

億力光電股份有限公司

EVERVISION ELECTRONICS CO., LTD.

Product Specification For LCD Module

(KVPF-7B-002-16)

Model NO. : VGG644804-6UFLWA(RoHS)

REVISION : 2

APPROVAL FOR SPECIFICATIONS ONLY

APPROVAL FOR SPECIFICATIONS AND SAMPLE

CUSTOMER :

STD.

APPROVED BY :

EVERVISION LCM R&D CENTER

APPROVED BY

[Handwritten Signature]
ZE
[Handwritten Signature]

DIRECTOR

CHECKED BY

[Handwritten Signature]
張乃元 8/5/08

MANAGER

PREPARED BY

[Handwritten Signature]
楊材成 8/5/08

Mechanism Engineer

[Handwritten Signature]
呂青溪 8/5/08

Electronic Engineer

億力光電股份有限公司總公司
EVERVISION ELECTRONICS LTD.
台北縣中和市建一路 186 號 12 樓
12F, NO. 186, JIAN 1st RD., CHUNG HO CITY,
TAIPEI HSIEN, TAIWAN, R.O.C
TEL : +886 2 8227-2788
FAX : +886 2 8227-2789

億力光電股份有限公司台中分公司
EVERVISION ELECTRONICS(T.C) LTD.
台中縣潭子鄉台中加工出口區建國路 19 號
NO. 19, CHIEN KUO ROAD, T.E.P.Z TANTZE
427 TAICHUNG HSIEN TAIWAN R.O.C
TEL : +886 4 2532-8889
FAX : +886 4 2532-6689

東莞莞城德寶電子廠
EVERVISION ELECTRONICS(B.V.I) LTD.
廣東省東莞市城區東縱大道天寶路 9 號
NO.9, Tian Bao Rd., Dong Zong St., Dong Guan City
Guang Dong, China.
TEL : +86 769 2220 5258
FAX : +86 769 2220 7258

勁佳光電(昆山)有限公司
EVERVISION ELECTRONICS(KUNSHAN) LTD.
江蘇省昆山市玉山鎮高科技工業園城北路 8 號
NO.8, Chengbei Rd., Hi-Tech Industry Park,
Yushan Town, Kunshan City, Jiangsu, China.
TEL : +86 512 5778 7288
FAX : +86 512 5777 0688

<http://www.evervisionlcd.com>

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	2

1. Table of Contents

No.	Contents	Page
1	Table of Contents	2
2	Record of Revisions	3
3	Module Numbering System	4
4	Application	5
5	Features	5
6	General Specifications	5
7	Absolute Maximum Ratings	6
8	Electrical Characteristics	7
9	Block Diagram	8
10	Input / Output Terminals Pin Assignment	11
11	Interface Timing	12
12	Optical Characteristics	16
13	Reliability Test	19
14	Packaging	20
15	Precautions	21
16	Outline Drawing	22
17	Definition of Labels	23
18	Incoming Inspection Standards	25

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	4

3. Module Numbering System

V G G 6448 04 - 6 U F L W A

Serial No.: A~Z

Backlight Color:

N: Without Backlight;
A: Amber; **B:** Blue; **G:** Green;
L: Yellow; **O:** Orange; **R:** Red;
W: White; **Y:** YellowGreen;
X: Others

Backlight Type:

N: Without Backlight; **E:** EL; **F:** CCFL;
L: General LED; **H:** High NTSC LED ;
R: RGB LED; **X:** Others

LCD Model:

T: TN; **H:** HTN; **G:** STN Gray; **Y:** STN Yellow;
B: STN Blue; **W:** FSTN Black/White;
C: CSTN; **F:** TFT; **O:** OLED; **P:** PLED;
L: LTPS; **N:** Others

LCD Type:

R: Reflective/Positive;
S: Reflective/Negative ;
F: Transflective/Positive ;
G: Transflective/Negative ;
U: Transmissive/Positive ;
T: Transmissive/Negative ; **N:** Others

Temperature Range & View Direction:

General Purpose : **1:**6H **2:**12H **3:**3H **4:**9H **5:**Others
High Performance: **6:**6H **7:**12H **8:**3H **9:**9H **0:**Others

STD Product Serial No.: 01~99

Customer Made Serial No.: A1,A2... A9,B1,B2... B9,C1..

Display Function:

Segment Number / Characters Lines / Column and Row Dots
/ Length * Width of Other

Display Type:

C:Character Type; **G:**Graphic Type; **S:**Segment Type; **O:**Other

Package Type:

B:COB; **F:**COF; **G:**COG; **H:**Heat Seal; **S:**SMT; **T:**TAB; **O:**Others

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	5

4. Application

This specification is applied to the 5.7 inch VGA supported TFT-LCD module, and can display true 262,144 colors(6 bit/ color). The module is designed for OA, Car TV application and other electronic products which require flat panel display of digital signal interface. This module is composed of a 5.7”TFT-LCD panel, a driver circuit and LED backlight unit.

5. Features

- VGA (640×480 pixels) resolution.
- LVDS Receiver 18 bit Interface
- Dot inversion mode with stripe type.

6. General Specifications

Item	Specifications	Unit
Screen Size	5.7 (Diagonal)	inch
Display Format	640RGB(H)×480(V)	dot
Active Area	115.2(H)×86.4(V)	mm
Dot Size	0.060(H)×0.180(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	TN Type Transmissive Mode Normally White	-
Surface Treatment	Anti-Glare and Hard Coating(3H)	-
Viewing Direction	6 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	144.0(W)×104.6(H)×13.0(D)	mm
LVDS Receiver IC	THine THC63LVDF84A	-
Weight	151	g

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	6

7. Absolute Maximum Ratings

7.1 Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-30	+80	°C	(1)
Operating Ambient Temperature	T _{OP}	-20	+70	°C	(1)

Note (1) Temperature and relative humidity range are shown in the figure below.

(a) 90%RH Max. ($T_a \leq 40^\circ\text{C}$).

(b) Wet-bulb temperature should be 39°C Max. ($T_a > 40^\circ\text{C}$).

(c) No condensation.

7.2 Electrical Absolute Ratings

7.2.1 TFT-LCD Module

($T_a = 25 \pm 2^\circ\text{C}$, GND = $V_{SS} = 0\text{V}$)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V _{CC}	-0.3	4.0	V	-
LVDS Driver Output Voltage	-	-0.3	V _{CC} + 0.3	V	-

7.2.2 Backlight Unit

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

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Current of Backlight Unit	I _B	-	250	mA	(1)
Reverse voltage	V _R	-	15	V	(1)

Note (1) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	7

8. Electrical Characteristics

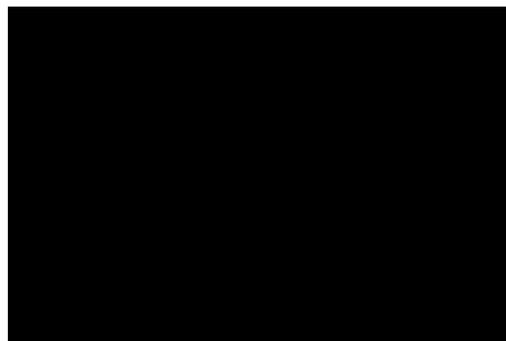
8.1 TFT-LCD Module

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V _{CC}	3.0	3.3	3.6	V	-
Power Supply Current	I _{CC}	-	225	315	mA	-
Differential Input High Threshold Voltage	V _{TH}	-	-	100	mV	-
Differential Input Low Threshold Voltage	V _{TL}	-100	-	-	mV	-
Power Consumption	P _L	-	(742.5)	1040	mW	(1)
Frame Frequency	F _V	-	60	-	Hz	-
Dot Clock	DCLK	-	25.175	-	MHz	-

Note (1) The specified power consumption is under the conditions at V_{CC}=3.3V, F_V=60Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern / 0 Gray



Active Area

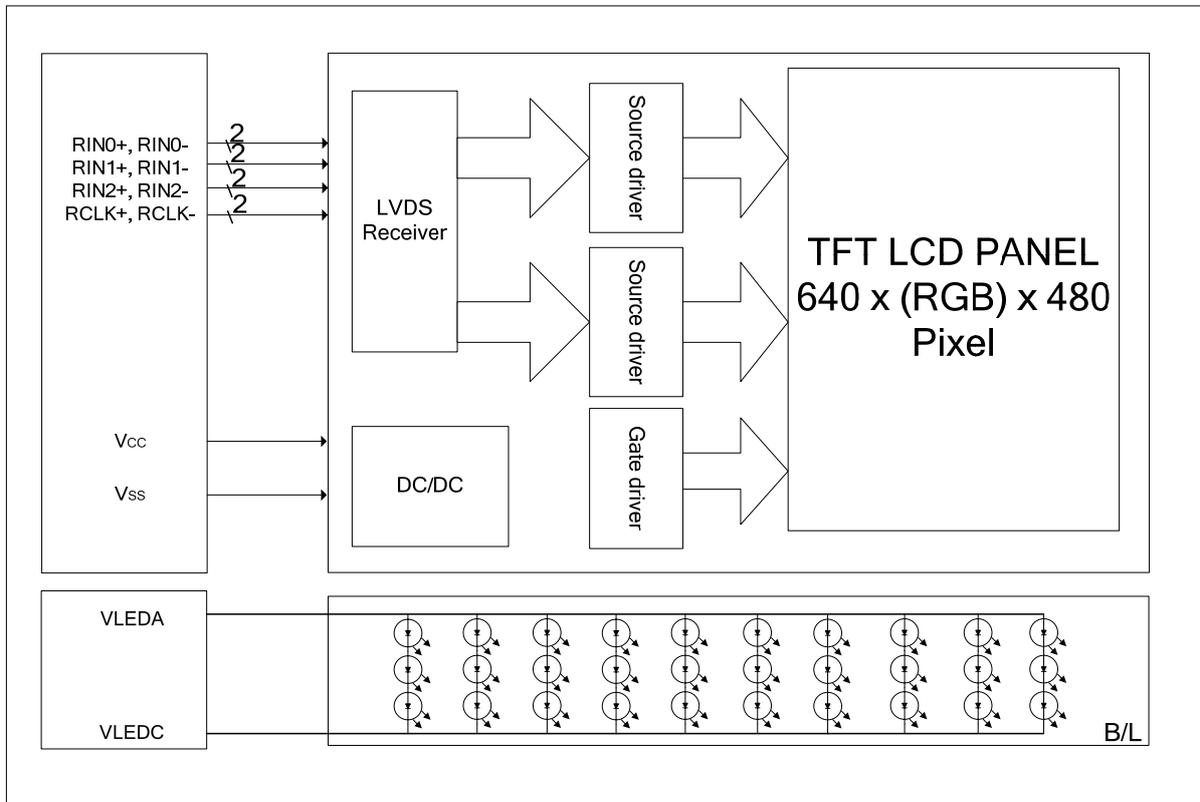
8.2 Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Current of Backlight Unit	I _B	-	200	-	mA	-
Voltage of Backlight Unit	V _B	-	9.9	-	V	I _B =200mA
Power Consumption	P _{BL}	-	(1.98)	-	W	I _B =200mA

9. Block Diagram

9.1 TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment

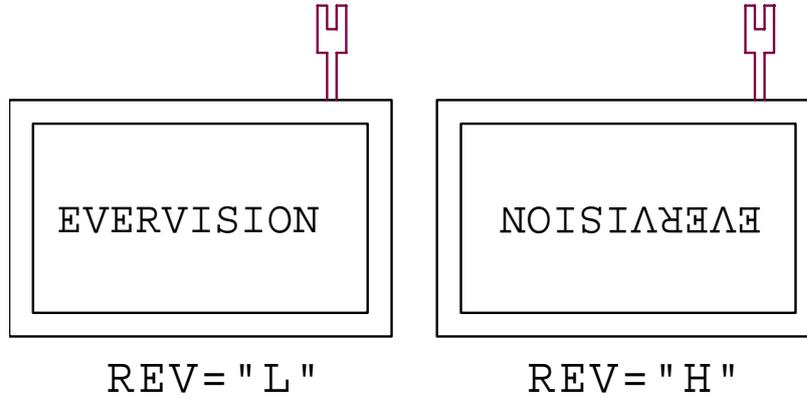
10.1 TFT-LCD Module

Connector: HIROSE DF19G-20P-1H

Pin No.	Symbol	I/O	Description
1	V _{CC}	I	+3.3V power supply
2	V _{CC}	I	+3.3V power supply
3	V _{SS}	I	Ground
4	V _{SS}	I	Ground
5	RIN0-	I	Negative LVDS differential data input
6	RIN0+	I	Positive LVDS differential data input
7	V _{SS}	I	Ground
8	RIN1-	I	Negative LVDS differential data input
9	RIN1+	I	Positive LVDS differential data input
10	V _{SS}	I	Ground
11	RIN2-	I	Negative LVDS differential data input
12	RIN2+	I	Positive LVDS differential data input
13	V _{SS}	I	Ground
14	RCLK-	I	Negative LVDS differential clock input
15	RCLK+	I	Positive LVDS differential clock input
16	V _{SS}	I	Ground
17	NC	I	Not connection
18	NC	I	Not connection
19	REV	I	Selection signal for horizontal/ vertical scanning direction. Note (1)
20	V _{SS}	I	Ground

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	10

Note (1)



10.2 Backlight Unit

Connector: JST BHSR-02VS-1(N)

Pin No.	Symbol	I/O	Description	Wire Color
1	VLEDA	I	Backlight LED Anode.	Red
2	VLEDC	I	Backlight LED Cathode.	Black

10.3 Color Data Input Assignment

The brightness of each primary color(red, green and blue) is based on the 6 bit gray scale data input for the color. The higher the binary input, the brighter the color. The table provides the assignment of color versus data input.

Color		Data Signal																	
		Red						Green						Blue					
		D05	D04	D03	D02	D01	D00	D15	D14	D13	D12	D11	D10	D25	D24	D23	D22	D21	D20
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	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
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	0	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	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
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	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	12

11. Interface Timing

11.1 Input Signal Characteristics

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
HS setup time	T_{hst}	10	-	-	ns
HS hold time	T_{hhd}	10	-	-	ns
VS setup time	T_{vst}	10	-	-	ns
VS hold time	T_{vhd}	10	-	-	ns
Data setup time	T_{dsu}	10	-	-	ns
Data hold time	T_{dhd}	10	-	-	ns
DEN setup time	T_{esu}	10	-	-	ns
VS falling to HS falling time on odd field @ RGB mode	T_{HV_O}	-4	0	+4	T_{CPH}
VS falling to HS falling time on even field @ RGB mode	T_{HV_E}	0.4	0.5	0.6	T_H

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
CLK frequency	F_{CPH}	-	25.175	-	MHz
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-DEN time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when $STHD[5:0]=00000$)

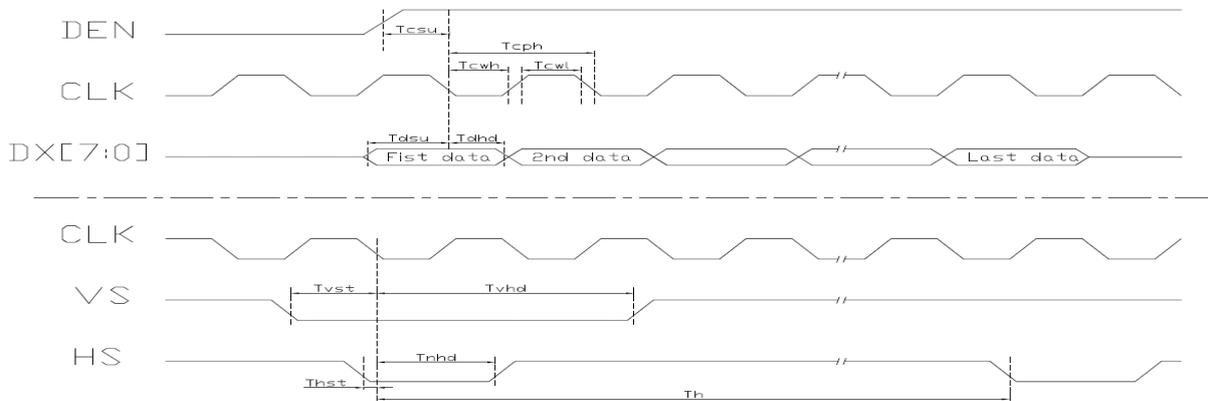
EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	13

11.2 LVDS Switching Characteristics

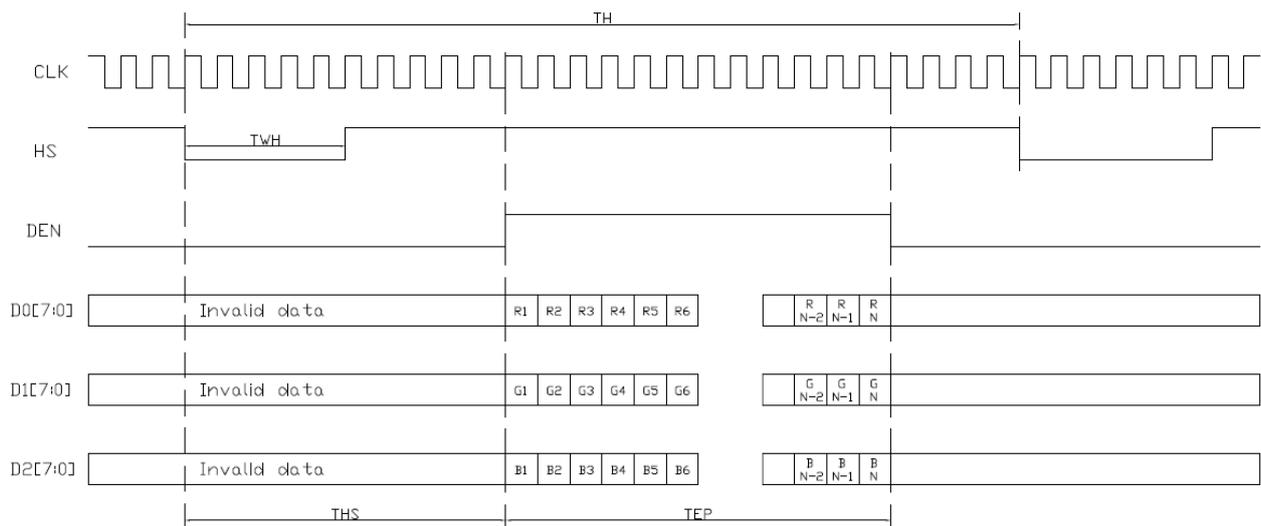
Symbol	Parameter	Min.	Typ.	Max.	Unit	
t _{RCP}	CLK OUT Period	VCC = 3.0 - 3.6V	11.76	T	50.0	ns
		VCC = 2.5 - 3.6V	14.28	T	50.0	ns
t _{RCH}	CLK OUT High Time		4T/7		ns	
t _{RCL}	CLK OUT Low Time		3T/7		ns	
t _{RCD}	RCLK +/- to CLK OUT Delay		5T/7		ns	
t _{RS}	TTL Data Setup to CLK OUT	0.35T-0.3			ns	
t _{RH}	TTL Data Hold from CLK OUT	0.45T-1.6			ns	
t _{TLH}	TTL Low to High Transition Time		2.0	3.0	ns	
t _{THL}	TTL High to Low Transition Time		1.8	3.0	ns	
t _{RIP1}	Input Data Position0 (T = 11.76ns)	-0.4	0.0	0.4	ns	
t _{RIP0}	Input Data Position1 (T = 11.76ns)	T/7-0.4	T/7	T/7+0.4	ns	
t _{RIP6}	Input Data Position2 (T = 11.76ns)	2T/7-0.4	2T/7	2T/7+0.4	ns	
t _{RIP5}	Input Data Position3 (T = 11.76ns)	3T/7-0.4	3T/7	3T/7+0.4	ns	
t _{RIP4}	Input Data Position4 (T = 11.76ns)	4T/7-0.4	4T/7	4T/7+0.4	ns	
t _{RIP3}	Input Data Position5 (T = 11.76ns)	5T/7-0.4	5T/7	5T/7+0.4	ns	
t _{RIP2}	Input Data Position6 (T = 11.76ns)	6T/7-0.4	6T/7	6T/7+0.4	ns	
t _{RPLL}	Phase Lock Loop Set			10.0	ms	

11.2 Waveform

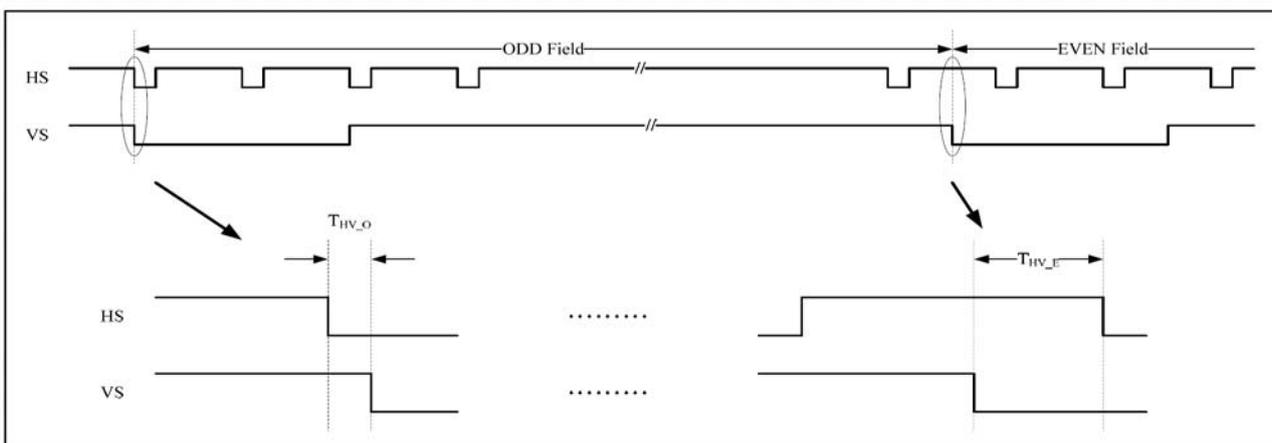
11.2.1 Clock and Data input waveforms



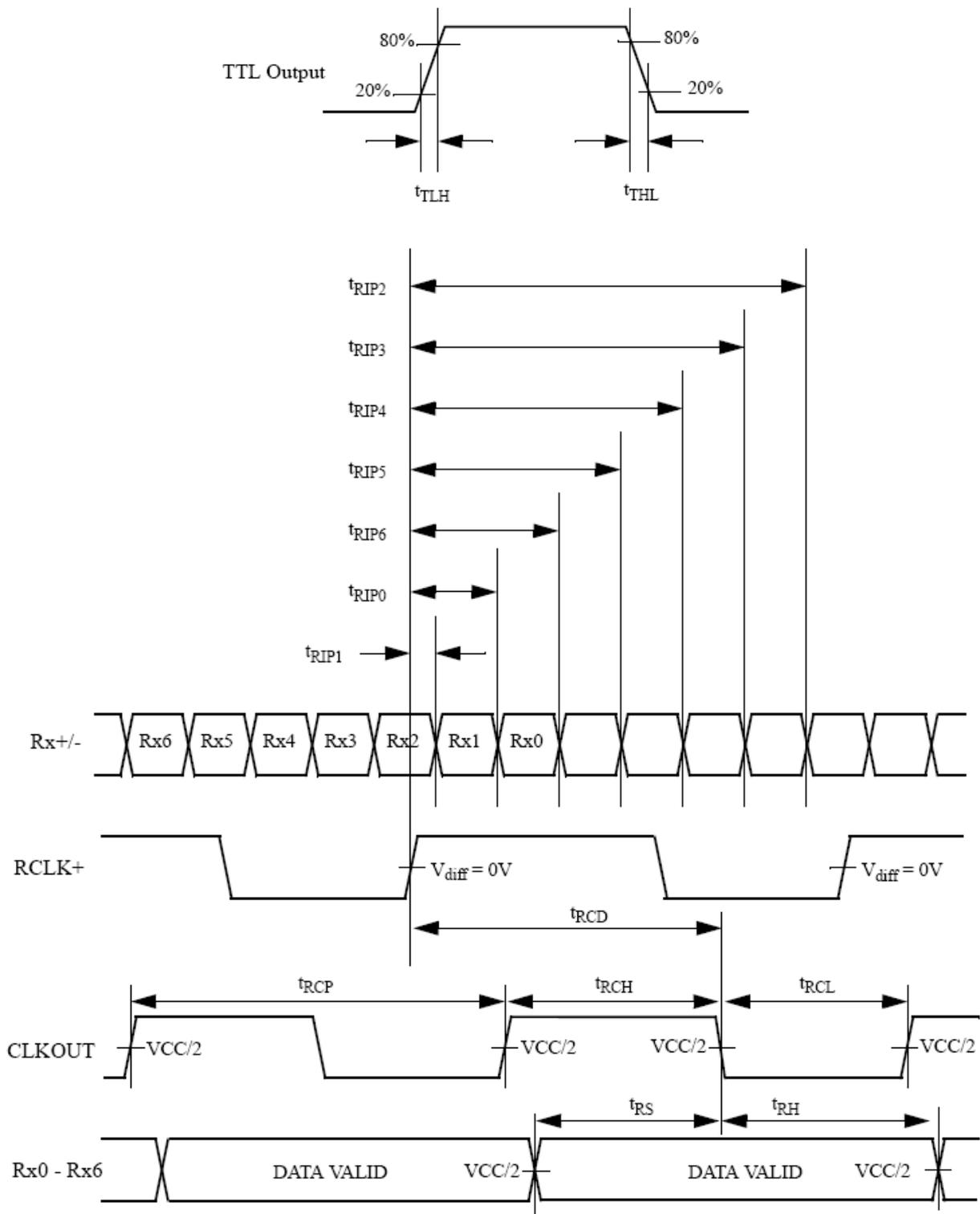
11.2.2 Data input format for RGB Mode



11.2.3 The HS & VS timing of the ODD/EVEN field.



11.2.4 LVDS AC Timing



Note:

1) $V_{diff} = (RA+) - (RA-), \dots, (RCLK+) - (RCLK-)$

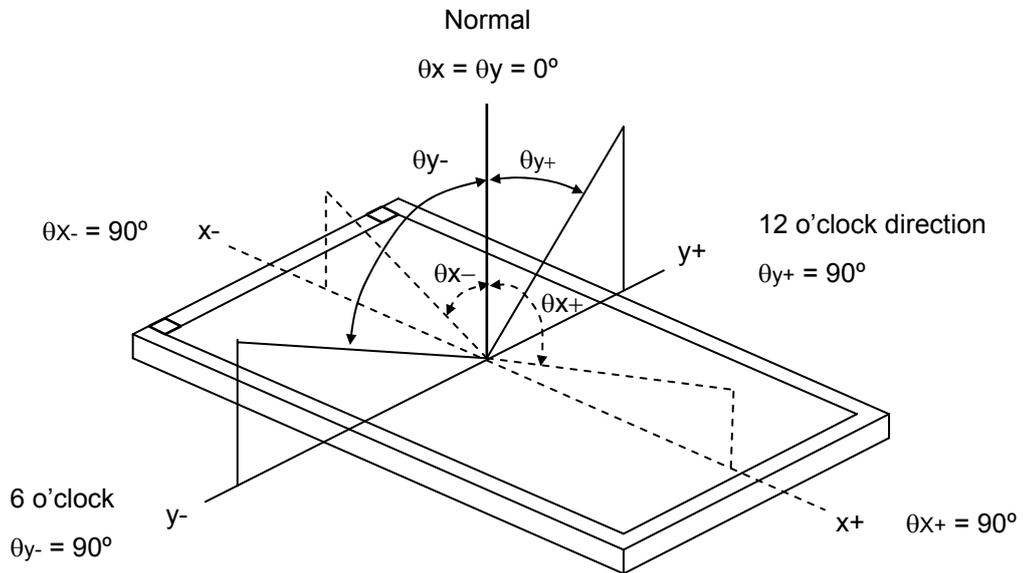
EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	16

12. Optical Characteristics

The optical characteristics should be measured in a dark environment (≤ 1 lux) or equivalent state with the methods shown in Note (4).

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	200	(350)	-	-	(2)
Response Time		T_R		-	15	-	ms	(3)
		T_F		-	35	-	ms	
Luminance(Center)		Y		620	(700)	-	cd/m ²	(4)
Brightness uniformity		BUNI		80	(85)	-	%	(5)
Color Chromaticity	Red	Rx		0.550	0.600	0.650	-	(1),(4)
		Ry		0.300	0.350	0.400	-	
	Green	Gx		0.270	0.320	0.370	-	
		Gy	0.500	0.550	0.600	-		
	Blue	Bx	0.090	0.140	0.190	-		
		By	0.100	0.150	0.200	-		
	White	Wx	0.280	0.320	0.380	-		
		Wy	0.330	0.380	0.430	-		
Viewing Angle	Horizontal	θ_{x+}	CR \geq 10	55	65	-	deg.	
		θ_{x-}		55	65	-		
	Vertical	θ_{y+}		45	55	-		
		θ_{y-}		55	65	-		

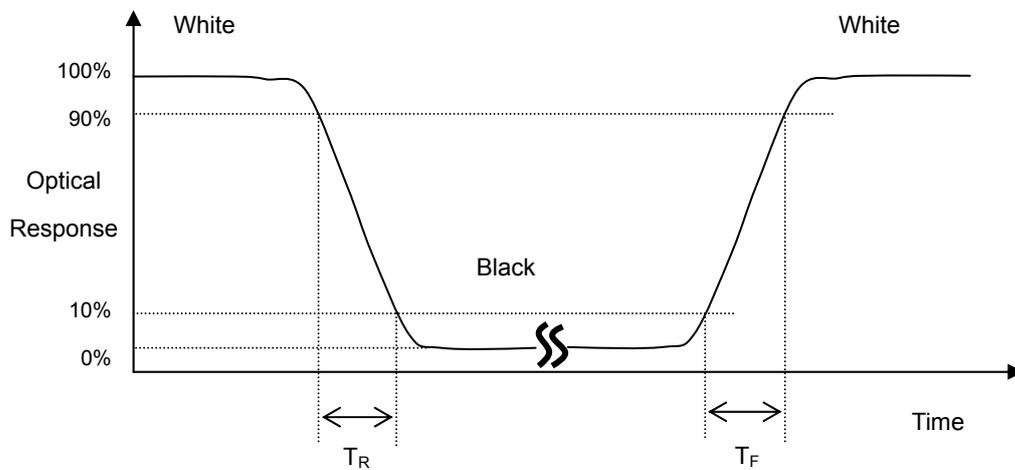
Note (1) Definition of Viewing Angle (θ_x , θ_y):



Note (2) Definition of Contrast Ratio (CR):

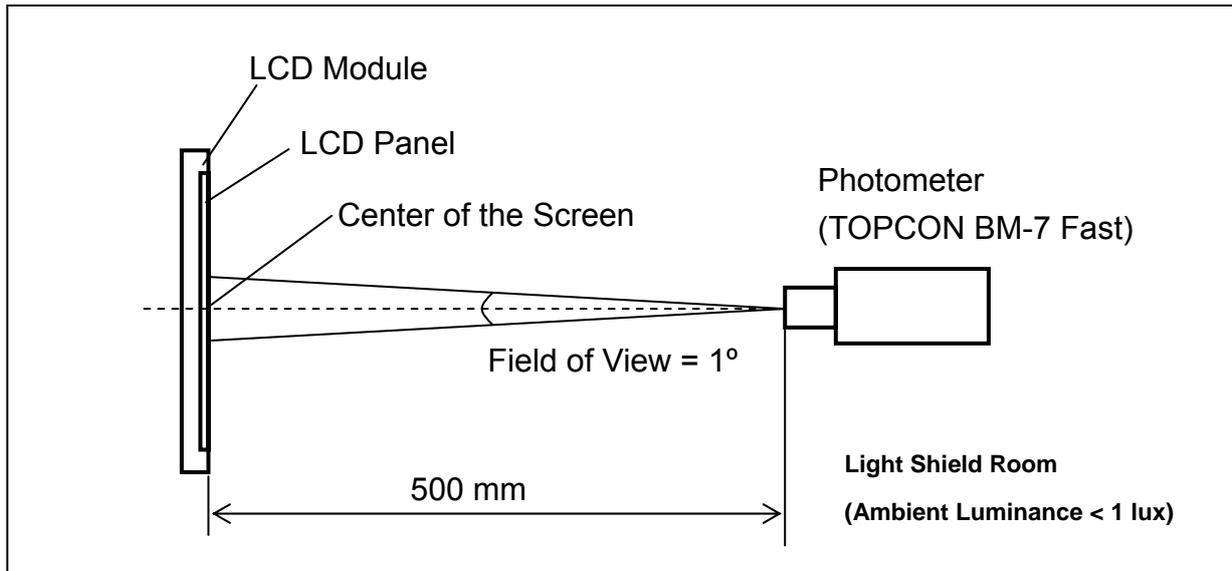
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note (3) Definition of Response Time (T_R , T_F):



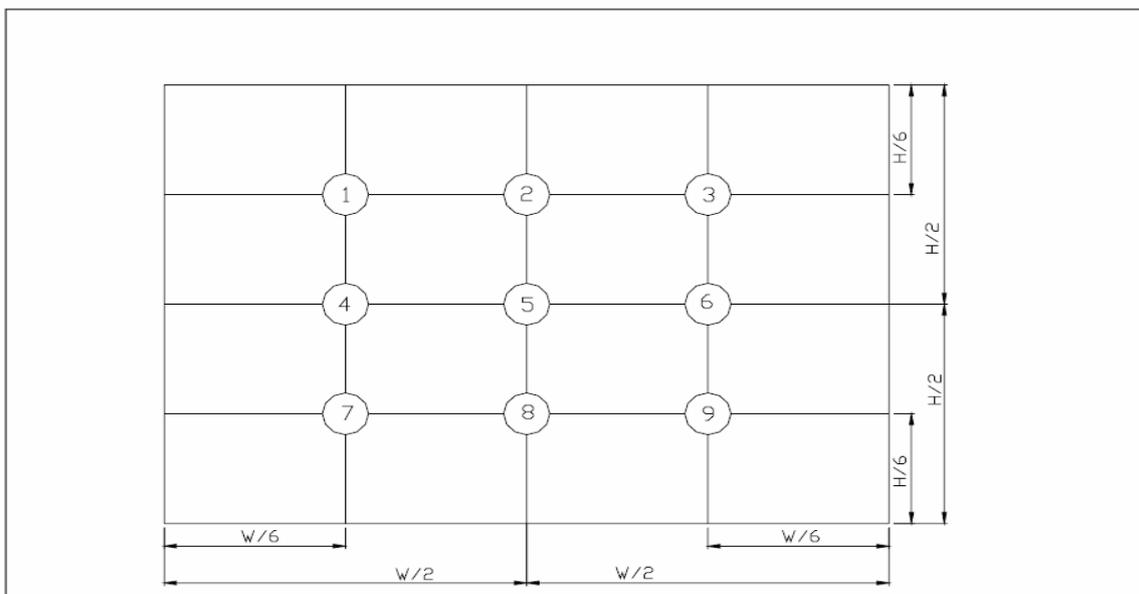
Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (5) Definition of brightness uniformity

Brightness uniformity=(Min Luminance of 9 points)/(Max Luminance of 9 points)×100%



(單位 : mm)

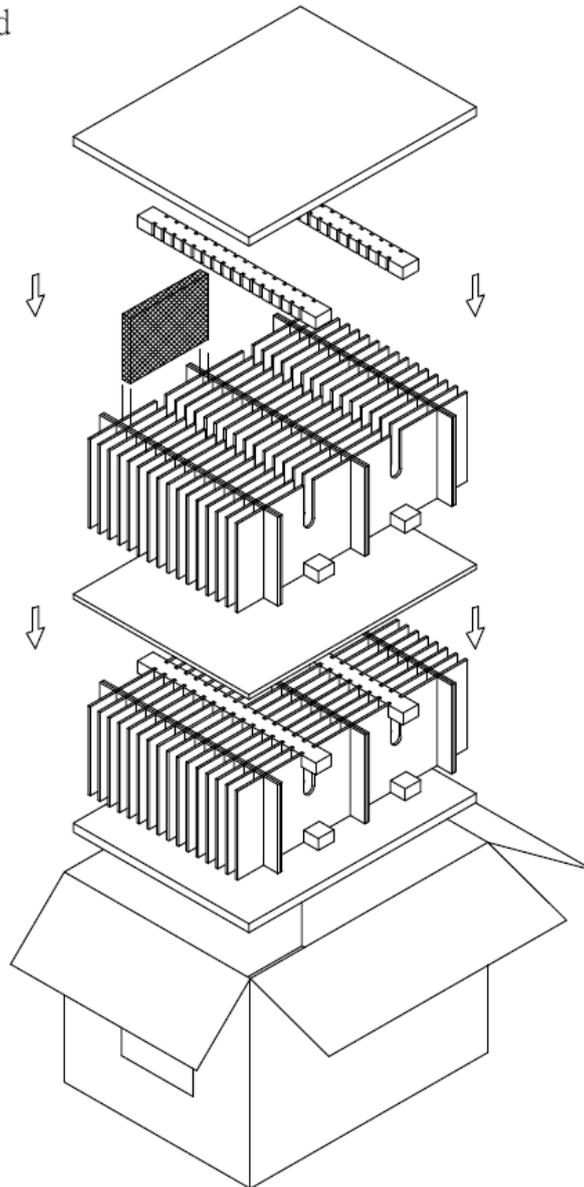
EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	19

13. Reliability Test

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	T _a = 80°C 240 hours	-
2	Low Temperature Storage Test	T _a = -30°C 240 hours	-
3	High Temperature Operation Test	T _a = 70°C 240 hours	-
4	Low Temperature Operation Test	T _a = -20°C 240 hours	-
5	High Temperature and High Humidity Operation Test	T _a =60°C 90%RH 240 hours	-
6	Electro Static Discharge Test (non-operating)	-Panel Surface/Top Case : 150pF, 330Ω Air: ±15kV, Contact: ±8kV	-
7	Mechanical Shock Test (non-operating)	Half sine wave, 80G, 11ms 3 times shock of each six surfaces	-
8	Vibration Test (non-operating)	Sine wave, 10 ~ 55 ~ 10Hz, 3 axis, 2 hours/axis	-
9	Thermal Shock Test (non-operating)	-20°C (30min) ~ 70°C (30min), 100 cycles	-
10	Drop Test(with Carton)	Height: 80cm 1 corner, 3 edges, 6 surfaces	-

14. Packaging

Packing Method



PARTS LIST					
	ITEM	SIZE(LxWxH) unit:mm	MATERIAL	Q.T.Y	NOTE
1	STATIC SHIEDING BAGS	200.0x145.0*0.09		60	
2	PU FOAM	440.0x340.0x15.0	SPONGE	2	
3	EPE PAD	345.0x30.0x20.0		8	
4	CARD BOARD	345.0x150.0x3.5	CARTON	12	
5	CARD BOARD	445.0x150.0x3.5	CARTON	32	
6	CARD BOARD	440.0x340.0x8.0	CARTON	1	
7	EXTERNAL BOX	460.0x360.0x355.0	CARTON	1	
8	PRODUCT	144.0x104.6x13.0		60	

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	21

15. Precautions

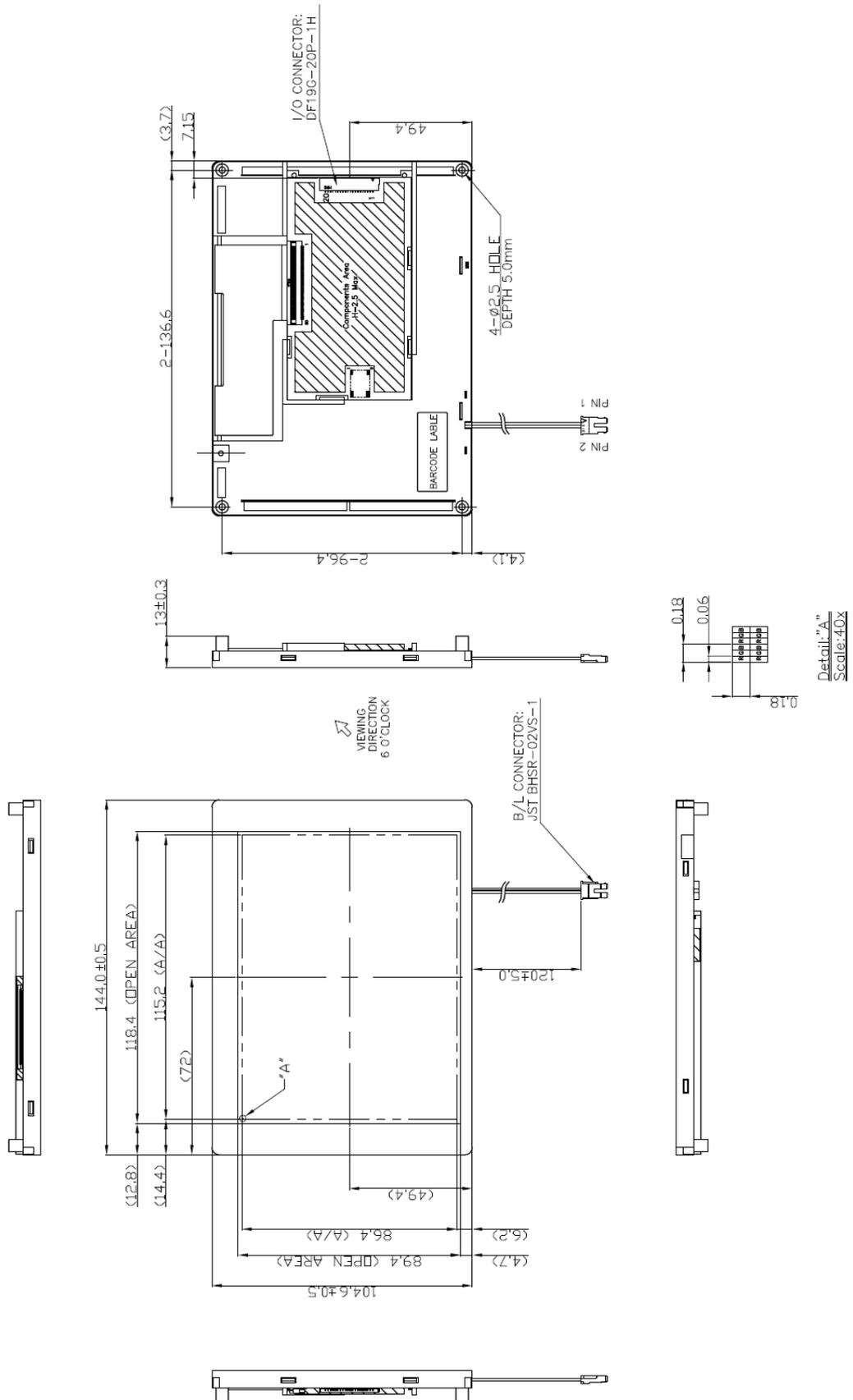
15.1 Assembly and Handling Precautions

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It's recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) Don't apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD module in the specified storage conditions.
- (10) When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow.

15.2 Safety Precautions

- (1) 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, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the module's end of life, it is not harmful in case of normal operation and storage.

16.Outline Drawing



EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	23

17. Definition of Labels

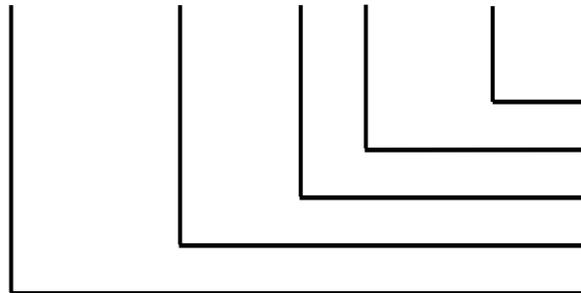
The bar code nameplate is pasted on each module as illustration, and its definitions are as following explanation.



(a) Module Name: VGG644804-6UFLWA

(b) Serial ID:

A B C D E F G H I J K L M



Serial No.
Revision Code
Factory Code
Manufactured Date
Screen Size

Serial ID includes the information as below:

(a) Screen size (Diagonal): Inch Code (ABCD)

3.5" → 0350

10.4" → 1040

(b) Manufactured Date: Year, Month, Day (EFG)

Year (E)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Mark	0	1	2	3	4	5	6	7	8	9

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	24

Month (F)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	A	B	C

Day (G)

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mark	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Mark	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	

(c) Factory Code (H):

For EVERVISION internal use.

(d) Revision Code (I):

Cover all the change, for example: 1: Rev.1, 2: Rev.2, 3: Rev.3...etc.

(e) Serial No. (JKLM):

Manufacturing sequence of product, for example: 0001~9999.

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	25

18. Incoming Inspection Standards

18.1 The environmental condition of inspection

The environmental condition and visual inspection shall be conducted as below.

- (1) Ambient temperature $25 \pm 5^{\circ}\text{C}$
- (2) Humidity: $60 \pm 5\%$ RH
- (3) Viewing distance is approximately 35 ~ 40 cm
- (4) Viewing angle is normal to the LCD panel as Fig _1(10°)
- (5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection

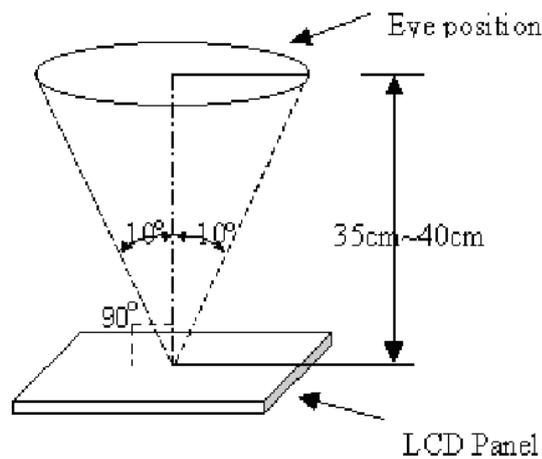


Fig _ 1

18.2 The defects classify of AQL as following:

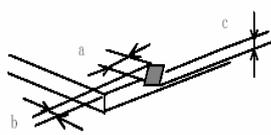
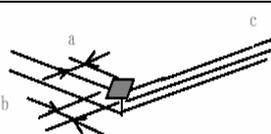
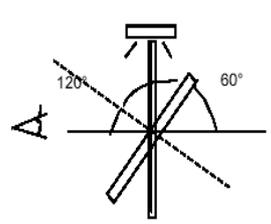
Class of defects	AQL	Definition
Major	0.65%	It is defect that is likely to result in failure or to reduce materially the usability of the intended function.
Minor	1.5%	It is a defect that will not result in functioning problem with deviation classified.

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	26

18.3 Inspection Parameters

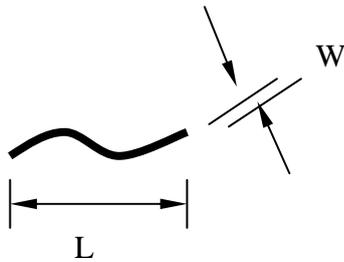
Item		Specification/Description			Note	
Display	Function	No Display			-	
		Malfunction			-	
Operating	Contrast ratio	Out of Spec			-	
	Line defect	No obvious Vertical and Horizontal line defect in bright , dark and colored.			-	
	Point Defect (red,green,blue,dark, white)	Item	Acceptable number			Note: 1、4、5、6
			A	B	Total	
		BRIGHT DOT	$N \leq 2$	$N \leq 2$	$N \leq 7$	
		DARK DOT	$N \leq 3$	$N \leq 4$		
		TOTAL DOT	$N \leq 4$	$N \leq 5$		
TWO ADJACENT DOT	NOT ALLOWED					
THREE OR MORE ADJACENT DOT	NOT ALLOWED					
External Inspection (non-operating)	Scratch on the polarizer	L(mm)		W(mm)	Acceptable number	
		$L \leq 2.5$		$W \leq 0.1$	4	
		$L > 2.5$		$W > 0.1$	0	
	Dent or bubble on the polarizer	Dimension(mm)		Acceptable number		
		$D \leq 0.5$		4		
		$D \leq 0.15$		Disregard		
Foreign material on the polarizer	Dimension(mm)		Acceptable number			
	$D \leq 0.5$		4			
	$D \leq 0.15$		Disregard			

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	27

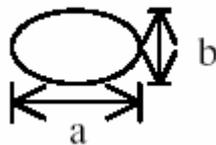
Item		Specification/Description			Note
Touch Panel	Scratch	L(mm)	W(mm)	Acceptable number	Note:2
		$L \leq 10$	$W < 0.05$	Disregard	
			$0.05 \leq W < 0.1$	$N \leq 4$	
	$W \geq 0.1$		0		
	Foreign Materials (Linear shape)	$L \leq 10$	$W < 0.05$	Disregard	Note:2
			$0.05 \leq W < 0.1$	$N \leq 3$	
			$W \geq 0.1$	0	
	Foreign Materials (Circular shape)	Dimension(mm)		Acceptable number	Note:3
		$D \leq 0.25$		Disregard	
		$0.25 < D \leq 0.5$		$N \leq 6$	
$D > 0.5$		0			
Glass chipping				$a \leq 5\text{mm}$ $b \leq 3\text{mm}$ $c \leq t$ (t: Glass think)	Note:7
				$a \leq 3\text{mm}$ $b \leq 3\text{mm}$ $c \leq t$ (t: Glass think)	Note:7
Newton-ring	(In case of doubtful situations) Observe on 60° from the product surface under a while Fluorescent lamp(3-wavelength lamp).			Average diameter $\leq 1/3$ Touch Panel area Disregard. Note:7	
					

Note1. The definition of dot defect : The dot defect was judged after repair and the size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

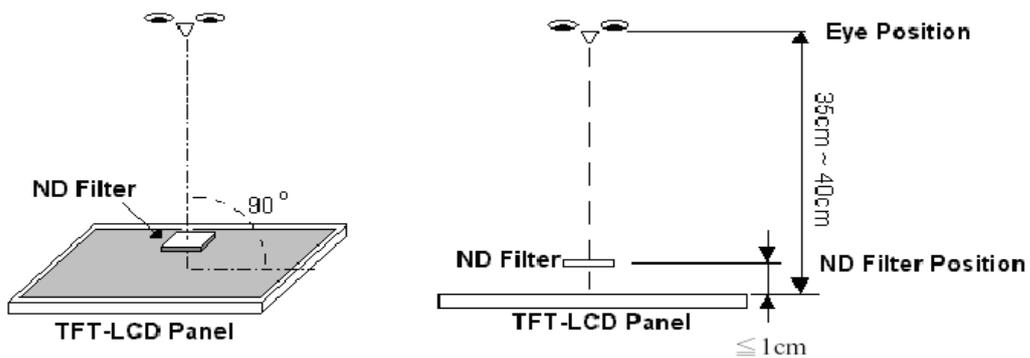
Note2.



Note3. D : Diameter $D=(a+b)/2$



Note4. Bright dot is defined through 6% transmission ND Filter as following.

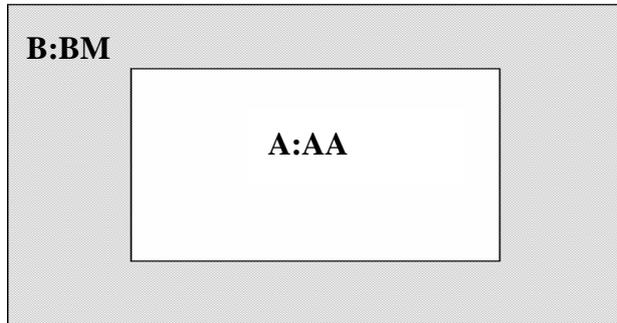


Note5. ADJACENT DOT

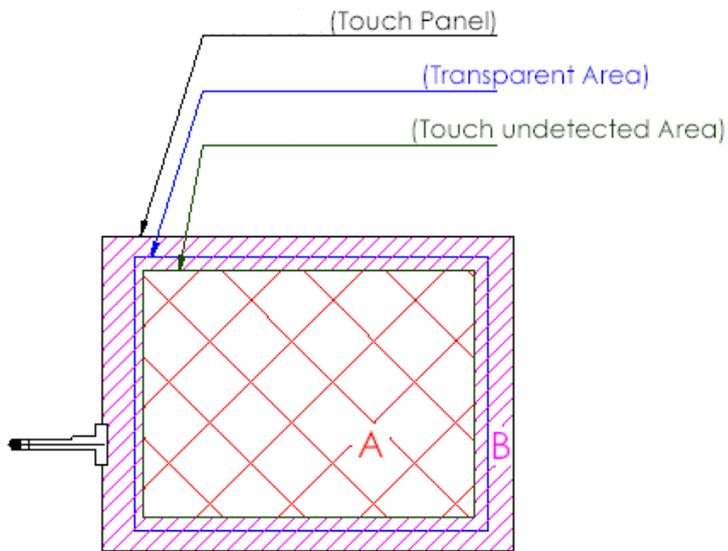


EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	29

Note6.



Note7.



A area : Without any defect point effect on normal operation.

B area : None-specify

EVERVISION	MODEL NO.		PAGE
	VGG644804-6UFLWA	SPEC SAMPLE	30

18.4 Handling of LCM

- (1) Don't give external shock.
- (2) Don't apply excessive force on the surface.
- (3) Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't disassemble the LCM.