SAMSUNG
ELECTRONICS

TO　　：
DATE　：　Jun. 2, 2008.

SAMSUNG TFT-LCD
MODEL NO. : LTN170MT02

NOTE　: Extension code [-001]
　　　　　→ LTN170MT02-**001**
　　　　Surface type [**Anti-Glare**]

Any Modification of Spec is not allowed without SEC' permission

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wise view™

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GENERAL DESCRIPTION

DESCRIPTION

LTN170MT02 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 17.0" contains 1680 x 1050 pixels and can display up to 262,144 colors. 6 O'clock direction is the optimum viewing angle.

FEATURES

- High contrast ratio
- Wide SXGA+ (1680x1050 pixels) resolution
- Low power consumption
- Fast Response
- DE (Data enable) only mode.
- 3.3V LVDS Interface
- On board EDID chip
- Pb free product

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	367.08(H) X 229.425(V) (17.0"diagonal)	mm	
Driver element	a-si TFT active matrix		
Display colors	262,144		
Number of pixel	1680 x 1050 (Wide SXGA+)	pixel	
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.21825(H) x 0.21825(V)	mm	
Display Mode	Normally White		
Surface treatment	Haze 25, Hardness 3H		

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Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	381.7	382.2	382.7	mm	
	Vertical (V)	244.0	244.5	245.0	mm	
	Depth (D)	-	6.2	6.5	mm	(1)
Weight		-	670	690	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	T_{STG}	-20	60	°C	(1)
Operating temperate (Temperature of glass surface)	T_{OPR}	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 ≥ Ta)
Maximum wet - bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation

Relative Humidity (%RH)

(40,90)

Operating Range

(50,50.4)

(60,27.7)

Storage Range

Temperature (°C)
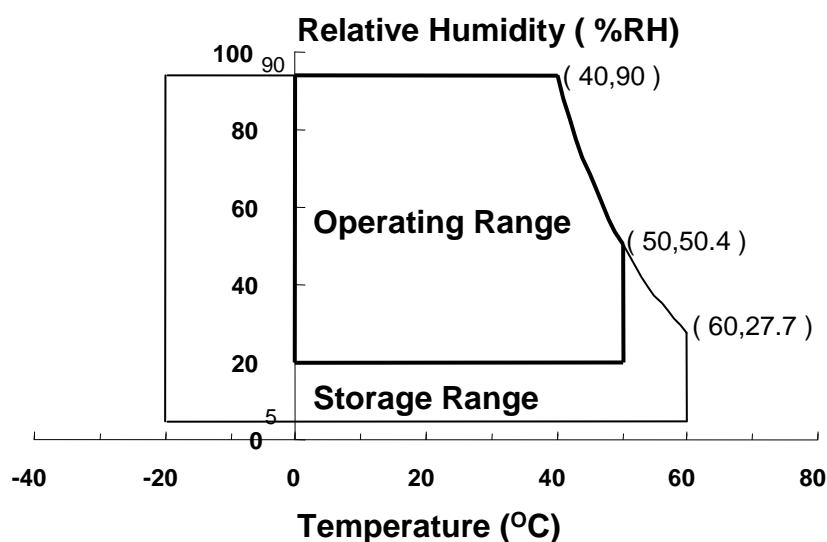
(2) 2ms, half sine wave, one time for ±X, ±Y, ± Z.
(3) 5 - 500 Hz, random vibration, 30min for X, Y, Z.
(4) At testing Vibration and Shock, the fixture in holding the Module to be tested have to be
hard and rigid enough so that the Module would not be twisted or bent by the fixture.
(5) If product is used for extended time excessively or exposed to high temperatures for extended time,
there is a possibility of wide viewing angle film damage which could affect visual characteristics.

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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 Ta (25 ± 2 ℃)

(2) BACK-LIGHT UNIT

Ta = 25 ± 2 ℃

Item	Symbol	Min.	Max.	Unit	Note
Lamp Current	I_L	3.0	7.0	mArms	(1)
Lamp frequency	F_L	40	80	kHz	(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.

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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} = 60.72MHz, I_L = 6.5 mA

Item		Symbol	Condition	Min.	Typ.	Max	Unit	Note
Contrast Ratio (5 Points)		CR		500	600	-	-	(1), (2), (5)
Response Time at Ta (Rising + Falling)		T_{RT}			16	25		(1), (3)
Average Luminance of White (5 Points)		$Y_{L,AVE}$		170	200	-	cd/m^2	I_L=6.5mA (1), (4)
Color Chromaticity (CIE)	Red	R_X	Normal Viewing Angle ϕ = 0 θ = 0	0.559	0.589	0.619	-	(1), (5) SR-3
		R_Y		0.313	0.343	0.373		
	Green	G_X		0.291	0.321	0.351		
		G_Y		0.515	0.545	0.575		
	Blue	B_X		0.123	0.153	0.183		
		B_Y		0.098	0.128	0.158		
	White	W_X		0.283	0.313	0.343		
		W_Y		0.299	0.329	0.359		
Viewing Angle	Hor.	θ_L	CR $\geq$ 10	60	65		Degrees	(1), (5) SR-3
		θ_H		60	65			
	Ver.	ϕ_H		45	50			
		ϕ_L		45	50			
13 Points White Variation		δ_L		-	-	2.2	-	(6)

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

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

θ_L

θ_R

ϕ_L ϕ_H

$\theta_L = 90^o$ x

y

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

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

x'

$\theta_R = 90^o$
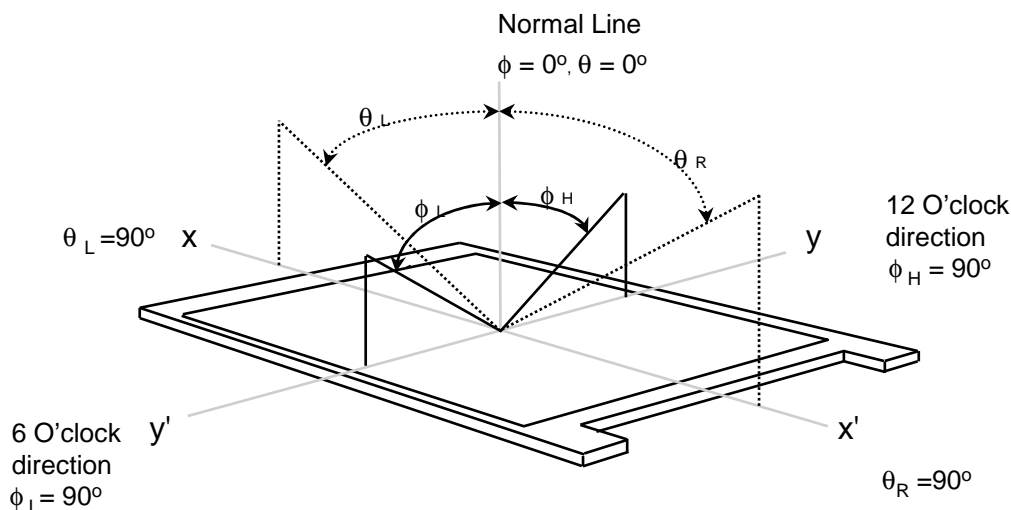
Note 2) Definition of Contrast Ratio (CR) : Ratio of gray max (Gmax) ,gray min (Gmin) at 5 points(4, 5, 7, 9, 10)

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

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

100%
90%

Optical
Response

10%
0%

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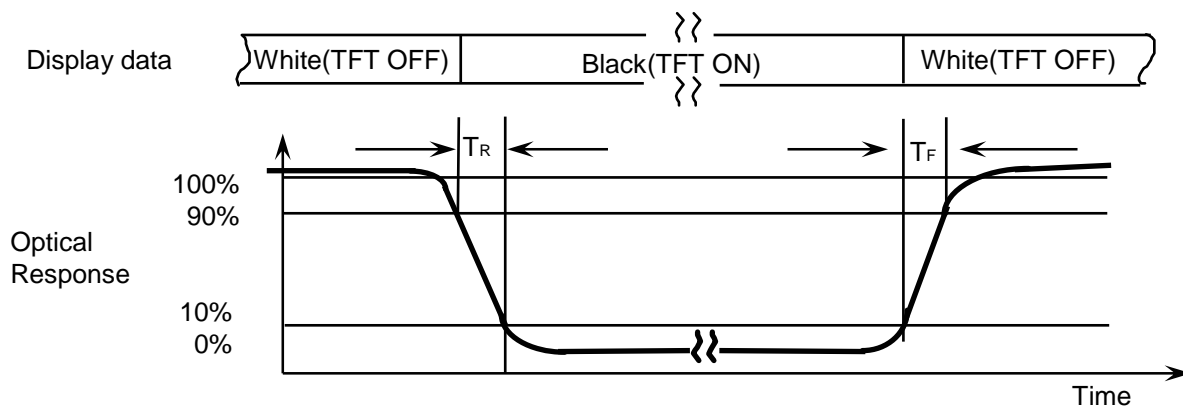
Note 4) Definition of Average Luminance of White : measure the luminance of white at 5 points.

(420)   (840)   (1260)

VIEW AREA

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

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

⑩   ⑨   (263)

⑦   (525)

⑤   ④   (788)
(lines)

◯ : test point

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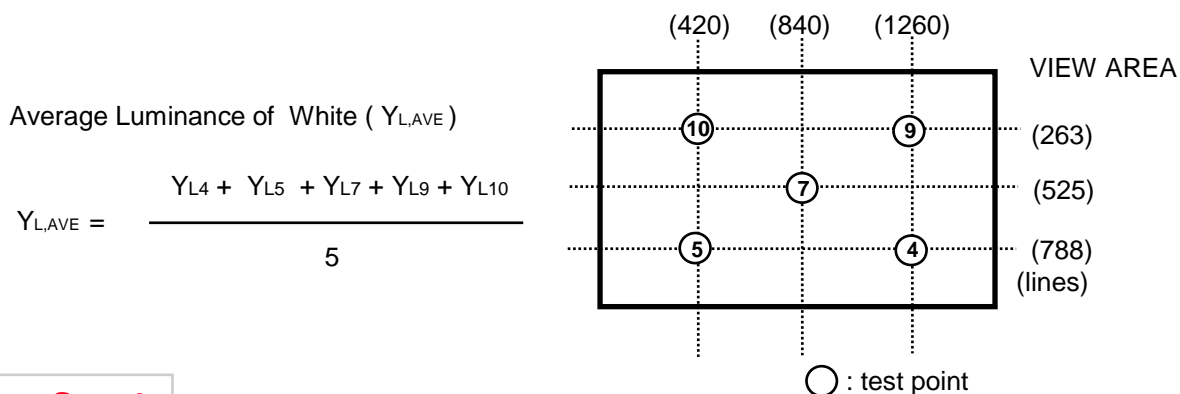
Note 5) After stabilizing and leaving the panel alone at a given temperature for 30 min , the measurement
should be executed. Measurement should be executed in a stable, windless,and dark room.
30 min after lighting the backlight. This should be measured in the center of screen.
Lamp current : 6.5mA (Inverter : SIC-130T)
Environment condition : Ta = 25 $\pm$ 2 °C

Photo-detector
(TOPCON SR-3)

Field = 2°

50 cm

TFT-LCD module

LCD panel

Center of the screen

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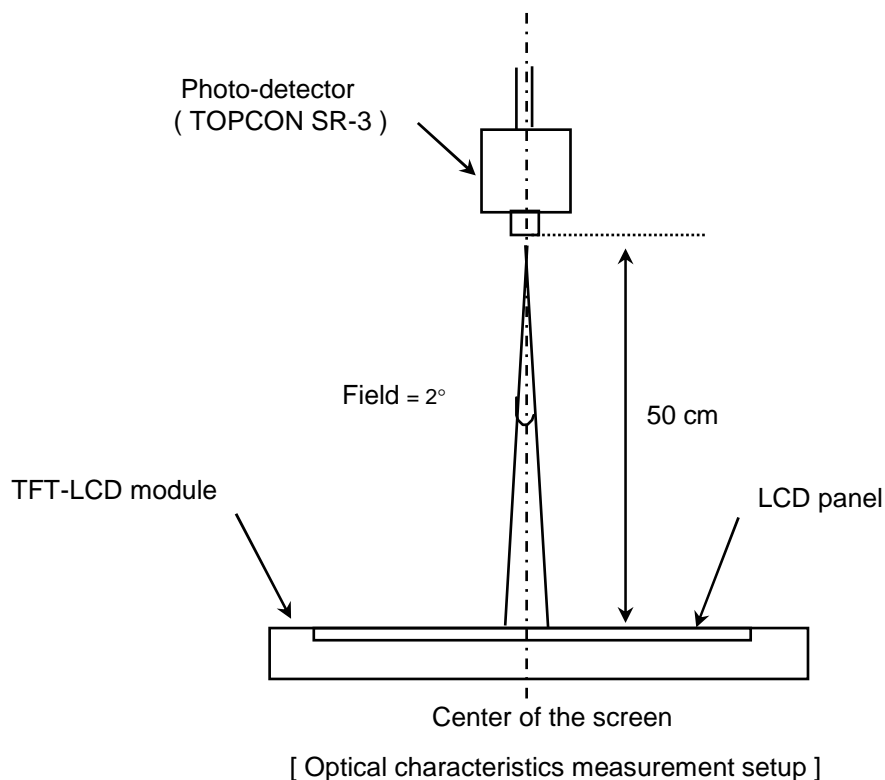
Note 6) Definition of 13 points white variation (δ L), [① ~ ⑬]

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

10mm

10mm

420   840   1260

10mm

⑬   ⑫   ⑪

⑩   ⑨   263

⑧   ⑦   ⑥   525   ◯ : test point

⑤   ④

788
(lines)

③   ②   ①

10mm

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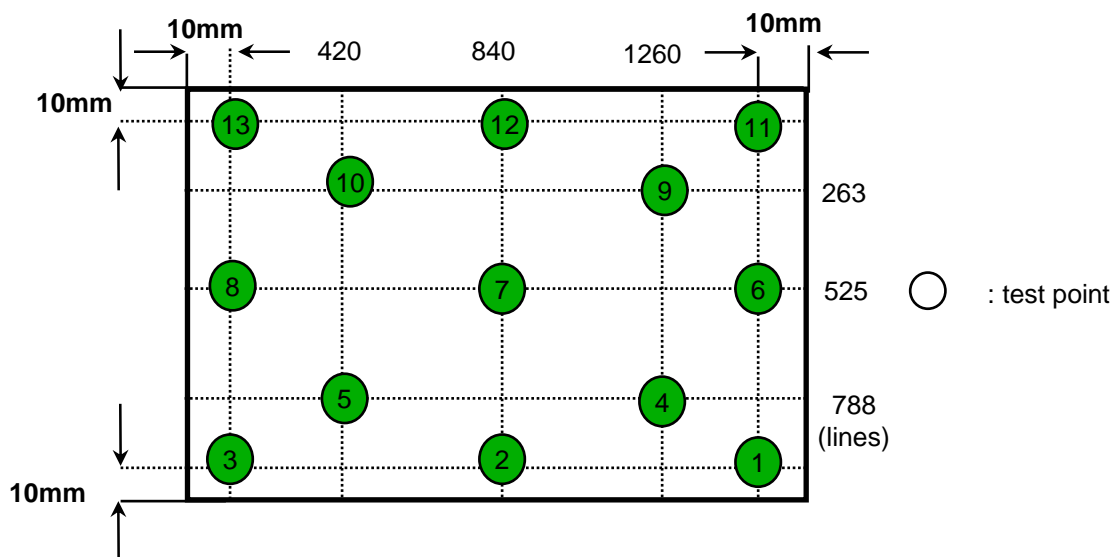
3. ELECTRICAL CHARACTERISTICS

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	-	64.8	-	KHz	
Main Frequency		f_{DCLK}	58.72	60.72	62.72	MHz	2 channel
Rush Current		I_{RUSH}	-	-	1.5	A	(4)
Current of Power Supply	White	I_{DD}	-	510	-	mA	(2),(3)*a
	Mosaic		-	560	-	mA	(2),(3)*b
	1 dot inv.		-	640	820	mA	(2),(3)*c

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

(2) f_V = 60Hz, f_{DCLK} = 60.72MHZ, V_{DD} = 3.3V , DC Current.

(3) Power dissipation pattern

*a) White Pattern

*b) Mosaic Pattern

VIEW AREA
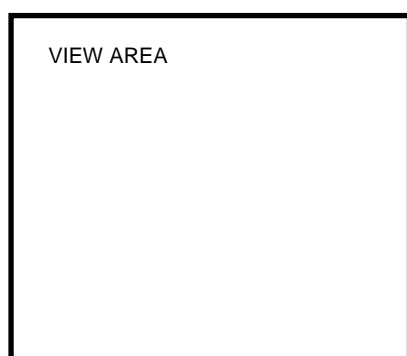
Display Brightest Gray Level

Display Darkest Gray Level

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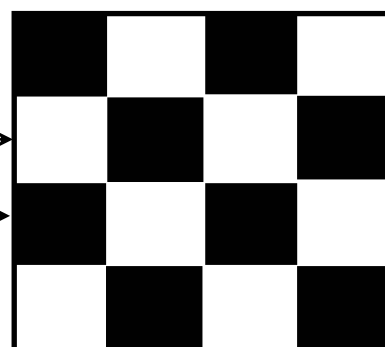
*c) 1dot Vertical stripe pattern
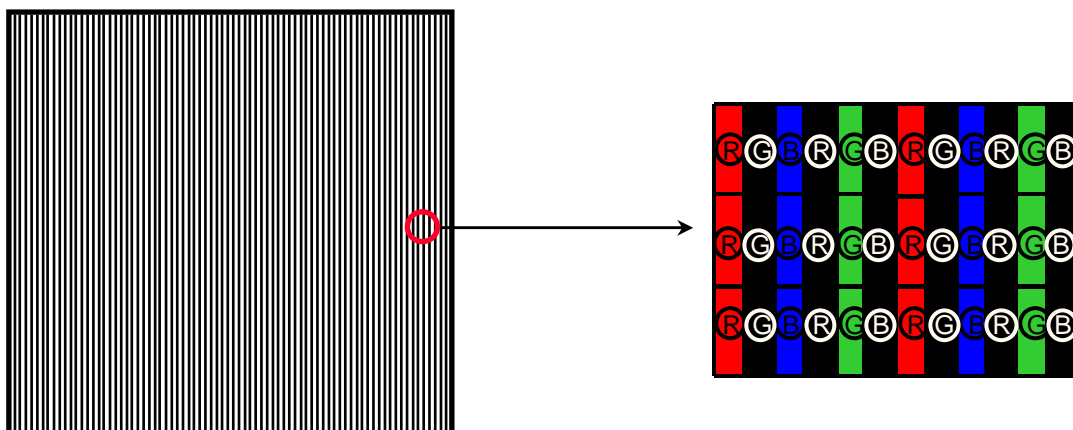
4) Rush current measurement condition

V_{DD} rising time is 470us

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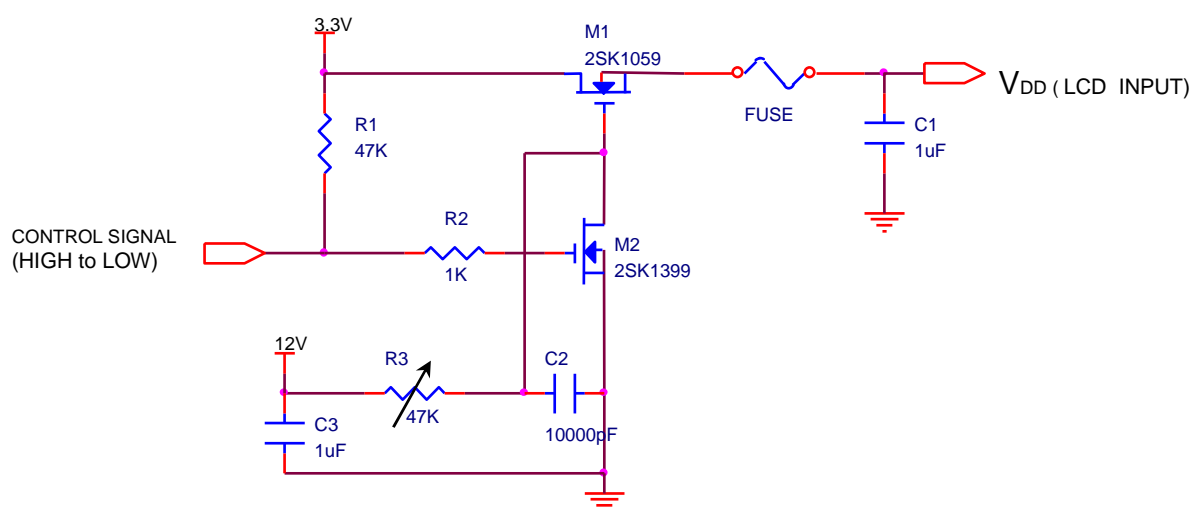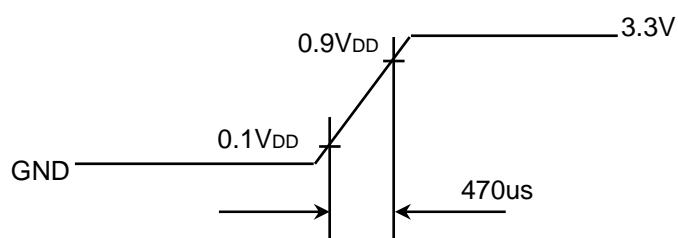
3.2 BACK-LIGHT UNIT

The backlight system is an edge-lighting type with a single CCFT (Cold Cathode Fluorescent Tube).
The characteristics of a single lamp are shown in the following table.

- INVERTER : SEM SIC 130T   Ta= 25 ± 2 ℃

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current	I_L	3.0	6.5	7.0	mArms	(1)
Lamp Voltage	V_L	-	730	-	Vrms	I_L=6.5mA
Frequency	f_L	45	60	65	KHz	(2)
Power Consumption	P_L		4.38		W	(3) I_L=6.5mA
Operating Life Time	Hr	10,000			Hour	(4)
Startup Voltage	V_S	-	-	1,300	Vrms	25℃, (5)
				1,650	Vrms	0℃, (5)
Lamp startup time		-	-	1.0	sec	(5)

Note) The waveform of the inverter output voltage must be area symmetric and the design of the
inverter must have specifications for the modularized lamp.

The performance of the backlight, for example life time or brightness, is much influenced by the
characteristics of the DC-AC inverter for the lamp. So all the parameters of an inverter should be carefully
designed so as not to produce too much leakage current from high-voltage output of the inverter.
When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of
the backlight and the inverter(miss lighting, flicker, etc.) never occur. When you confirm it, the module
should be operated in the same condition as it is installed in your instrument.

Note (1) Lamp current is measured with a high frequency current meter as shown below.
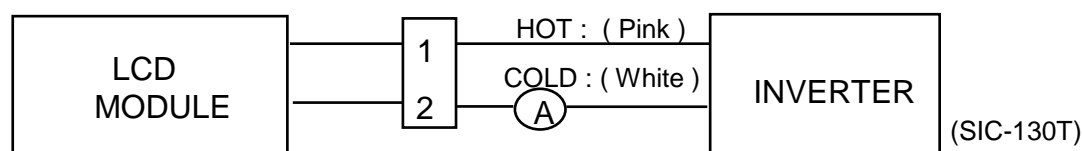
(2) Lamp frequency may produce interference with horizontal synchronous frequency and this
may cause line flow on the display. Therefore lamp frequency should be detached from the
horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

(3) Refer to $I_L \times V_L$ to calculate.

(4) Life time (Hr) of a lamp can be defined as the time in which it continues to operate under the
condition Ta= 25 ± 2 ℃ and I_L = 6.5 mArms until one of the following event occurs.

1. When the brightness becomes 50% or lower than the original.
2. When the Effective ignition length becomes 80% or lower than the original value.
(Effective ignition length is defined as an area that has less than 70% brightness compared to
the brightness in the center point.)

(5) The inverter open voltage - this voltage should be measured after ballast capacitor- have to be larger
than the lamp startup voltage, otherwise backlight may has blinking for a moment after turns on
or not be turned on.
If an inverter has shutdown function it should keep its open voltage for longer than 1 second
even if lamp connector open.

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4. BLOCK DIAGRAM

4.1 TFT LCD Module

I²C bus

EDID EEPROM

LVDS

Input-Connector
FI-XB30SRLZ-HF11
or Compatible

LVDS Input/RSDS Output
Timing Controller

RSDS

Source
Driver
IC

17.0" WSXGA+
(1680*3*1050)

TFT-LCD Panel

DC-DC
Converter

Gamma
Generator

VCOM
Generator

SOURCE PCB

Gate Driver IC

Video Signal
Control Signal
VCOM
Gamma
DVDD
AVDD
Von/Voff

4.2 BACK-LIGHT UNIT

Reflector

LAMP

1 HOT (Pink)

2 COLD(White)

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5. INPUT TERMINAL PIN ASSIGNMENT

5.1. Input Signal & Power   LVDS, Connector : (JAE, FI-XB30SRLZ-HF11 or Compatible)
Mating Connector :(JAE FI-X30M or Compatible)

No.	Symbol	Function	Polarity	Remarks
1	GND	Ground		
2	VDD	POWER SUPPLY +3.3V		
3	VDD	POWER SUPPLY +3.3V		
4	VEEDID	DDC 3.3V Power		
5	DVR_CLK	I2C Control signal		
6	CLKEDID	DDC Clock		
7	DATAEDID	DDC data		
8	O_RxIN0-	LVDS Differential Data INPUT (Odd R0-R5,G0)	Negative	
9	O_RxIN0+	LVDS Differential Data INPUT (Odd R0-R5,G0)	Positive	
10	GND	Ground		
11	O_RxIN1-	LVDS Differential Data INPUT (Odd G1-G5,B0-B1)	Negative	
12	O_RxIN1+	LVDS Differential Data INPUT (Odd G1-G5,B0-B1)	Positive	
13	GND	Ground		
14	O_RxIN2-	LVDS Differential Data INPUT (Odd B2-B5,Sync,DE)	Negative	
15	O_RxIN2+	LVDS Differential Data INPUT (Odd B2-B5,Sync,DE)	Positive	
16	GND	Ground		
17	O_RxCLK-	LVDS Differential Data INPUT (Odd Clock)	Negative	
18	O_RxCLK+	LVDS Differential Data INPUT (Odd Clock)	Positive	
19	GND	Ground		
20	E_RxIN0-	LVDS Differential Data INPUT (Even R0-R5,G0)	Negative	
21	E_RxIN0+	LVDS Differential Data INPUT (Even R0-R5,G0)	Positive	
22	GND	Ground		
23	E_RxIN1-	LVDS Differential Data INPUT (Even G1-G5,B0-B1)	Negative	
24	E_RxIN1+	LVDS Differential Data INPUT (Even G1-G5,B0-B1)	Positive	
25	GND	Ground		
26	E_RxIN2-	LVDS Differential Data INPUT (Even B2-B5,Sync,DE)	Negative	
27	E_RxIN2+	LVDS Differential Data INPUT (Even B2-B5,Sync,DE)	Positive	
28	GND	Ground		
29	E_RxCLK-	LVDS Differential Data INPUT (Even Clock)	Negative	
30	E_RxCLK+	LVDS Differential Data INPUT (Even Clock)	Positive	

5.2 LVDS Interface : Transmitter DS90CF363 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

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LVDS Interface

Graphics controller 36-bit	DS90CF363 or compatible	JAE,FI-XB30SRLZ-HF11	LRU4312X2

Graphics controller 36-bit

Signal	Pin
ODD RED0	44
ODD RED1	45
ODD RED2	47
ODD RED3	48
ODD RED4	1
ODD RED5	3
ODD GREEN0	4
ODD GREEN1	6
ODD GREEN2	7
ODD GREEN3	9
ODD GREEN4	10
ODD GREEN5	12
ODD BLUE0	13
ODD BLUE1	15
ODD BLUE2	16
ODD BLUE3	18
ODD BLUE4	19
ODD BLUE5	20
Hsync	22
Vsync	23
Enable	25
CLOCK	26

DS90CF363 or compatible (ODD) → JAE connector → LRU4312X2

DS90 out	JAE	LRU4312X2
TxOUT0- (41)	8	O_RxIN0-
TxOUT0+ (40)	9	O_RxIN0+ (100 Ω)
TxOUT1- (39)	11	O_RxIN1-
TxOUT1+ (38)	12	O_RxIN1+ (100 Ω)
TxOUT2- (35)	14	RxIN2-
TxOUT2+ (34)	15	RxIN2+ (100 Ω)
TxCLKOUT- (33)	17	RxCLK-
TxCLKOUT+ (32)	18	RxCLK+ (100 Ω)

EVEN section

Signal	Pin
EVEN RED0	44
EVEN RED1	45
EVEN RED2	47
EVEN RED3	48
EVEN RED4	1
EVEN RED5	3
EVEN GREEN0	4
EVEN GREEN1	6
EVEN GREEN2	7
EVEN GREEN3	9
EVEN GREEN4	10
EVEN GREEN5	12
EVEN BLUE0	13
EVEN BLUE1	15
EVEN BLUE2	16
EVEN BLUE3	18
EVEN BLUE4	19
EVEN BLUE5	20
Hsync	22
Vsync	23
Enable	25
CLOCK	26

DS90CF363 or compatible (EVEN) → JAE connector → LRU4312X2

DS90 out	JAE	LRU4312X2
TxOUT0- (41)	20	E_RxIN0-
TxOUT0+ (40)	21	E_RxIN0+ (100 Ω)
TxOUT1- (39)	23	E_RxIN1-
TxOUT1+ (38)	24	E_RxIN1+ (100 Ω)
TxOUT2- (35)	26	E_RxIN2-
TxOUT2+ (34)	27	E_RxIN2+ (100 Ω)
TxCLKOUT- (33)	29	E_RxCLK-
TxCLKOUT+ (32)	30	E_RxCLK+ (100 Ω)

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

5.3 BACK LIGHT UNIT

Connector : JST BHSR - 02VS -1
Mating Connector : SM02B-BHSS-1(JST)

Pin NO.	Symbol	Color	Function
1	HOT	Pink	High Voltage
2	COLD	White	Low Voltage

5.4 Timing Diagrams of LVDS For Transmission

LVDS Receiver : Integrated T-CON

Signal							
O_TxCLK OUT / 0_RxCLK IN				T			
O_Rx IN2 (T/7)	RxOUT20	RxOUT19	RxOUT18	RxOUT17	RxOUT16	RxOUT15	RxOUT14
	DE	Vsync	Hsync	B5	B4	B3	B2
O_Rx IN1	RxOUT13	RxOUT12	RxOUT11	RxOUT10	RxOUT9	RxOUT8	RxOUT7
	B1	B0	G5	G4	G3	G2	G1
O_RxIN0	RxOUT6	RxOUT5	RxOUT4	RxOUT3	RxOUT2	RxOUT1	RxOUT0
	G0	R5	R4	R3	R2	R1	R0
E_TxCLK OUT / E_RxCLK IN							
E_Rx IN2 (T/7)	RxOUT20	RxOUT19	RxOUT18	RxOUT17	RxOUT16	RxOUT15	RxOUT14
	N/C	N/C	N/C	B5	B4	B3	B2
E_Rx IN1	RxOUT13	RxOUT12	RxOUT11	RxOUT10	RxOUT9	RxOUT8	RxOUT7
	B1	B0	G5	G4	G3	G2	G1
E_RxIN0	RxOUT6	RxOUT5	RxOUT4	RxOUT3	RxOUT2	RxOUT1	RxOUT0
	G0	R5	R4	R3	R2	R1	R0

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

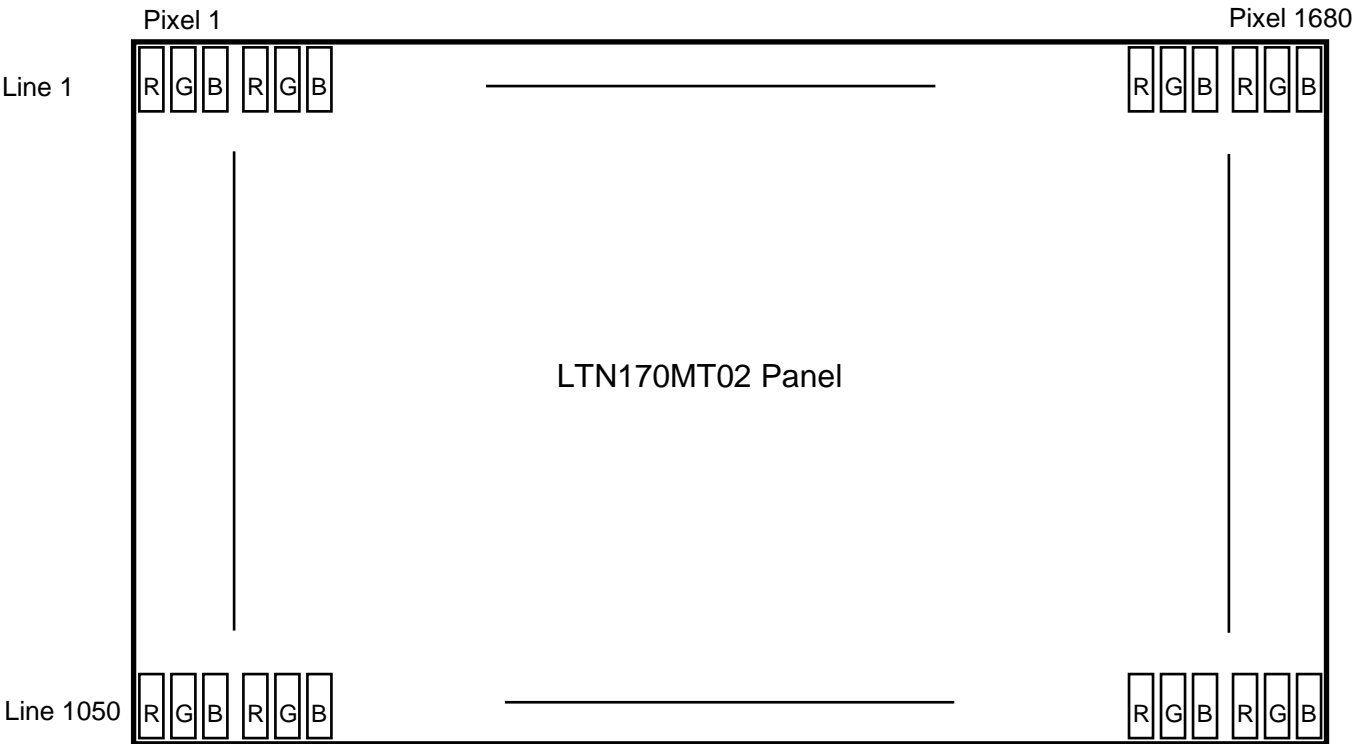| Color	Display	Red						Green						Blue						Gray Scale Level
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	45	B5	
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	-
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	-
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	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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5.6 Pixel Format in the display

Pixel 1   Pixel 1680

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

LTN170MT02 Panel

Line 1050 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	T_V	1060	1080	1100	Lines	-
Vertical Active Display Term	Display Period	T_{VD}		1050		Lines	-
One Line Scanning Time	Cycle	T_H	905	920	935	Clocks	-
Horizontal Active Display Term	Display Period	T_{HD}		840		Clocks	2 CH

6.2 Timing diagrams of interface signal

T_V

T_{VD}

DE

T_H

DCLK

T_C

DE

T_{HD}

DATA SIGNALS   Valid display data (840 clocks)

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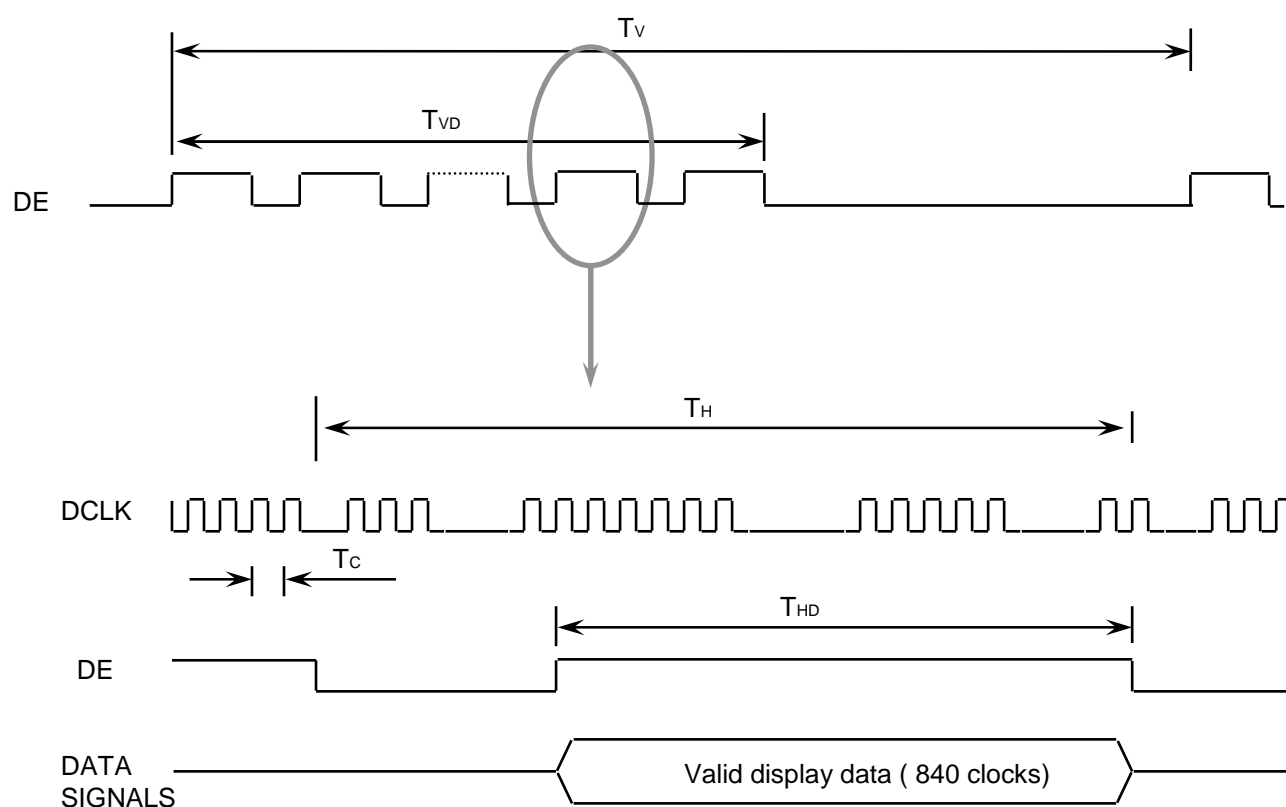
6.3 Power ON/OFF Sequence

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

Power Supply V_{DD}

0.9 V_{DD}

0.1 V_{DD}

0V

$0.5 < T_1 \leq 10$ **msec**
$0 < T_2 \leq 50$ **msec**
$0 < T_3 \leq 50$ **msec**
500 **msec** $\leq T_4$

Signals

0 V

T_1 T_2 VALID T_3 T_4

Power On   Power Off

Back-light
200 **msec** $\leq T_5$
200 **msec** $\leq T_6$

50%   50%

T_5 T_6
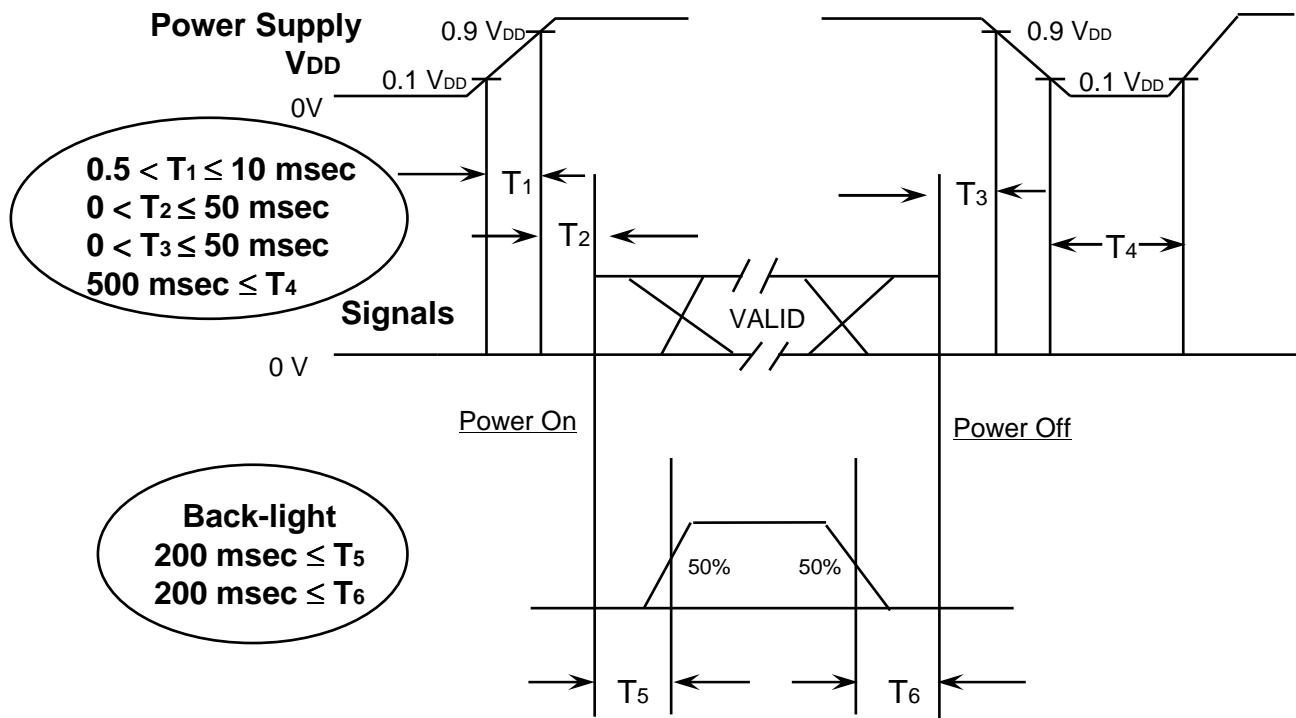
Power ON/OFF Sequence

T1 : Vdd rising time from 10% to 90%
T2 : The time from Vdd to valid data at power ON.
T3 : The time from valid data off to Vdd off at power Off.
T4 : Vdd off time for Windows restart
T5 : The time from valid data to B/L enable at power ON.
T6 : The time from valid data off to B/L disable at power Off.

NOTE.
(1) The supply voltage of the external system for the module input should be the same as the definition of V_{DD}.

(2) Apply the lamp 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 V_{DD} = 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.

7. MECHANICAL OUTLINE DIMENSION

[Refer to the next page]

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

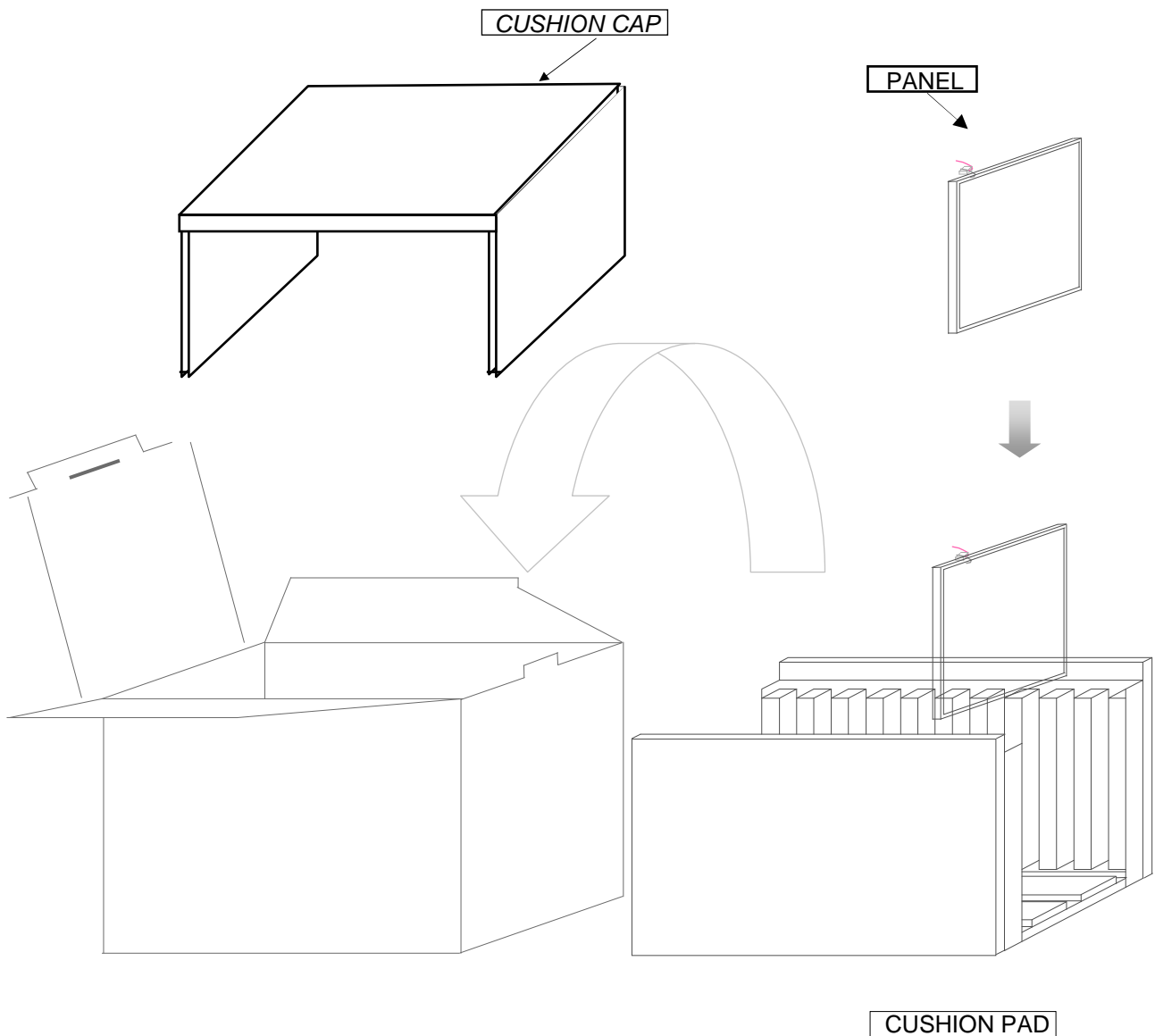| Doc.No.	LTN170MT02-001	Rev.No	04-P00-G-080602	Page	22 / 31

8. Packing

8.1 Packing

CARTON(Internal Package)

(1)Packing Form

Corrugated fiberboard box and corrugated cardboard as shock absorber

(2)Packing Method

CUSHION CAP

PANEL

CUSHION PAD

Note (1)Total : Approx. 10.0Kg

(2)Acceptance number of piling : 10 sets

(3)Carton size : 463 (W) X 359 (D) X 328 (H)

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(3)Packing Material

No	Part name	Quantity
1	Static electric protective sack	10
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.
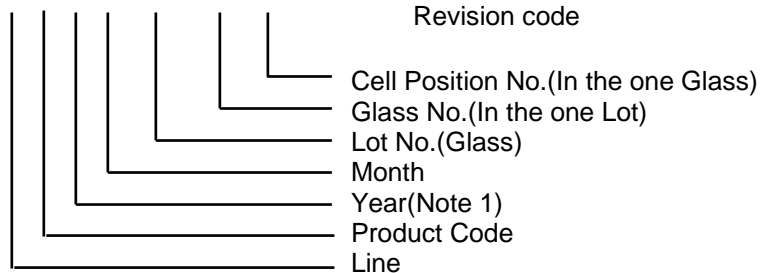
(1)Parts number : LTN170MT02
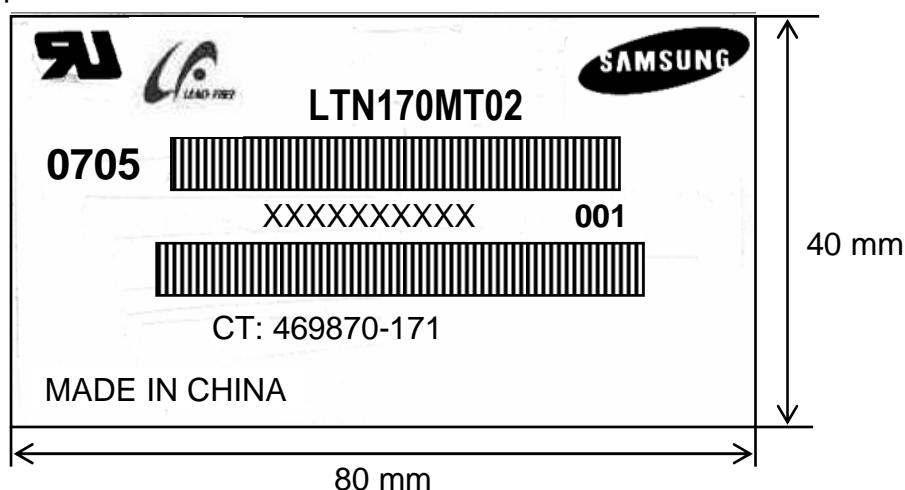(2)Revision   : Three letters
(3)Lot number   : X X X X   XXX XX X   **001**
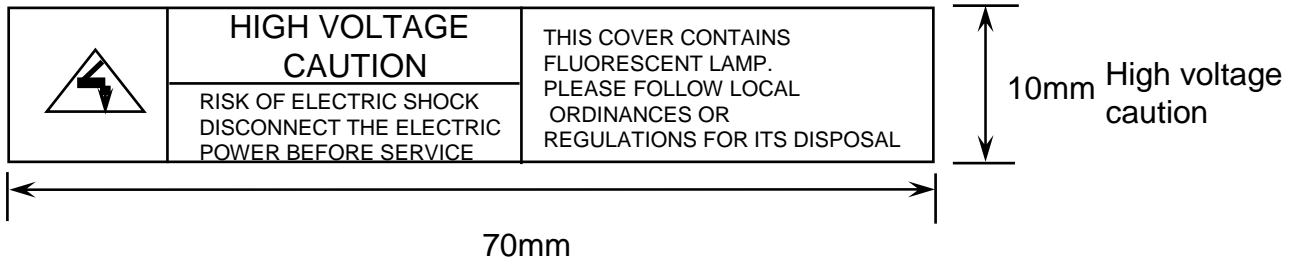
                                       Revision code

                            Cell Position No.(In the one Glass)
                            Glass No.(In the one Lot)
                            Lot No.(Glass)
                            Month
                            Year(Note 1)
                            Product Code
                            Line

(4) Nameplate Indication

LTN170MT02

0705

XXXXXXXXXX   **001**

CT: 469870-171

MADE IN CHINA

40 mm

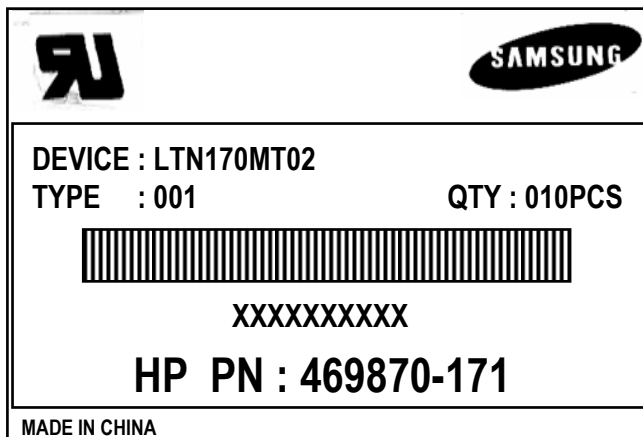80 mm

Parts name   : LTN170MT02
Lot number   : XXXXXXXXXX
Inspected work week   : 0705 (2007 year 5th week)
Product Revision Code : **001**
CT code : 469870-171 (Released after HP's approval)

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High voltage caution label

| ⚡ | HIGH VOLTAGE CAUTION
RISK OF ELECTRIC SHOCK DISCONNECT THE ELECTRIC POWER BEFORE SERVICE | THIS COVER CONTAINS FLUORESCENT LAMP. PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR ITS DISPOSAL |

10mm High voltage caution

70mm

(5) Packing small box attach

UL   **SAMSUNG**

DEVICE : LTN170MT02
TYPE   : 001   QTY : 010PCS

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

XXXXXXXXXX

HP PN : 469870-171

MADE IN CHINA

(6) Packing box Marking : Samsung TFT-LCD Brand Name

wise view™

Samsung Secret

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

(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.

11. EDID

Address (HEX)	FUNCTION	Value HEX	BIN	DEC	ASCII or Data	Notes
00		00	00000000	0		
01		FF	11111111	255		
02		FF	11111111	255		
03		FF	11111111	255		
04	Header	FF	11111111	255		EDID Header
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	47	01000111	71	[G]	
0B		4B	01001011	75	[K]	
0C		00	00000000	0		
0D	32-bit serial no.	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	25	00100101	37	37	37 cm(approx)
16	Max V image size	17	00010111	23	23	23 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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Addr	Field	Hex	Binary	Dec	Value	Remark
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	70	01110000	112	121.44	Main clock= 121.44MHz
37		2F	00101111	47		
38		90	10010000	144	1680	Hor active=840*2 pixels
39		A0	10100000	160	160	Hor blanking=160 pixels
3A		60	01100000	96		4bit : 4bit
3B		1A	00011010	26	1050	Vertcal active=1050 lines
3C		32	00110010	50	50	Vertical blanking=50 lines
3D		40	01000000	64		4bit : 4bit
3E		30	00110000	48	48	Hor sync. Offset=48 pixels
3F		20	00100000	32	32	H sync. Width=32 pixels
40		26	00100110	38	2 / 6	V sync. Offset=2 lines / V sync. Width=6 lines
41		00	00000000	0		2bit : 2bit :2bit :2bit
42		6D	01101101	109	365	H image size= 365 mm(approx)
43		E4	11100100	228	228	V image size = 228 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		41	01000001	65		Thpmin=**value***2 + HA pixelclks
56		5F	01011111	95		Thpmax=**value***2 + HA pixelclks
57		05	00000101	5		Tvpmin=**value***2 + VA lines
58		19	00011001	25		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		37	00110111	55	[7]	
73	Detailed timing/monitor	30	00110000	48	[0]	
74	descriptor #4	4D	01001101	77	[M]	
75		54	01010100	84	[T]	
76		30	00110000	48	[0]	
77		32	00110010	50	[2]	
78		2D	00101101	45	[-]	
79		30	00110000	48	[0]	
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	2E	00101110	46		

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