



# FORMIKE ELECTRONIC CO.,LTD

## PRDUCT SPECIFICATON

TFT LCD MODULE

MODEL NO. : KWH100HT02-F01

【    】 Preliminary Specification

【 ♦  】 Finally Specification

CUSTOMER'S APPROVAL	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWD	PD REVIEWD	PREPARED BY
Ken	Lily	Stephen	Jack

**Prepared By :**

FORMIKE ELECTRONIC CO.,LTD

Address :Room A818 New Energy Building, NanHai Road, NanShan District, ShenZhen, China. 518054

TEL:(86) 755 88306921,88306931 FAX:(86) 755 88304615

Http:// www.wandisplay.com

- This specification is subject to change withouth notice.Please contact FORMIKE or it's representative before designing your product based on this specification.

Issued Date: July-7-2008



### Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	Jul., 7, 2008	A00	Formal Product Specification was first released



## Contents

1.0	General description .....	p.4
2.0	Absolute maximum ratings.....	p.5
3.0	Optical characteristics.....	p.6
4.0	Block diagram .....	p.10
5.0	Interface pin connection .....	p.12
6.0	Electrical characteristics .....	p.14
7.0	Reliability test items .....	p.18
8.0	Outline dimension .....	p.19
9.0	Package specification .....	p.21
10.0	General precaution .....	p.22
11.0	EDID Table .....	p.24



## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

FORMIKE Display model KWH100HT02 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10 (17:10) inch diagonally measured active display area with WSVGA (1024 horizontal by 600 vertical pixel) resolution.

### 1.2 Features

- 10 (17:10 diagonal) inch configuration
- One channel LVDS interface
- 256K color by 6 bit R.G.B signal input
- RoHS Compliance

### 1.3 Applications

- Mobile NB
- Digital Photo frame
- Display terminal for AV application

### 1.4 General information

Item	Specification	Unit	
Outline Dimension	235 x 145.8 x 5.5 (Typ.)	mm	
Display area	220.416(H) x 129.15(V)	mm	
Number of Pixel	1024 RGB (H) x 600(V)	pixels	
Pixel pitch	0.21525(H) x 0.21525(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display mode	Normally white		
Surface treatment	Antiglare, Hard-Coating (3H) with EWV film		
Weight	253 (Typ.)	g	
Back-light	Single LED (Side-Light type)		
Power Consumption	Logic System	1.1 (Max.)	W
	B/L System	3.1 (Max.)	W

### 1.5 Mechanical Information

Item	Min.	Typ.	Max.	Unit	
Module Size	Horizontal (H)	234.5	235	235.5	mm
	Vertical (V)	145.3	145.8	146.3	mm
	Depth (D)	—	5.5	5.8	mm
Weight	—	253	270	g	



## 2.0 ABSOLUTE MAXIMUM RATINGS

### 2.1 Electrical Absolute Rating

#### 2.1.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
LED Power Supply voltage	$V_{LED}$	-0.3	6.0	V	GND=0
Logic Supply voltage	$V_{DD}$	-0.3	6.0	V	

### 2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	$T_{opa}$	0	50	°C	
Storage Temperature	$T_{stg}$	-20	60	°C	



### 3.0 OPTICAL CHARACTERISTICS

#### 3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR	Normal viewing angle	400	500	—		(1)(2)
Response time	Rising	T <sub>R</sub>		—	5	7	msec	(1)(3)
	Falling	T <sub>F</sub>		—	20	28		
White luminance (Center)		Y <sub>L</sub>		CR>10	200	250	—	cd/m <sup>2</sup>
Color chromaticity (CIE1931)	White	W <sub>x</sub>	0.260		0.310	0.360	(1)(4)	
		W <sub>y</sub>	0.280		0.330	0.380		
Viewing angle	Hor.	θ <sub>L</sub>	60		70	—		
		θ <sub>R</sub>	60	70	—			
	Ver.	θ <sub>U</sub>	40	50	—			
		θ <sub>D</sub>	50	60	—			
Brightness uniformity		B <sub>UNI</sub>	θ=0	70	—	—	%	(5)
Optima View Direction		6 O' clock						(6)

#### 3.2 Measuring Condition

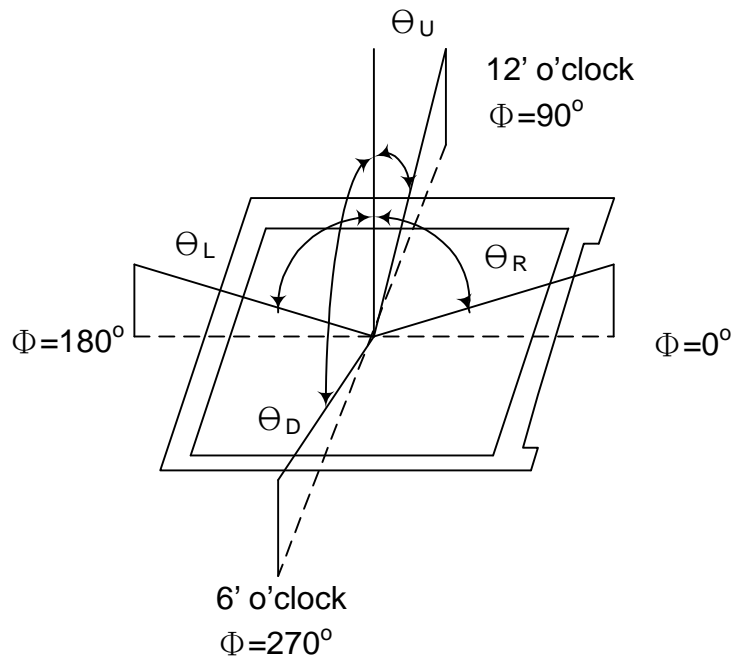
- Measuring surrounding : dark room
- LED current I<sub>L</sub> : 200mA
- Ambient temperature : 25±2°C
- 15min. warm-up time.

### 3.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

- Measuring spot size : 20 ~ 21 mm

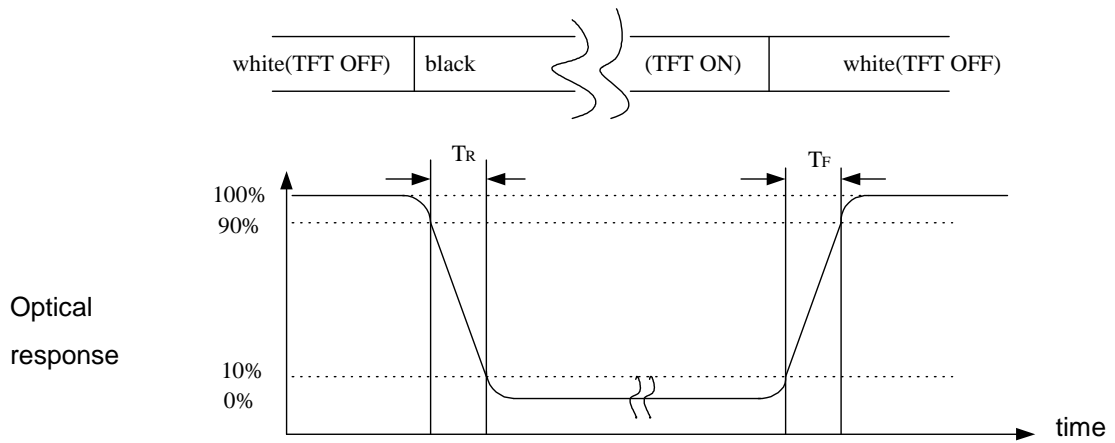
**Note (1)** Definition of Viewing Angle:



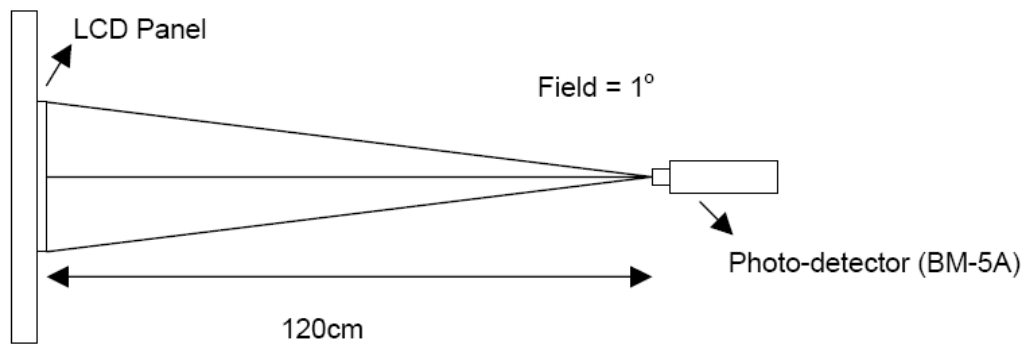
**Note (2)** Definition of Contrast Ratio (CR) :  
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

**Note (3)** Definition of Response Time : Sum of  $T_R$  and  $T_F$

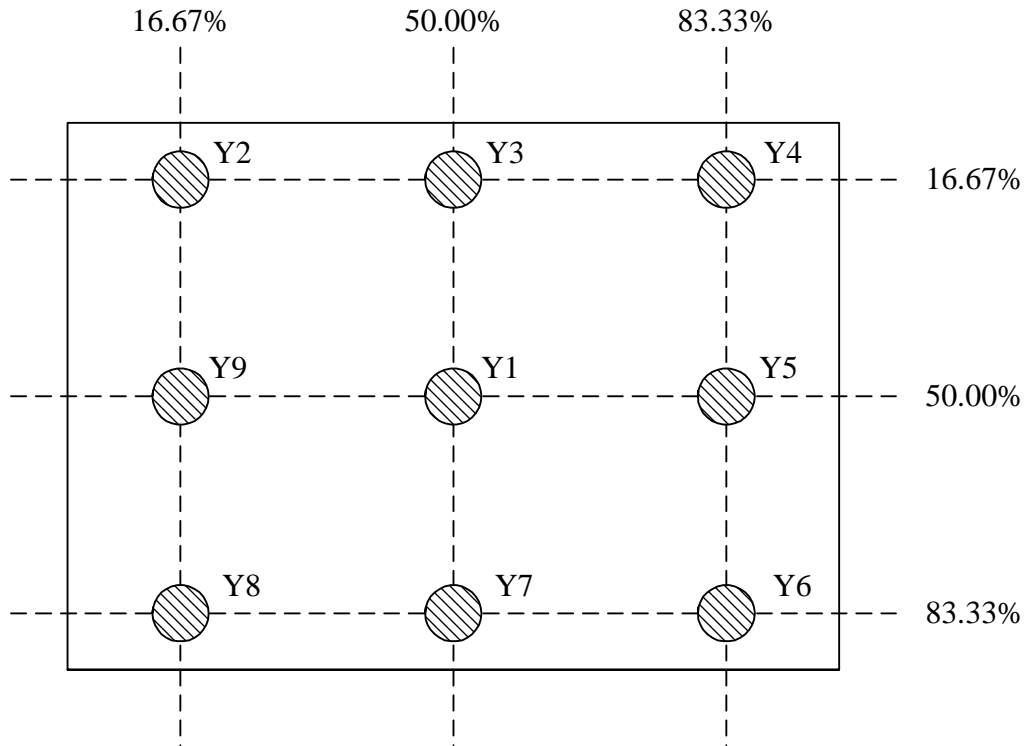


**Note (4)** Definition of optical measurement setup





**Note (5)** Definition of brightness uniformity



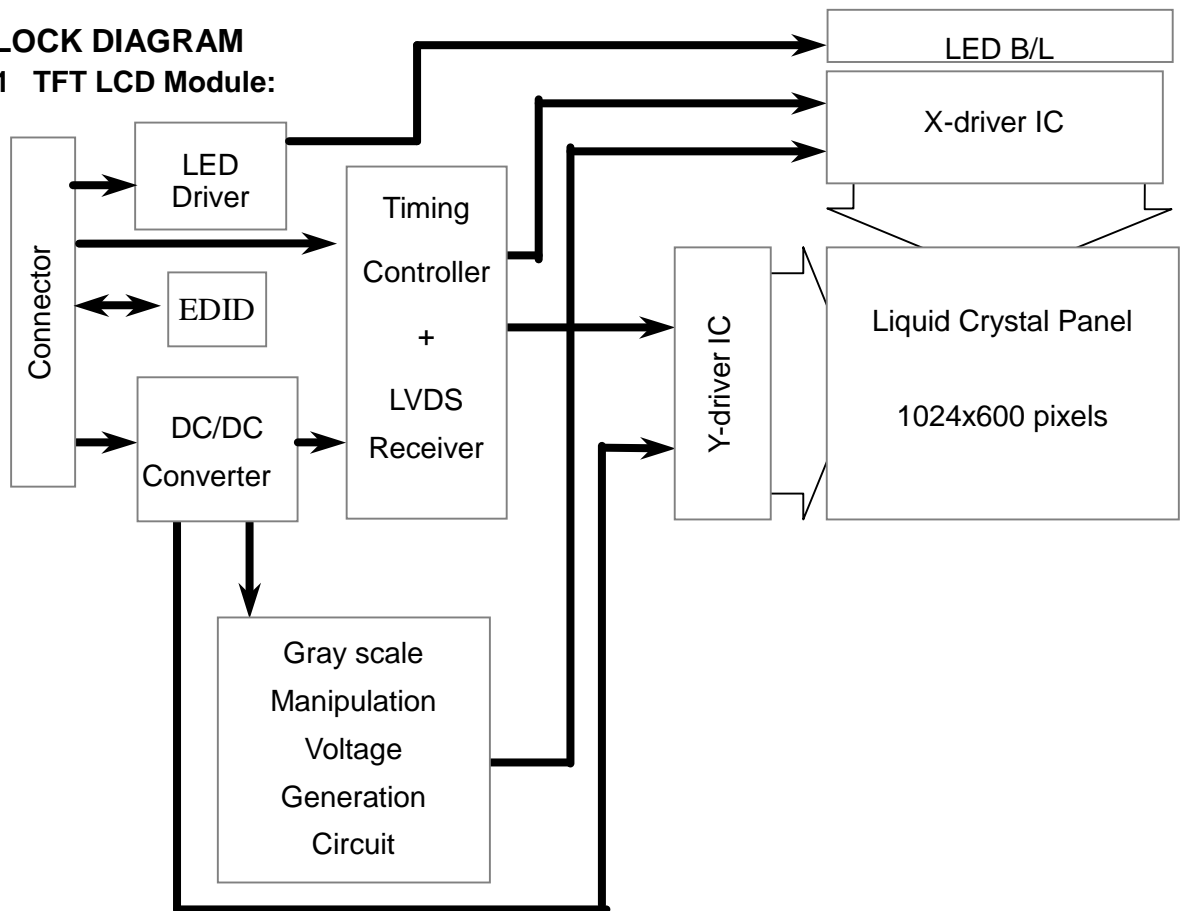
$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

**Note (6)** : Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.)

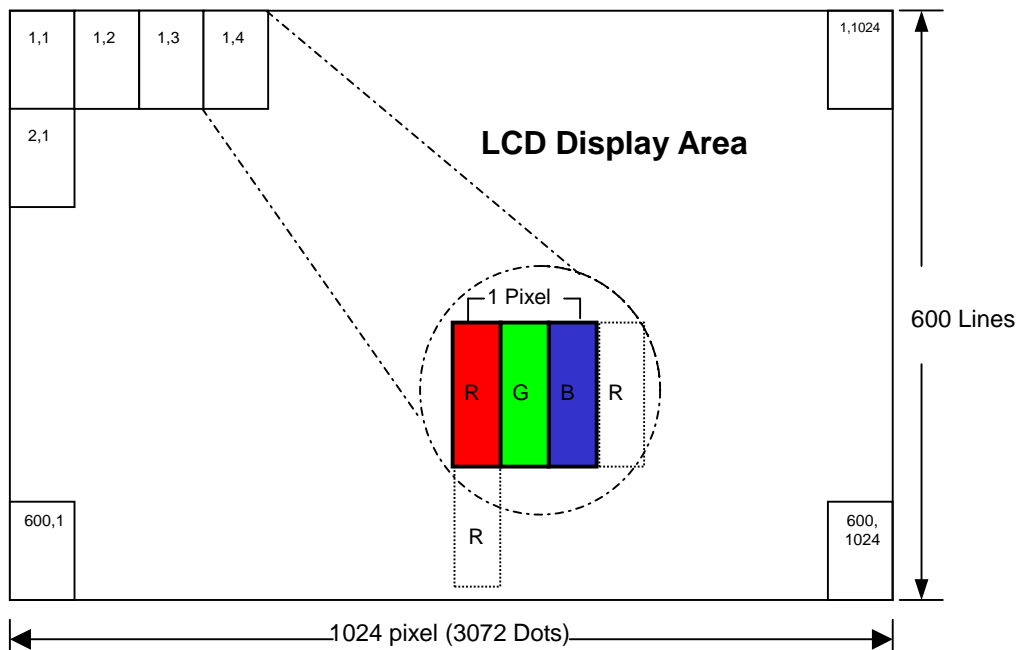


### 4.0 BLOCK DIAGRAM

#### 4.1 TFT LCD Module:



#### 4.2 Pixel Format





**5.0 INTERFACE PIN CONNECTION****5.1 TFT LCD Module :**

**CN1** (Input signal): FI-XB30SSRL-HF16 (JAE or equivalent)

Pin No.	Signal	Description
1	GND	Ground
2	VDD	3.3V Power
3	VDD	3.3V Power
4	V_EDID	3.3V Power for EDID
5	ADJ	Adjust for LED brightness Note
6	CLK_EDID	EDID Clock Input
7	DATA_EDID	EDID Data Input
8	RXIN0-	LVDS Signal - channel0-
9	RXIN0+	LVDS Signal+ channel0+
10	GND	Ground
11	RXIN1-	Data Input channel1-
12	RXIN1+	Data Input channel1+
13	GND	Ground
14	RXIN2-	Data Input channel2-
15	RXIN2+	Data Input channel2+
16	GND	Ground
17	RXCLKIN-	Data Input CLK-
18	RXCLKIN+	Data Input CLK+
19	GND	Ground
20	NC	NC
21	NC	NC
22	GND	Ground
23	GND	Ground
24	VLED	LED Power +5V
25	VLED	LED Power +5V
26	VLED	LED Power +5V
27	NC	NC
28	NC	NC
29	NC	NC
30	NC	NC

**Note :** The brightness of LCD panel could be changed by adjusting ADJ

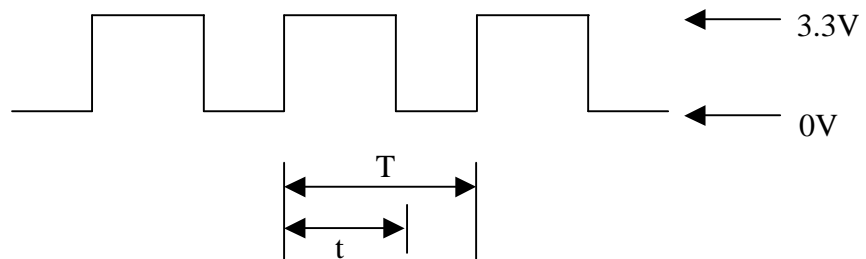
**[Note]**

**(1) ADJ can adjust brightness to control Pin. Pulse duty the bigger the brighter.**



**(2) ADJ Signal=0~3.3V · Operation Frequency :**

Dimming Range		
PWM Frequency (F)	Duty Cycle (Min.)	Duty Cycle (Max.)
100Hz < F < 500Hz	5%	100%
500Hz < F < 20KHz	10%	100%



$$\text{Duty Cycle} = t / T * 100\%$$

$$T = 1 / F$$

## 6.0 ELECTRICAL CHARACTERISTICS

### 6.1 TFT LCD Module

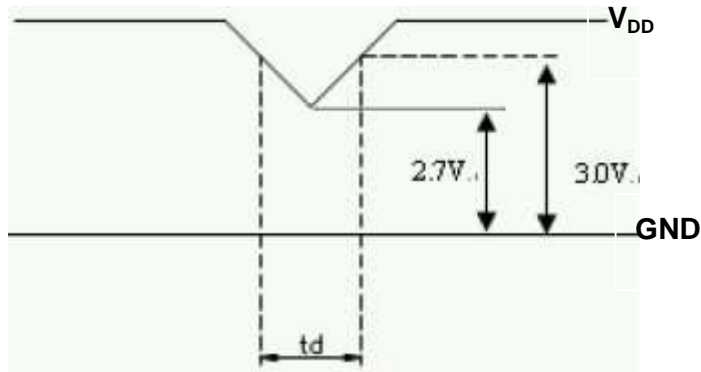
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	$V_{DD}$	3.0	3.3	3.6	V	Note (2)
	$V_{LED}$	4.7	5.0	5.3	V	
Current of power supply	$I_{DD}$	-	0.3	-	A	$V_{DD} = 3.3V$ · L0 pattern

**Note** : (1) The brightness of LCD panel could be changed by adjusting ADJ.

(2)  $V_{DD}$ -dip condition :

When  $V_{DD}$  operating within  $2.7V \leq V_{DD} < 3.0V$  ,  $t_d \leq 10ms$  , the display may momentarily become abnormal .

$V_{DD} > 3.0V$  ,  $V_{DD}$ -dip condition should be same as  $V_{DD}$ -turn-con condition.

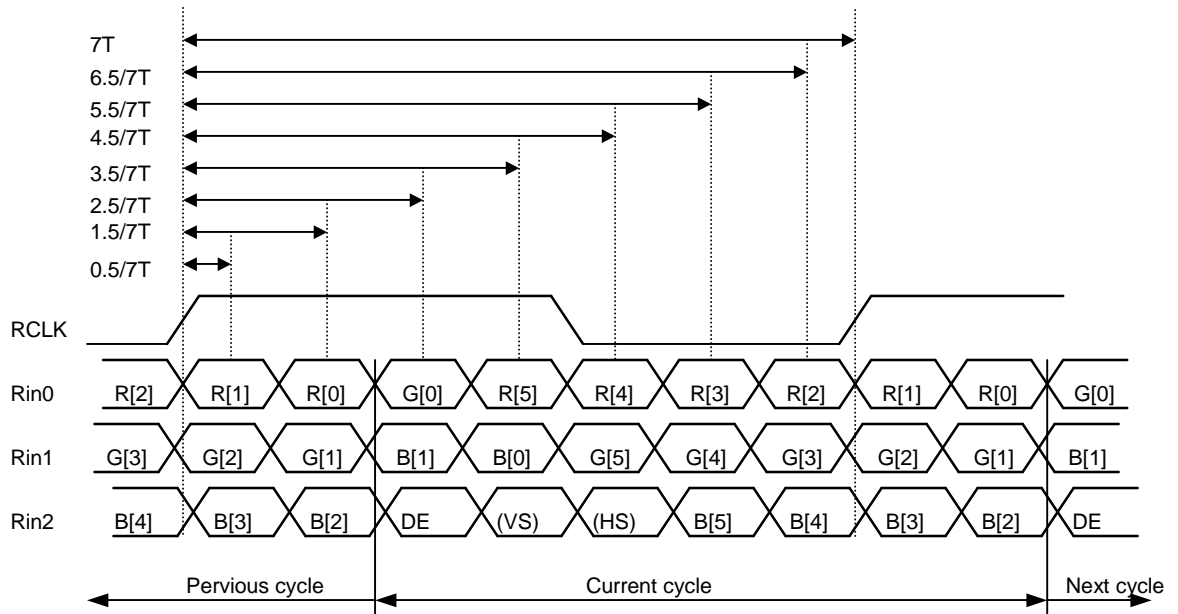




### 6.2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	V <sub>th</sub>	—	—	100	mV	V <sub>CM</sub> =1.2V
Differential Input Low Threshold	V <sub>tl</sub>	-100	—	—	mV	
Input Current	I <sub>IN</sub>	-10	—	+10	uA	
Differential input Voltage	V <sub>ID</sub>	0.1	—	0.6	V	
Common Mode Voltage Offset	V <sub>CM</sub>	( V <sub>ID</sub>  /2)	1.25	1.8-0.4-( V <sub>ID</sub>  /2)	V	

### 6.3 Bit Mapping & Interface Definition



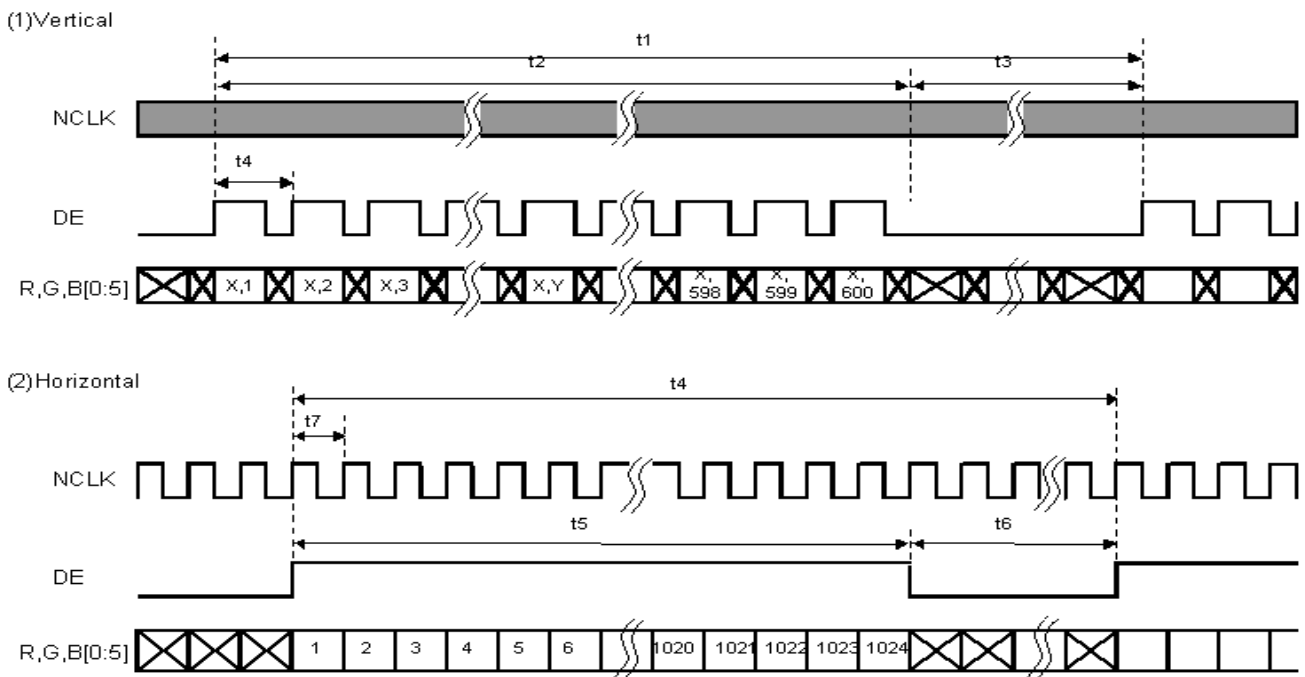
LVDS Receiver Input Timing Definition  
for 6bits LVDS input



### 6.4 Interface Timing (DE mode)

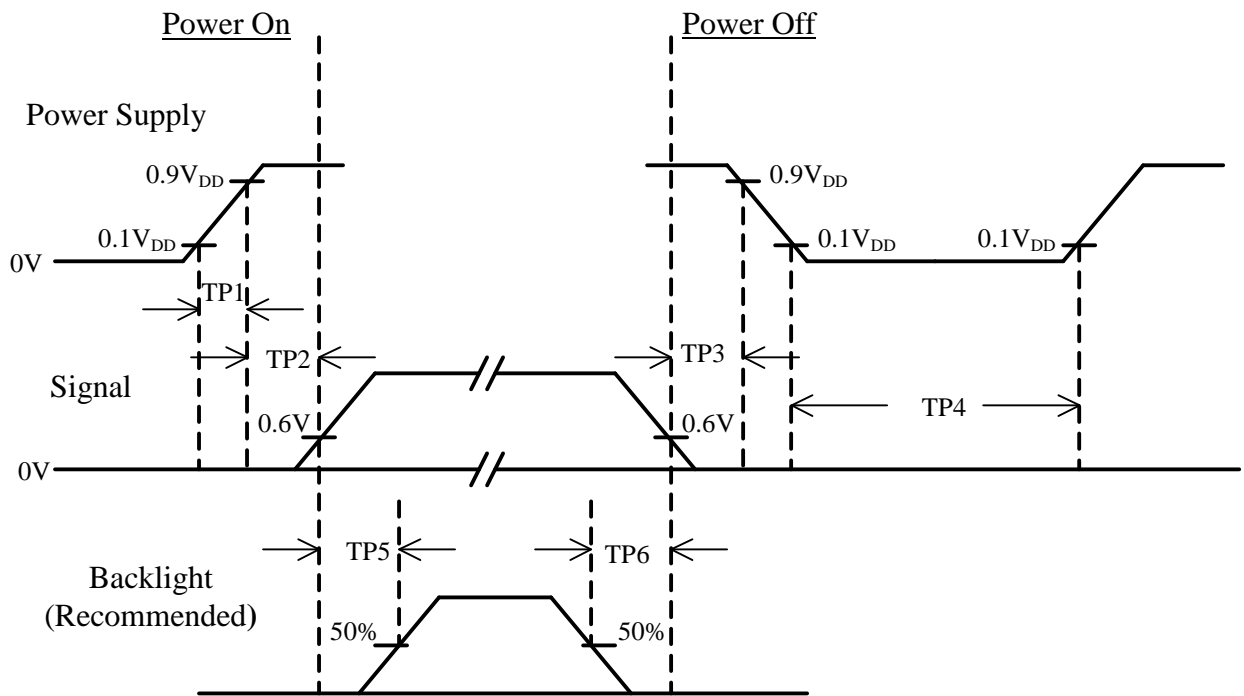
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	55	60	65	Hz
Frame Period	t1	612	625	638	line
Vertical Display Time	t2	600	600	600	line
Vertical Blanking Time	t3	12	25	38	line
1 Line Scanning Time	t4	1160	1200	1240	clock
Horizontal Display Time	t5	1024	1024	1024	clock
Horizontal Blanking Time	t6	136	176	216	clock
Clock Rate	t7	39	45	51.42	MHz

### Timing Diagram of Interface Signal (DE mode)





### 6.5 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit	Remark
TP1	0.5	--	10	msec	
TP2	0	--	50	msec	
TP3	0	--	50	msec	
TP4	500	--	--	msec	
TP5	200	--	--	msec	
TP6	200	--	--	msec	

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 signal on the low or keep a high impedance.

(4) TP4 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.

## 7.0 Reliability test items

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+60°C, 240hrs	
2	Low Temperature Storage	Ta=-20°C, 240hrs	
3	High Temperature Operation	Ta=+50°C, 500hrs	
4	Low Temperature Operation	Ta=0°C, 500hrs	
5	High Temperature and High Humidity (operation)	Ta=+50°C, 80%RH, 500hrs	
6	Thermal Cycling Test (non operation)	-20°C(30min) → +60°C(30min), 100 cycles	
7	Electrostatic Discharge	±200V,200pF(0Ω) 1 time/connector	
8	Vibration	1.Random: 1.04G, 10~500Hz, XYZ, 30min/each direction 2.Sine: 1.5G, 5~500Hz, XYZ 30min/each direction	
9	Shock	Half-Sine, 220G, 2ms, ±XYZ, 1time	
10	Vibration (with carton)	Random: 1.04G, 10~500Hz, XYZ, 45min/each direction	
11	Drop (with carton)	Height : 60 cm 1 corner, 3 edges, 6 surfaces	JIS Z0202

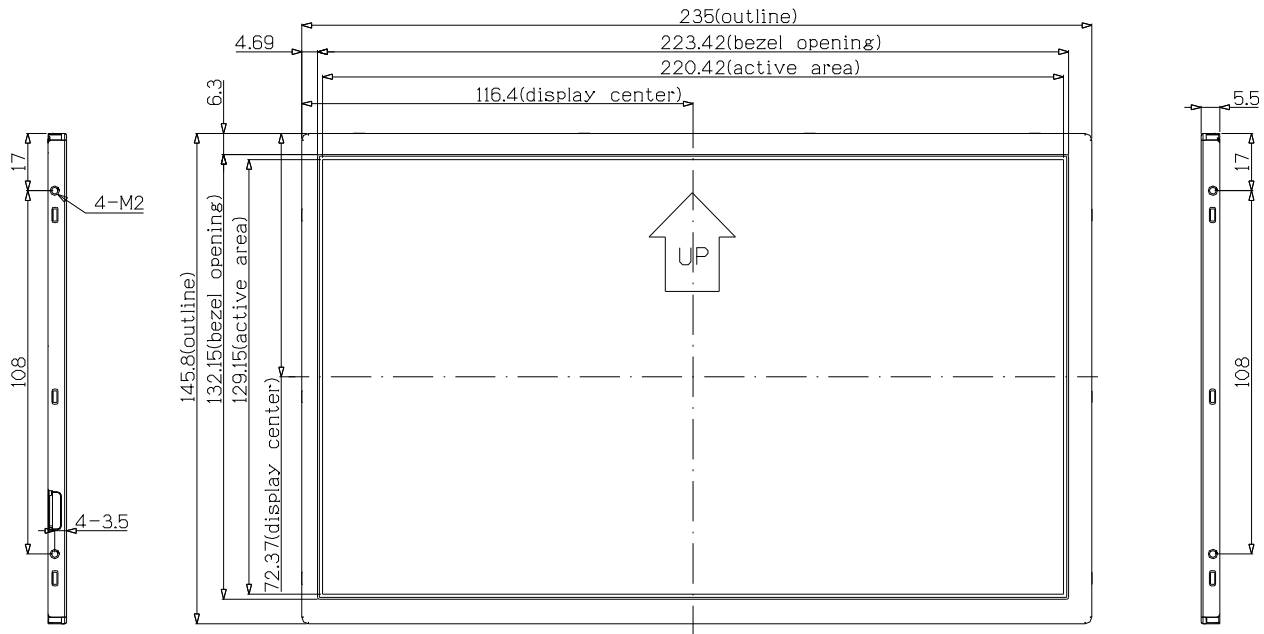
Note: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.



### 8.0 OUTLINE DIMENSION

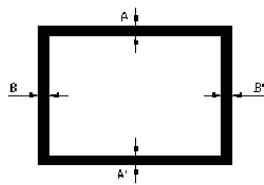
#### 8.1 Outline Dimension

Unit : mm



NOTE:

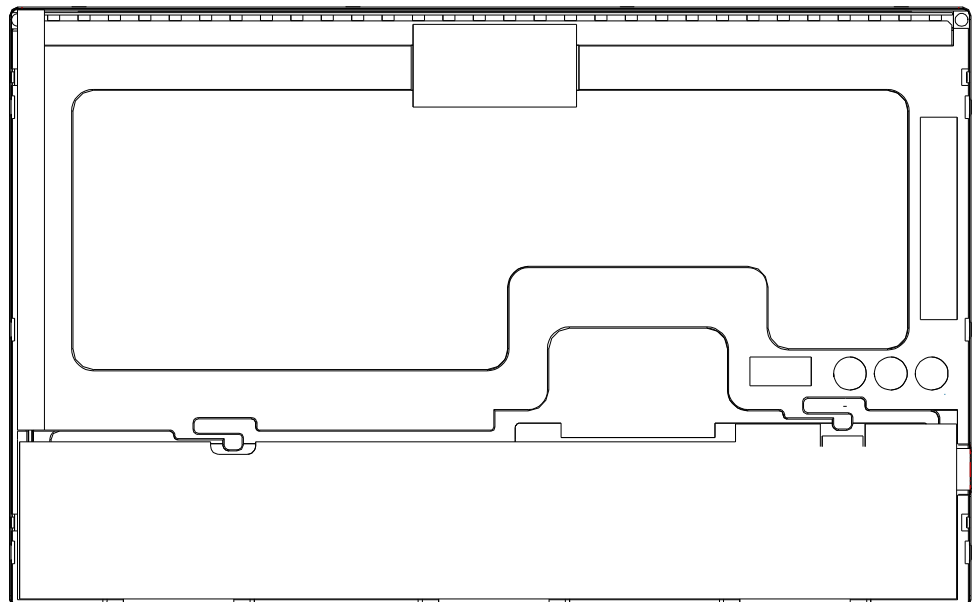
1. GENERAL TOLERANCE :  $\pm 0.3\text{mm}$ .
2. ALLOWED DEPTH OF USERHOLE SCREW INSERTION IS 1.5mm Max.
3. USERHOLE SCREW OF TORQUE = 2.0kgf/cm Max.



BM Assembly Tolerance

$|A-A'| \leq 1.0 \text{ (mm)}$

$|B-B'| \leq 1.0 \text{ (mm)}$



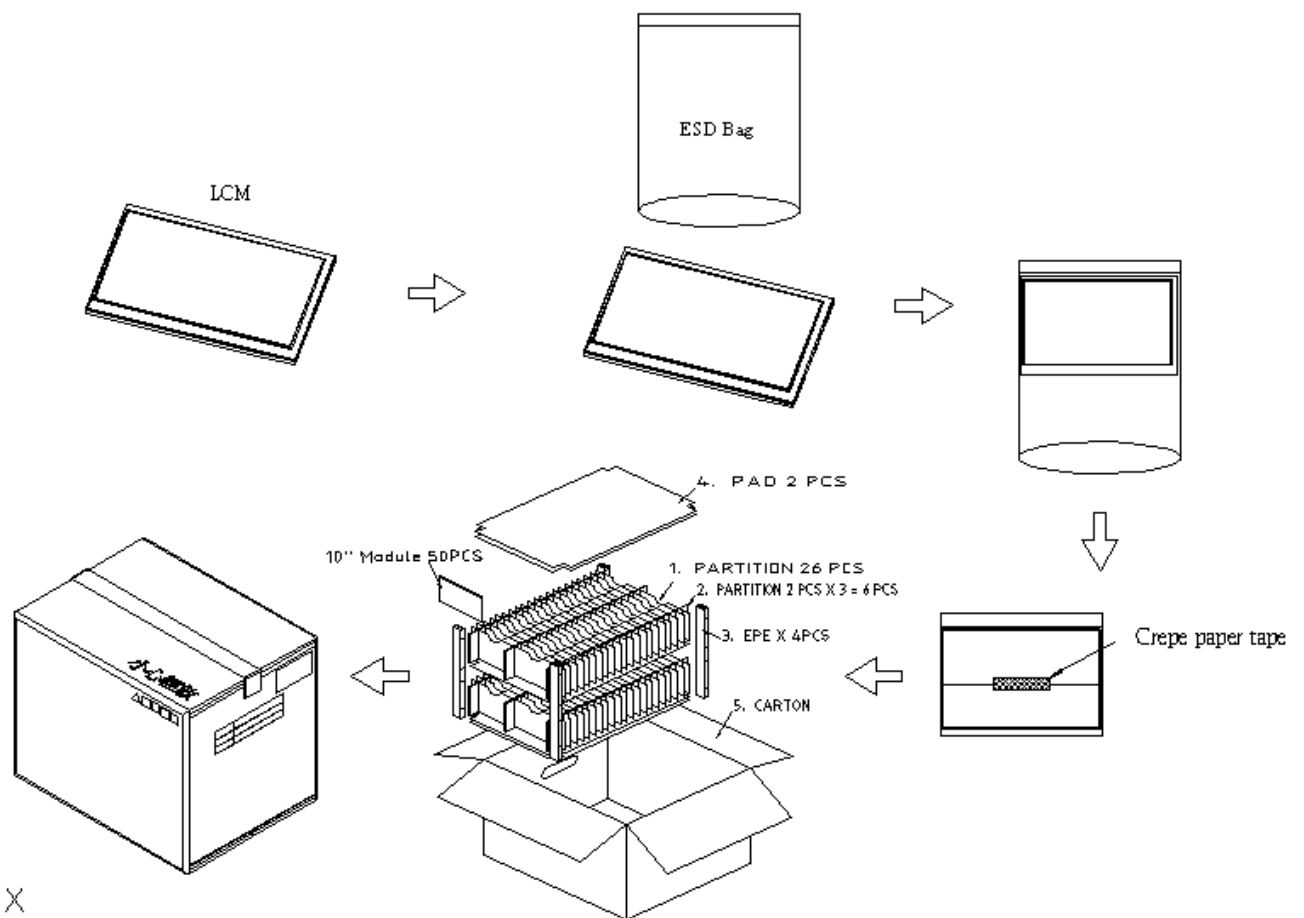


## 9.0 PACKAGE SPECIFICATION

### 9.1 Packing form

- (1) Package quantity in one carton: 30 pieces.
- (2) Carton size:  $460\pm 5$  mm $\times$  $361\pm 5$  mm $\times$  $321\pm 5$  mm.

### 9.2 Packing assembly drawings





## **10.0 GENERAL PRECAUTION**

### **10.1 Use Restriction**

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

### **10.2 Disassembling or Modification**

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. FORMIKE does not warrant the module, if customers disassemble or modify the module.

### **10.3 Breakage of LCD Panel**

10.3.1. If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

10.3.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.

10.3.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

10.3.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

### **10.4 Electric Shock**

10.4.1. Disconnect power supply before handling LCD module.

10.4.2. Do not pull or fold the LED cable.

10.4.3. Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

### **10.5 Absolute Maximum Ratings and Power Protection Circuit**

10.5.1. Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

10.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

10.5.3. It's recommended to employ protection circuit for power supply.

### **10.6 Operation**

10.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

10.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

10.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.



10.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

10.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

### **10.7 Mechanism**

Please mount LCD module by using mounting holes arranged in four corners tightly.

### **10.8 Static Electricity**

10.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

10.8.2 Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

### **10.9 Strong Light Exposure**

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

### **10.10 Disposal**

When disposing LCD module, obey the local environmental regulations.

**11.0 EDID Table**

Byte# (Decimal)	Byte# (HEX)	Field Name & Comments	Value (HEX)	Value (BIN)	Value (DEC)
0	0	Header	00	00000000	0
1	1	Header	FF	11111111	255
2	2	Header	FF	11111111	255
3	3	Header	FF	11111111	255
4	4	Header	FF	11111111	255
5	5	Header	FF	11111111	255
6	6	Header	FF	11111111	255
7	7	Header	00	00000000	0
8	8	EISA Manufacture Code LSB (3 character ID = HSD)	22	00100010	34
9	9	Compressed ASCII	64	01100100	100
10	0A	Product Code "1001"	E9	11101001	233
11	0B	Hex, LSB first	03	00000011	3
12	0C	LCD module Serial No - Preferred but Optional	00	00000000	0
13	0D	LCD module Serial No - Preferred but Optional	00	00000000	0
14	0E	LCD module Serial No – Preferred but Optional	00	00000000	0
15	0F	LCD module Serial No – Preferred but Optional	00	00000000	0
16	10	Week of manufacture=18	12	00010010	18
17	11	Year of manufacture = 2008	12	00010010	18
18	12	EDID Structure Version # = 1	01	00000001	1
19	13	EDID revision # = 3	03	00000011	3
20	14	Video input definition = Digital input, CRGB	80	10000000	128
21	15	Max H image size = 22cm	16	00010110	22
22	16	Max V image size = 13cm	0D	00001101	13
23	17	Display Gamma = 2.2	78	01111000	120
24	18	Feature support (DPMS) = Active off, RGB color	0A	00001010	10
25	19	Red/green low bits (10000110)	86	10000110	134
26	1A	Blue/white low bits (00100110)	26	00100110	38
27	1B	Red x , Red x = 0.58	94	10010100	148
28	1C	Red y , Red y = 0.34	57	01010111	87
29	1D	Green x , Green x = 0.317	51	01010001	81
30	1E	Green y , Green y = 0.564	90	10010000	144
31	1F	Blue x , Blue x = 0.152	27	00100111	39



Byte# (Decimal)	Byte# (HEX)	Field Name & Comments	Value (HEX)	Value (BIN)	Value (DEC)
32	20	Blue y , Blue y = 0.131	21	00100001	33
33	21	White x , White x = 0.31	4F	01001111	79
34	22	White y , White y = 0.33	54	01010100	84
35	23	Established timing 1	00	00000000	0
36	24	Established timing 2	00	00000000	0
37	25	Manufacturer's timings	00	00000000	0
38	26	Standard timing #1 was not used	01	00000001	1
39	27		01	00000001	1
40	28	Standard timing #2 was not used	01	00000001	1
41	29		01	00000001	1
42	2A	Standard timing #3 was not used	01	00000001	1
43	2B		01	00000001	1
44	2C	Standard timing #4 was not used	01	00000001	1
45	2D		01	00000001	1
46	2E	Standard timing #5 was not used	01	00000001	1
47	2F		01	00000001	1
48	30	Standard timing #6 was not used	01	00000001	1
49	31		01	00000001	1
50	32	Standard timing #7 was not used	01	00000001	1
51	33		01	00000001	1
52	34	Standard timing #8 was not used	01	00000001	1
53	35		01	00000001	1
54	36	Detailed timing/monitor (descriptor #1)	94	10010100	148
55	37	1024x600 @60Hz: Pixel Clock = 45 MHz	11	00010001	17
56	38	Horizontal active=1024 pixels (L8b)	00	00000000	0
57	39	Horizontal blanking= 176 pixels (L8b)	B0	10110000	176
58	3A	HA (U4b): HB (U4b)	40	01010000	64
59	3B	Vertical active=600 lines (L8b)	58	01011000	88
60	3C	Vertical blanking= 25 lines (L8b)	19	00011001	25
61	3D	HA (U4b): HB (U4b)	20	00100000	32
62	3E	H sync. Offset= 53 pixels	35	00110101	53
63	3F	H sync. Width= 35 pixels	23	00100011	35





Byte# (Decimal)	Byte# (HEX)	Field Name & Comments	Value (HEX)	Value (BIN)	Value (DEC)
64	40	V sync. Offset= 4 lines	45	01000101	69
65	41	V sync. Width= 5 lines	00	00000000	0
66	42	H image size = 220 mm (L8b)	DC	11011100	220
67	43	V image size = 129 mm (L8b)	81	10000001	129
68	44	Horizontal Image (U4b): Vertical Image (U4b)	00	00000000	0
69	45	No Horizontal Border=0	00	00000000	0
70	46	No Vertical Border=0	00	00000000	0
71	47	Non-interlaced, Normal display, No stereo, Digital separate sync, H/V pol Negatives	19	00011000	25
72	48	Detailed timing/monitor (descriptor #2)	16	00010110	22
73	49	1024x600 @65Hz: Pixel Clock = 51.42 MHz	14	00010100	20
74	4A	Horizontal active=1024 pixels (L8b)	00	00000000	0
75	4B	Horizontal blanking=216pixels (L8b)	D8	11011000	216
76	4C	HA (U4b): HB (U4b)	40	01000000	64
77	4D	Vertical active=600 lines (L8b)	58	01011000	88
78	4E	Vertical blanking= 38 lines (L8b)	26	00100110	38
79	4F	HA (U4b): HB (U4b)	20	00100000	32
80	50	H sync. Offset= 93 pixels	5D	01011101	93
81	51	H sync. Width= 35 pixels	23	00100011	35
82	52	V sync. Offset= 17lines	15	00010101	21
83	53	V sync. Width=5 lines	04	00000100	4
84	54	H image size = 220 mm (L8b)	DC	11011100	220
85	55	V image size = 129 mm (L8b)	81	10000001	129
86	56	Horizontal Image (U4b): Vertical Image (U4b)	00	00000000	0
87	57	No Horizontal Border=0	00	00000000	0
88	58	No Vertical Border=0	00	00000000	0
89	59	EDID Module revision	00	00000000	0
90	5A	Flag	00	00000000	0
91	5B	Flag	00	00000000	0
92	5C	Flag	00	00000000	0
93	5D	Dummy Descriptor	FE	11111110	254
94	5E	Flag	00	00000000	0
95	5F	PC Maker P/N 1 <sup>st</sup> Character =M	00	00000000	0



Byte# (Decimal)	Byte# (HEX)	Field Name & Comments	Value (HEX)	Value (BIN)	Value (DEC)
96	60	PC Maker P/N 2 <sup>nd</sup> Character =3	00	00000000	0
97	61	PC Maker P/N 3 <sup>rd</sup> Character =4	00	00000000	0
98	62	PC Maker P/N 4 <sup>th</sup> Character =9	00	00000000	0
99	63	PC Maker P/N 5 <sup>th</sup> Character =5	00	00000000	0
100	64	LCD Supplier EEDID Revision # =1.0	00	00000000	0
101	65	Manufacturer P/N = 1	00	00000000	0
102	66	Manufacturer P/N = 5	00	00000000	0
103	67	Manufacturer P/N = P	00	00000000	0
104	68	Manufacturer P/N = X	00	00000000	0
105	69	Manufacturer P/N = 1	00	00000000	0
106	6A	Manufacturer P/N = 4	00	00000000	0
107	6B	Manufacturer P/N(If <13char, then terminate with ASCII code, set remaining=20h)	00	00000000	0
108	6C	Flag	00	00000000	0
109	6D	Flag	00	00000000	0
110	6E	Flag	00	00000000	0
111	6F	Data Type Tag	FE	11111110	254
112	70	Flag	00	00000000	0
113	71	SMBUS Value = 20 nit	00	00000000	0
114	72	SMBUS Value = 28 nit	00	00000000	0
115	73	SMBUS Value = 40 nit	00	00000000	0
116	74	SMBUS Value = 56 nit	00	00000000	0
117	75	SMBUS Value = 79 nit	00	00000000	0
118	76	SMBUS Value = 111 nit	00	00000000	0
119	77	SMBUS Value = 156 nit	00	00000000	0
120	78	SMBUS Value = max nit	00	00000000	0
121	79	Number of LVDS channels=1	01	00000001	1
122	7A	Panel Self Test (00-Not Present, 01-Present)	00	00000000	0
123	7B	(If<13 char, then terminate with ASCII code 0Ah,set remaining char=20h)	00	00000000	0
124	7C	(If<13 char, then terminate with ASCII code 0Ah,set remaining char=20h)	00	00000000	0
125	7D	(If<13 char, then terminate with ASCII code 0Ah,set remaining char=20h)	00	00000000	0
126	7E	Extension Flag = 00	00	00000000	0
127	7F	Checksum	C8	11001000	200

Note: 1. Checksum will be changed according to LCD module Serial No (HEX Byte 0C~0F) 、 Week of manufacture (HEX Byte 10) 、 Year of manufacture (HEX Byte 11) changed.