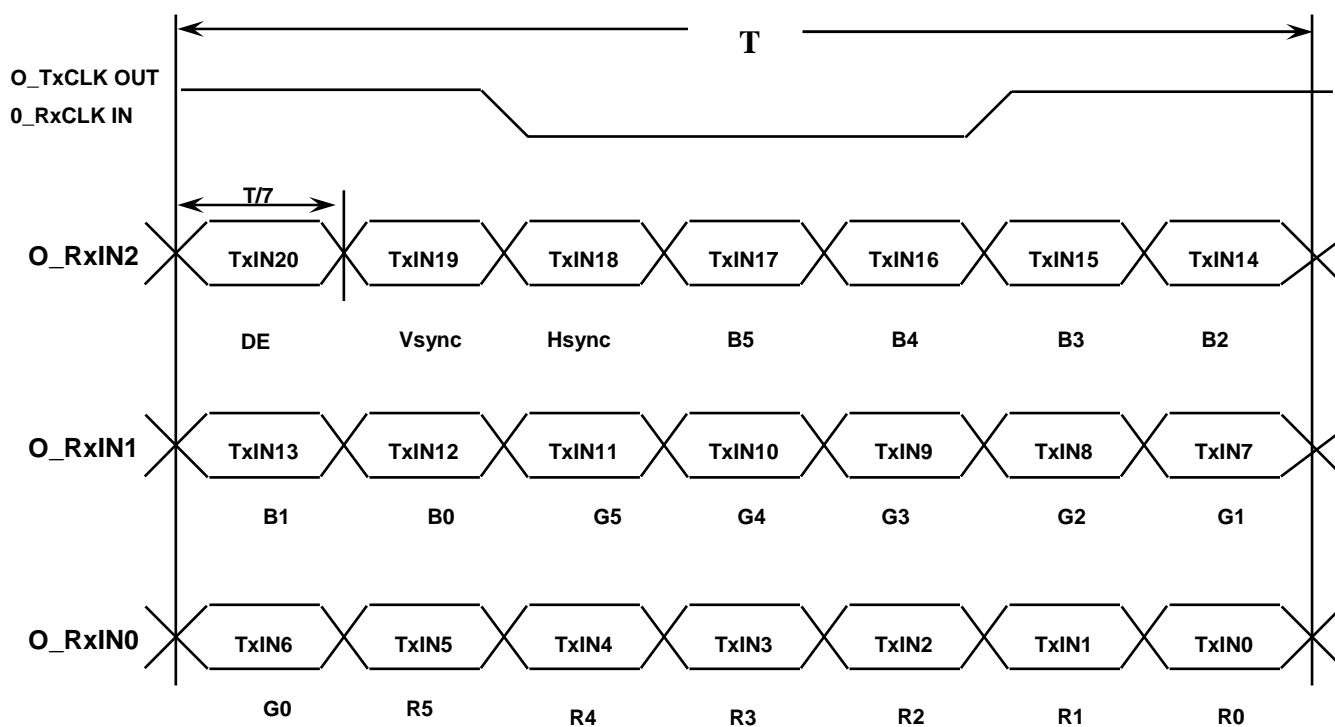
5.4 Input Signals, Basic Display Colors and Gray Scale of Each Color

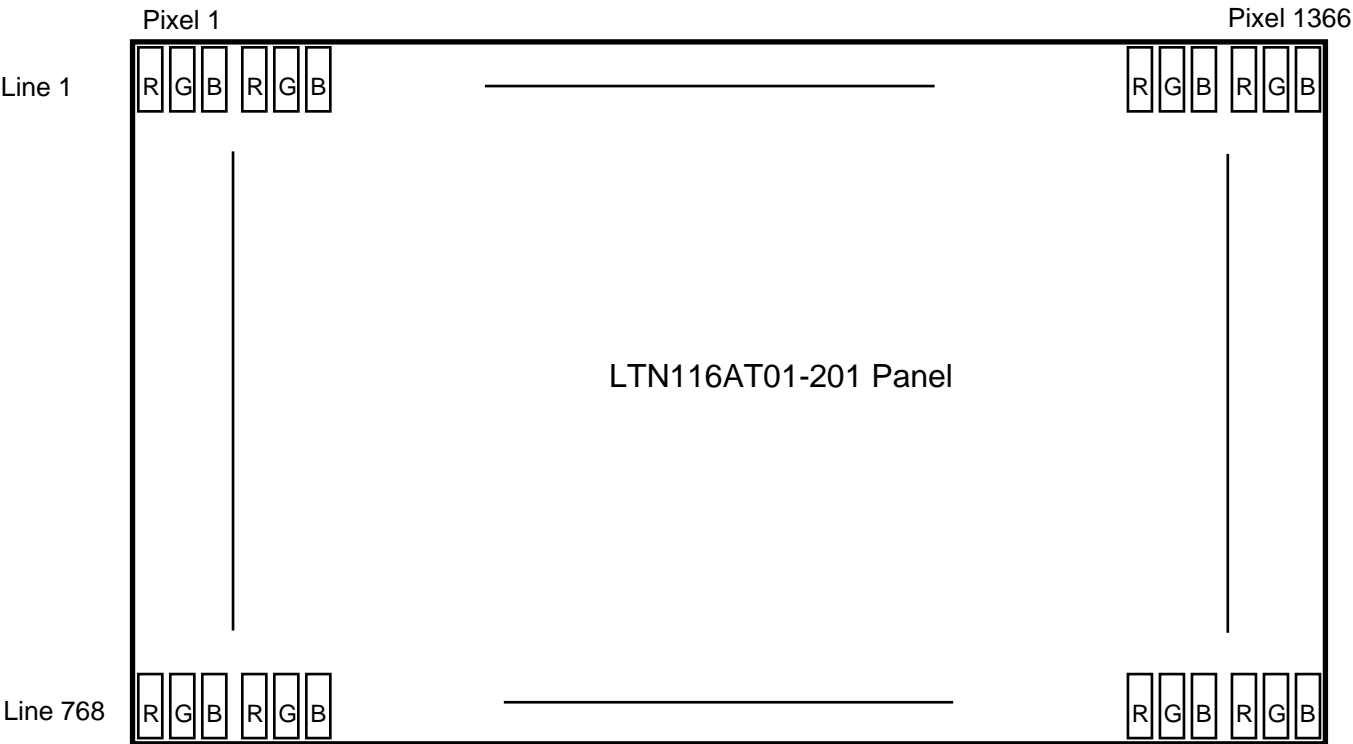| Color	Display	Data Signal																		Gray Scale Level
		Red						Green						Blue						
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	45	B5	
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	-
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	-
	Cyan	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

Pixel 1   Pixel 1366

Line 1 | R | G | B | R | G | B | | R | G | B | R | G | B |

LTN116AT01-201 Panel

Line 768 | R | G | B | R | G | B | | R | G | B | R | G | B |

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6. INTERFACE TIMING

6.1 Timing Parameters

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	TV	-	830	-	Lines	-
Vertical Active Display Term	Display Period	TVD	-	768	-	Lines	-
One Line Scanning Time	Cycle	TH	-	1526	-	Clocks	-
Horizontal Active Display Term	Display Period	THD	-	1366	-	Clocks	-

6.2 Timing diagrams of interface signal
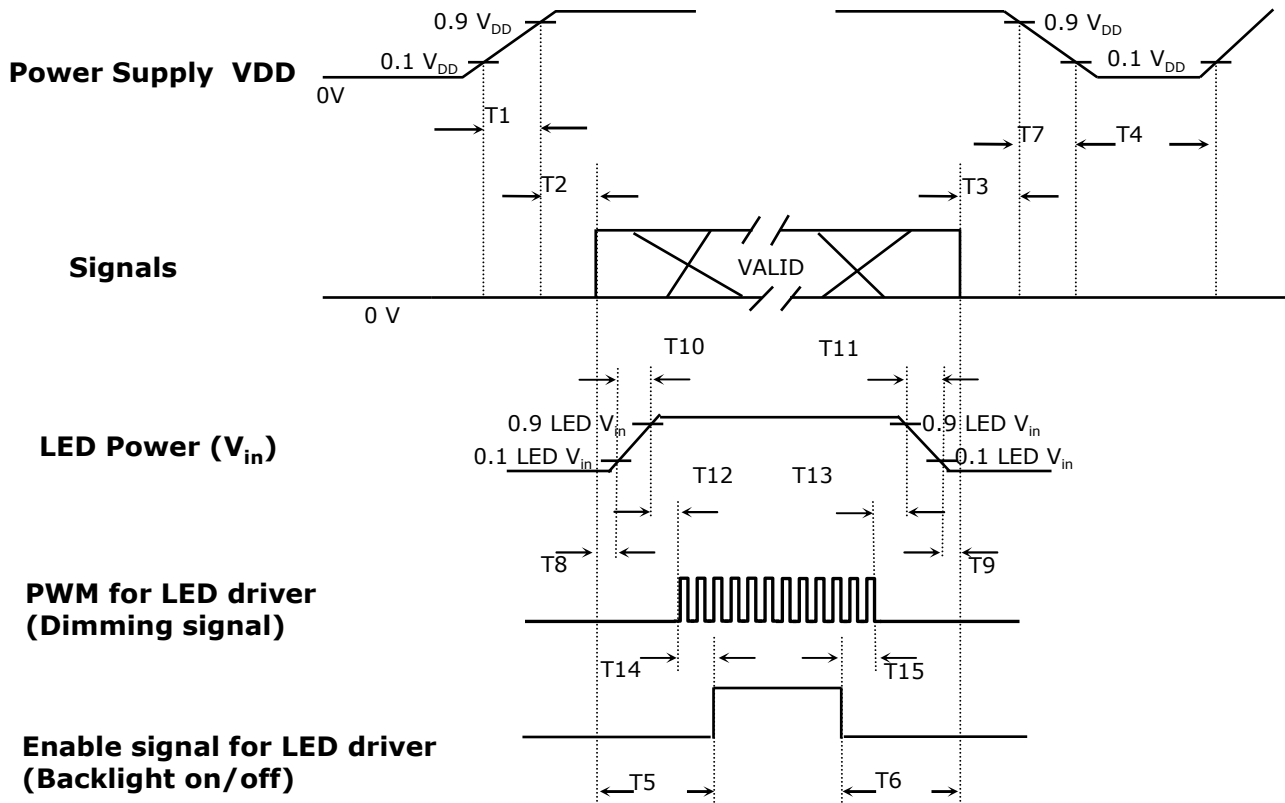
6.3 Power ON/OFF Sequence

: 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
$0 < T_3 \leq 50$	Delay from valid data OFF to V_{DD} OFF at power Off
$500 \leq T_4$	V_{DD} OFF time for Windows restart
$200 \leq T_5$	Delay from valid data to B/L enable at power ON
$200 \leq T_6$	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%
$10 < T_8$	Delay from valid data on to LED driver Vin rising time 10%
$10 < T_9$	Delay 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%
$0 \leq T_{12}$, Don't care	Delay from LED driver Vin rising time 90% to PWM ON
$0 \leq T_{13}$	Delay from PWM Off to LED driver Vin falling time 10%, Must Keep rule
$0 \leq T_{14}$	Delay from PWM ON to B/L Enable ON, Must Keep rule
$0 \leq T_{15}$, Don't care	Delay from B/L Enable Off to PWM Off

Power Sequence & Timing Parameters

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6.3 Power ON/OFF Sequence

NOTE.

  (1) The supply voltage of the external system for the module input should be the same
     as the definition of VDD.

  (2) Apply the B/L operation voltage within the LCD operation range. When the back-light turns on
     before the LCD operation or the LCD turns off before the back-light turns off, the
     display may momentarily become white.

  (3) In case of VDD = off level, please keep the level of input signals on the low or keep
     a high impedance.

  (4) T4 should be measured after the module has been fully discharged between power
     off and on period.

  (5) Interface signal shall not be kept at high impedance when the power is on.

  (6) EN must be turned on late than VDD and PWM signal.
     EN must be turned off early than VDD and and PWM signal.

7. MECHANICAL OUTLINE DIMENSION

[Refer to the next page]

268±0.5 [OUTLINE]

256.125 [ACTIVE AREA]

133±0.3

5.2 MAX

(3.25)

(6.8)

55.75±0.3

144 [ACTIVE AREA]

161.5±0.5 [OUTLINE]

ACTIVE CENTER

(5.25)

(6.8)

8-M2.0 * 0.4

2.8±0.3

25±0.3

111.5±0.3

A—A'

LTN116AT01

I-PEX 20455-040E-02S
or Equivalent

30.3

3.1

SIGNAL PIN 1

2-30

(69.5625)

(198.5625)

60±1

110±1

2.8±0.3

M2

1.8Max

SECTION A-A' (S=3/1)

SCREW PENETRATION DEPTH

LTN116AT01-A01

SAMSUNG CONFIDENTIAL

BM SHIFT SPEC.

C

BEZEL OPENING

A   B

ACTIVE AREA

|A-B| < 1.0 (mm)
|C-D| < 1.0 (mm)
|BM| ≥ 1.0 (mm)

D

* NOTE
1. SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.
 - MAKER : I-PEX OR COMPATIBLE
 - INPUT CONNECTOR : I-PEX ,20455-040E-02S
2. ALLOWED DEPTH OF USERHOLE SCREW INSERTION IS 1.8mm MAX.
3. MEASURING FORCE : 750±250gf-cm
4. MAXIMUM SCREW TORQUE : 2.0kgf-cm
5. WEIGHT SPEC : 255g MAX
6. In order to avoid IC damage, it is not allow that overlapping
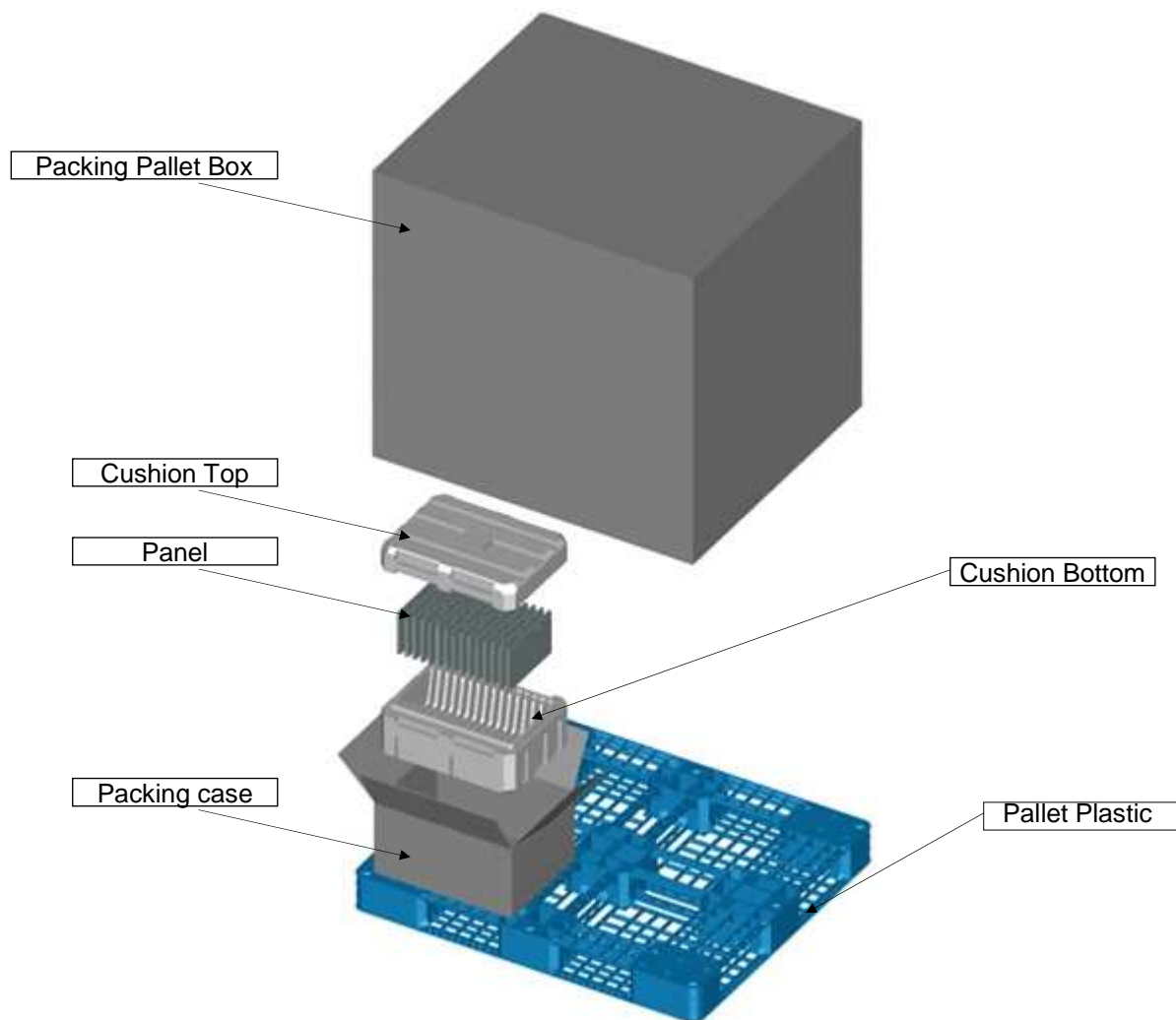 of cables or antennas, camera , WLAN , WWAN over these COF locations.

8. PACKING

1. CARTON(Internal Package)

   (1) Packing Form
      Corrugated Cardboard box and Corrupad form as shock absorber

   (2) Packing Method

Packing Pallet Box

Cushion Top

Panel

Cushion Bottom

Packing case

Pallet Plastic

PACKING CASE

Note (1) Total : Approx. (11) Kg

     (2) Acceptance number of piling : (30) sets

     (3) Carton size : (475)(W) X (356)(D) X (278)(H)

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(3)Packing Material

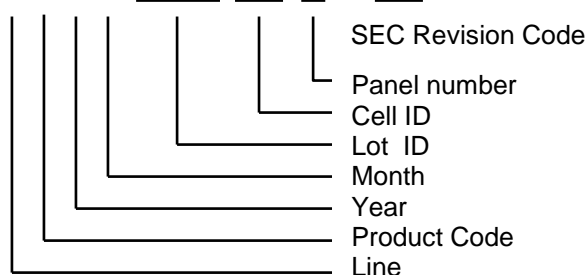| No	Part name	Quantity
1	Static electric protective sack	30
2	Packing case (Inner box) included shock absorber	1 set
3	Pictorial marking	2 pcs
4	Carton	1 set

9. MARKINGS & OTHERS

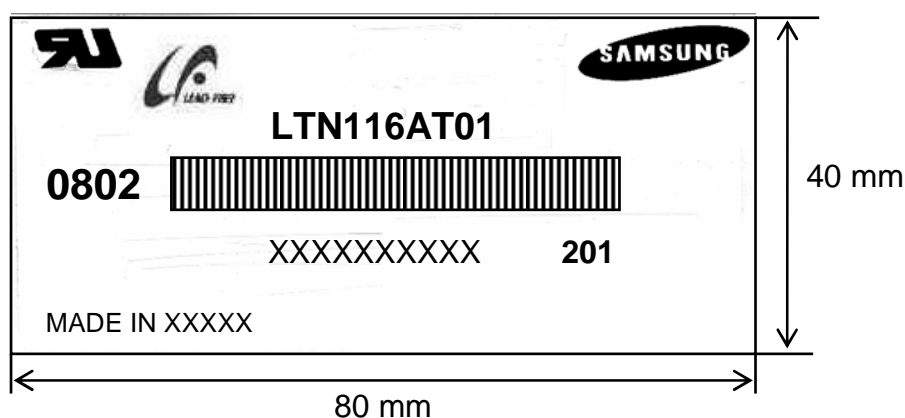A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.

(1)Parts number : LTN116AT01
(2)Revision code : 3 letters
(3)Lot number   : X X X X XXX XX X **201**

```
                                    SEC Revision Code
                                    Panel number
                                    Cell ID
                                    Lot  ID
                                    Month
                                    Year
                                    Product Code
                                    Line
```
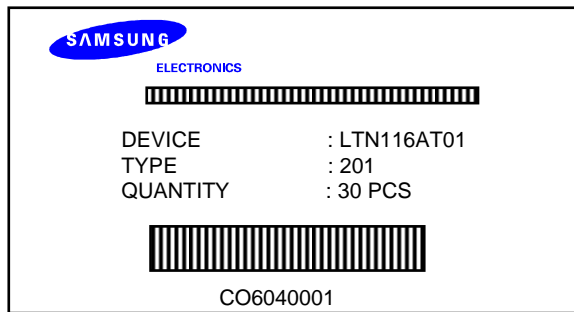
(5) Nameplate Indication

Parts name   : LTN116AT01
Lot number   : XXXXXXXXXX
Inspected work week   : 0802(2008 year, 2nd week)

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(6) Packing small box attach

SAMSUNG ELECTRONICS

DEVICE : LTN116AT01
TYPE : 201
QUANTITY : 30 PCS

CO6040001

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10. GENERAL PRECAUTIONS

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.

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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 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.

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.

Approval

11. 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	4C	01001100	76	S E C	3 character ID
09		A3	10100011	163		"SEC"
0A	ID Product Code	52	01010010	82	[R]	
0B		30	00110000	48	[0]	
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	13	00010011	19	2009	2009
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	1B	00011011	27	27	27 cm(approx)
16	Max V image size	10	00010000	16	16	16 cm(approx)
17	Display Gamma	78	01111000	120	2.2	Gamma 2.2
18	Feature support	0A	00001010	10		
19	Red/green low bits	87	10000111	135		10000111
1A	Blue/white low bits	F5	11110101	245		11111110
1B	Red x/ high bits	94	10010100	148	0.580	Red x 0.580= 1001010010
1C	Red y	57	01010111	87	0.340	Red y 0.340= 0101011100
1D	Green x	4F	01001111	79	0.310	Green x 0.310= 0100111101
1E	Green y	8C	10001100	140	0.550	Green y 0.550= 1000110011
1F	Blue x	27	00100111	39	0.155	Blue x 0.155= 001001111
20	Blue y	27	00100111	39	0.155	Blue y 0.155= 001001111
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		

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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	B0	10110000	176	76	Main clock= 76 MHz
37		1D	00011101	29		
38		56	01010110	86	1366	Hor active=1366 pixels
39		A0	10100000	160	160	Hor blanking=160 pixels
3A		50	01010000	80		4bit : 4bit
3B		00	00000000	0	768	Vertcal active=768 lines
3C		3E	00111110	62	62	Vertical blanking=62 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		00	00000000	0	256	H image size= 256 mm (approx)
43		90	10010000	144	144	V image size = 144 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		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	Detailed timing/monitor	4D	01001101	77	[M]	
62	descriptor #3	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		00	00000000	0		Monitor Name Tag (ASCII)
6D		00	00000000	0		
6E		00	00000000	0		
6F		FE	11111110	254		
70		00	00000000	0		
71		31	00110001	49	[1]	
72		31	00110001	49	[1]	
73	Detailed timing/monitor	36	00110110	54	[6]	
74	descriptor #4	41	01000001	65	[A]	
75		54	01010100	84	[T]	
76		30	00110000	48	[0]	
77		31	00110001	49	[1]	
78		2D	00101101	45	[-]	
79		32	00110010	50	[2]	
7A		30	00110000	48	[0]	
7B		31	00110001	49	[1]	
7C		0A	00001010	10	[^]	
7D		20	00100000	32	[ ]	
7E	Extension Flag	00	00000000	0		
7F	Checksum	**CB**	11001011	**203**		