

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. : VGG804808-6UFLWB(RoHS)

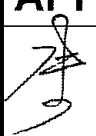




REVISION : 1

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3. Module Numbering System

V G G 8048 08 – 6 U F L W B

Serial No.: A~Z

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

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4. Application

This specification is applied to the 7 inch WVGA supported TFT-LCD module With Transparent Type Projected Capacitive Touch Panel, 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 7" TFT-LCD panel, a driver circuit and backlight unit.

5. Features

- WVGA (800×480 pixels) resolution.
- LVDS Receiver 18 bit Interface.
- Dot inversion mode with stripe type.
- Projected Capacitive Touch Panel
 - I²C Interface
 - Double Points
 - Chemical Strengthen

6. General Specifications

Item	Specifications	Unit
Screen Size	7 (Diagonal)	inch
Display Format	800RGB(H)×480(V)	dot
Active Area	152.4(H)×91.44(V)	mm
Dot Size	0.0635(H)×0.1905(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	TN Type Transmissive Mode Normally White	-
Surface Treatment	Hard Coating(7H)	-
Viewing Direction	6 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	174.4(W)×113.44(H)×11.8(D)	mm
LVDS Receiver IC	THine THC63LVDF84B	-
Weight	(TBD)	g
RoHS Compliance	Evervision certifies this product to be in compliance with European Union Directive 2002/95/EC on the restriction of certain hazardous substances in electrical and electronic equipment.	-

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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)(3)
Operating Temperature	T _{OP}	-20	+70	°C	(1)(2)

Note1: Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note2: Ta ≤ 70°C : 75%RH max.

Note3: Please refer to item of RELIABILITY.

7.2 Electrical Absolute Ratings

7.2.1 TFT-LCD Module

(Ta=25±2°C, GND=V_{SS}=0V)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital 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

(Ta=25±2°C)

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

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

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8. Electrical Characteristics

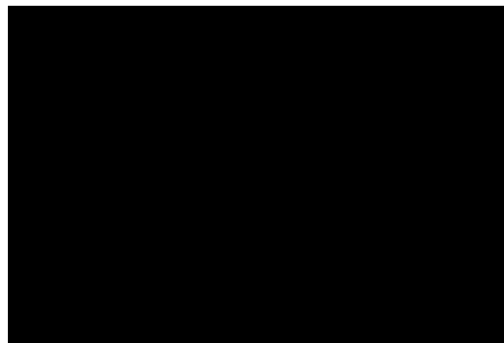
8.1 TFT-LCD Module

(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}	-	215	305	mA	(1)
Differential Input High Threshold Voltage	V _{TH}	-	-	100	mV	-
Differential Input Low Threshold Voltage	V _{TL}	-100	-	-	mV	-
Power Consumption	P _L	-	709.5	990	mW	(1)
VSYNC Frequency	F _V	-	60	-	Hz	-
DCLK Frequency	DCLK	-	33.26	-	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
LED Life Time(25°C)	-	40000	-	-	hr	(1)

Note (1) : LED life time is defined as under 25±2°C , when the average brightness decrease to 50% of original brightness

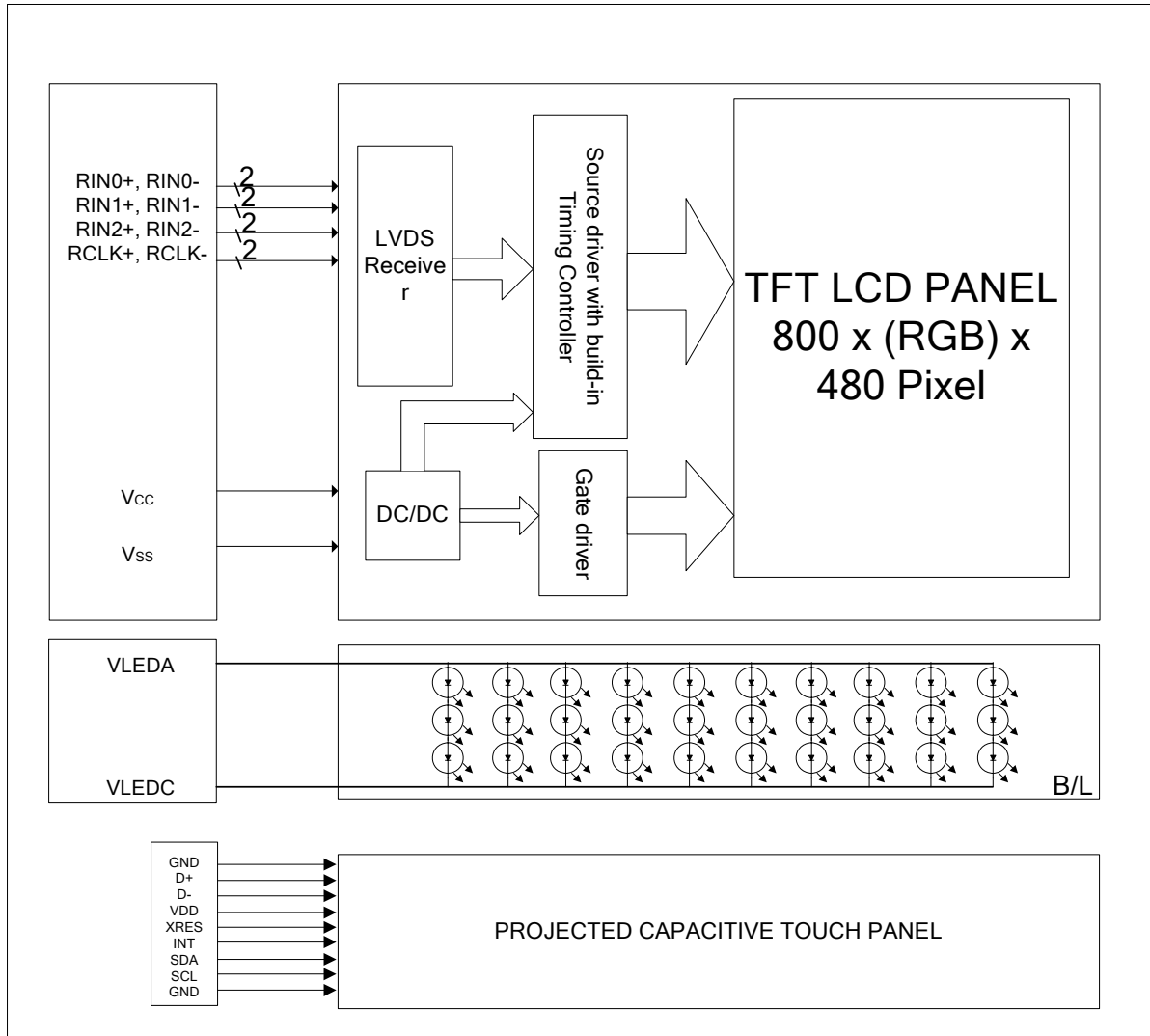
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8.3 Projected Capacitive Touch panel

Item	Value			Unit	Note
	Min.	Typ.	Max.		
Operating Voltage	2.7	3.3	3.6	V	-
Power Consumption	-	TBD	-	mW	-
Resolution	X	TBD		-	-
	Y	TBD		-	-
Interface	I ² C				-
Function	Double Points				-

9. Block Diagram

9.1 TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment

10.1 TFT-LCD Module

Connector: HIROSE DF19K-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	V _{SS}	I	Ground
20	V _{SS}	I	Ground

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 Projected Capacitive Touch panel

Connector: CVILUX CF25091D0R0-05

No.	Symbol	Functions
1	GND	Ground
2	D+	USB D+
3	D-	USB D-
4	VDD	Power Supply Voltage
5	XRES	Reset active high
6	INT	Interrupt active low
7	SDA	I ² C data
8	SCL	I ² C clock
9	GND	Ground

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					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
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	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	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	

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11. Interface Timing

11.1 Input Signal Characteristics

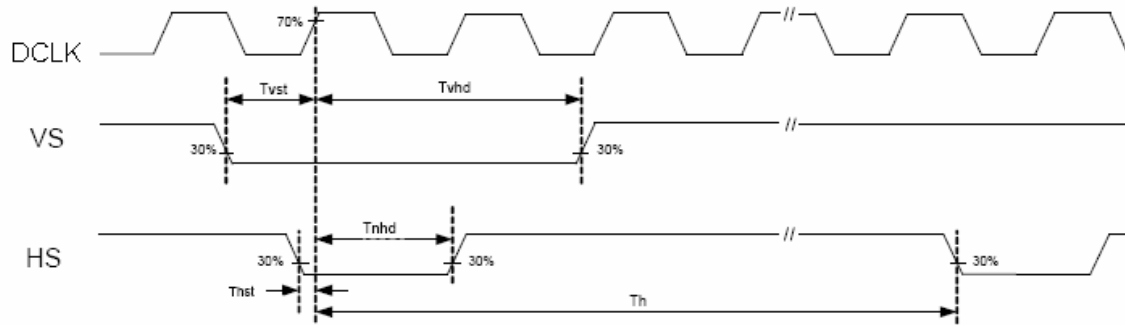
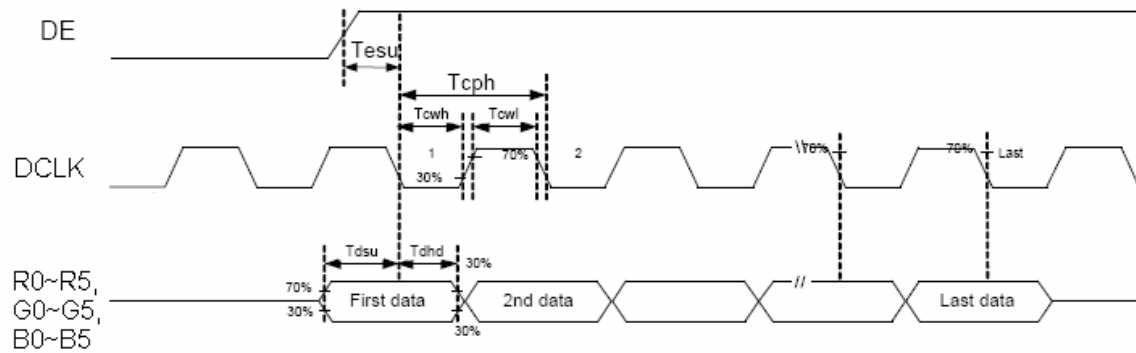
PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	F_{CPH}	-	33.26	-	MHz
DCLK period	T_{CPH}	-	30.06	-	ns
DCLK pulse duty	T_{CWH}	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	1000	1056	1200	T_{CPH}
DE pulse width	T_{DEH}	-	800	-	T_{CPH}
DE frame blanking	T_{DEB}	10	45	110	$T_{DEH}+T_{DEL}$
DE frame width	T_{DE}	-	480	-	$T_{DEH}+T_{DEL}$
Data setup time	T_{dsu}	6	-	-	ns
Data hold time	T_{dhd}	6	-	-	ns
DE setup time	T_{esu}	6	-	-	ns

11.2 LVDS Switching Characteristics

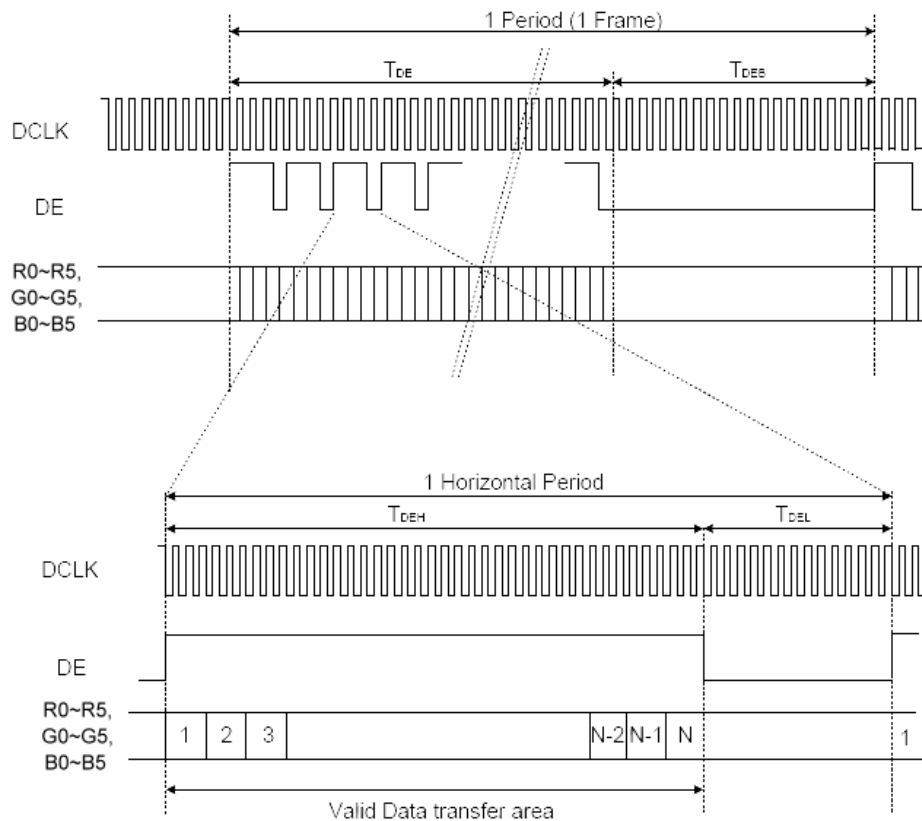
Symbol	Parameter	Min.	Typ.	Max.	Unit	
t_{RCP}	CLK OUT Period	VCC = 3.0 - 3.6V	11.76	T	50.0	ns
		VCC = 2.5 - 3.6V	14.28	T	50.0	ns
t_{RCH}	CLK OUT High Time		4T/7		ns	
t_{RCL}	CLK OUT Low Time		3T/7		ns	
t_{RCD}	RCLK +/- to CLK OUT Delay		5T/7		ns	
t_{RS}	TTL Data Setup to CLK OUT	0.35T-0.3			ns	
t_{RH}	TTL Data Hold from CKL 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	

11.3 Waveform

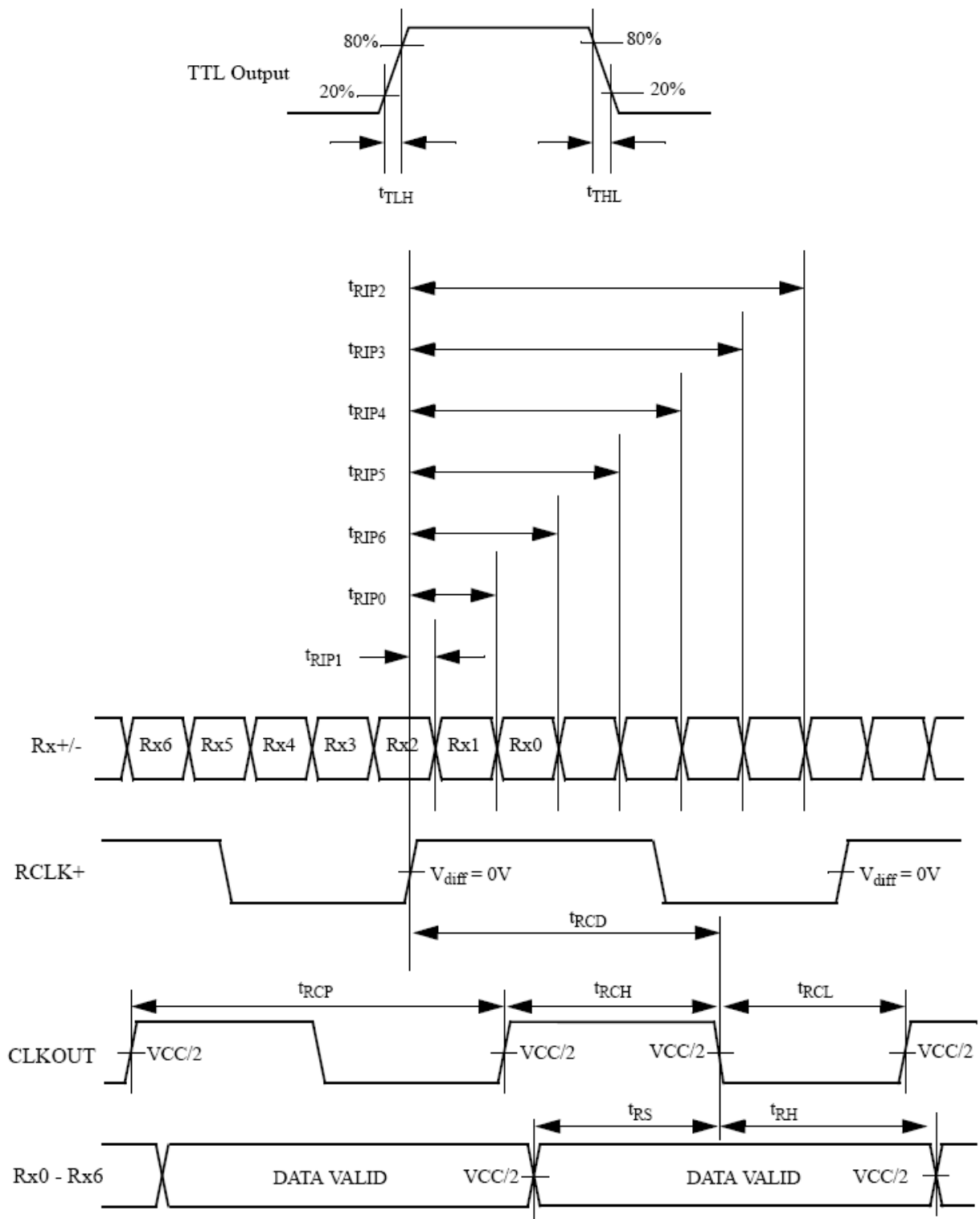
11.3.1 Clock and data input waveforms



11.3.2 Data input format



11.3.3 LVDS AC Timing

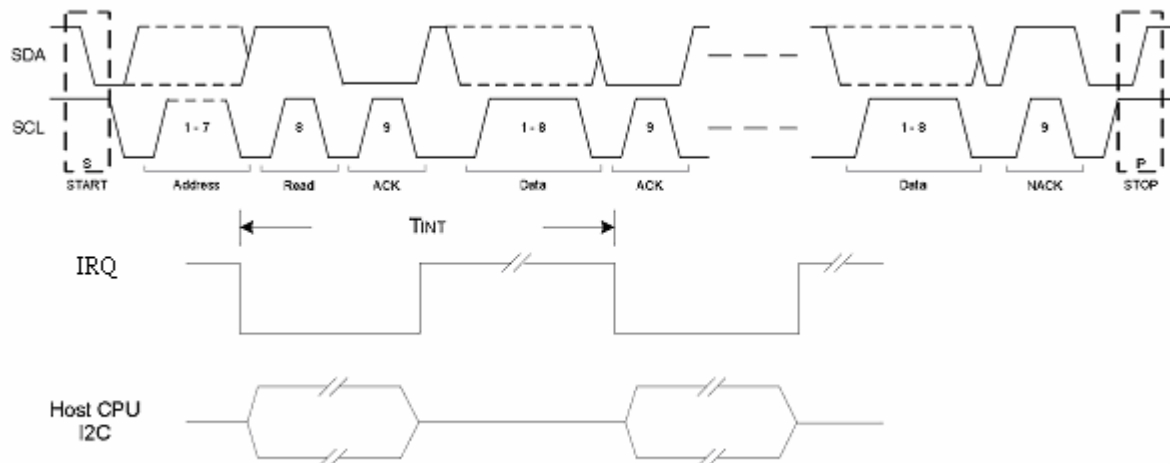


Note:

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

11.4 Timing Requirement of Projected Capacitive Touch Panel

11.4.1 I2C Timing Chart



11.4.2 Protocol

I2C Transaction Frame : each I2C transaction frame transfers one I2C packet data. Each I2C packet data may not be an exact application packet.

From Host to Device:

Report ID = 3 (Diagnostics mode)

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x03	len	D1	D2	D3	D4	D5	D6	D7	D8

len = valid data length in bytes of this current I2C data packet.

D1 to DN totally N bytes are valid data in this current I2C data packet.

$N \leq 8$. This Report ID = 3 is used for diagnostics.

From Device To Host:

Host computer poll this I2C device only when the IRQ pulled low by this Touch device. The host computer should not poll this device when this IRQ signal pulled high.

The packet size of each I2C transaction frame is defined as 12 bytes

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
ID	D0	D1	D2	D3	D4	D5	D6	D7	D8

ID is defined as Report ID. The report ID was defined as below

Report ID = 1 (single touch mouse mode)

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x01	D0	D1	D2	D3	D4	D5	D6	D7	D8

D0 = Mouse Button States

D1 = Low byte of X coordination

D2 = High byte of X coordination

D3 = Low byte of Y coordination

D4 = High byte of Y coordination

[D5..D8] not used and must be kept as 0

Report ID = 3 (Diagnostics mode)

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x03	len	D1	D2	D3	D4	D5	D6	D7	D8

len = valid data length in bytes of this current I2C data packet.

D1 to DN totally N bytes are valid data in this current I2C data packet.

$N \leq 8$.

This Report ID is used for diagnostics

Report ID = 4 (MutliTouch report)

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x04	D0	D1	D2	D3	D4	D5	D6	D7	D8

D0 : B7 = Touch Valid. B7 = 1 is valid touch

[B6:B2] = Contact ID.

B1 = In Range bit, this bit should be always 1

B0 = Down/Up bit, B0 = 1 for Touch Down, B0 = 0 for Lift Off

D1 = Low byte of X coordination

D2 = High byte of X coordination

D3 = Low byte of Y coordination

D4 = High byte of Y coordination

D5 = Low byte of Z coordination

D6 = High byte of Z coordination

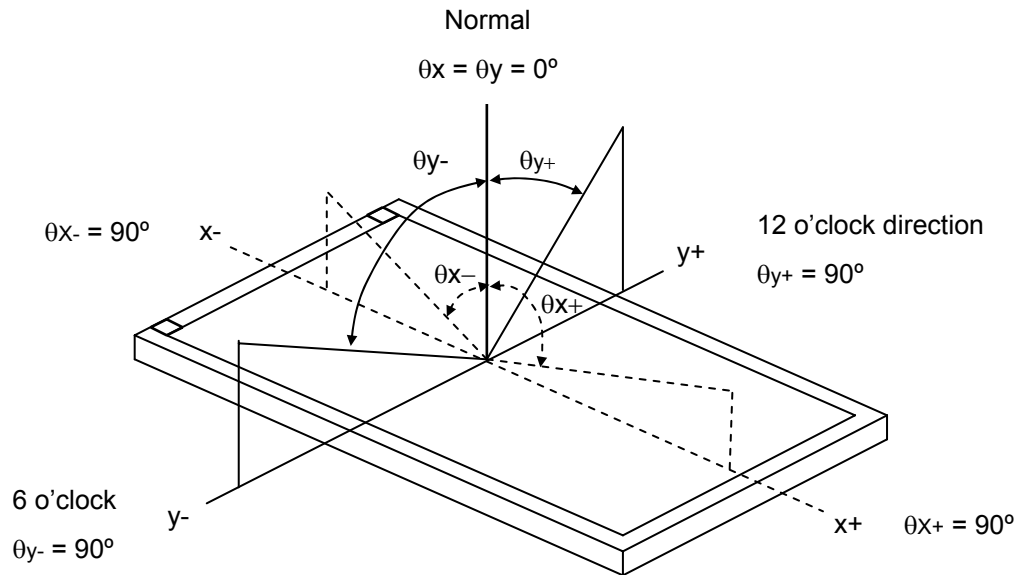
D7, D8 = reserved and must be zero.

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	150	(250)	-	-	(2)
Response Time		T_R		-	5	10	ms	(3)
		T_F		-	15	20	ms	
Luminance(Center)		Y		400	(450)	-	cd/m ²	(4)
Brightness uniformity		BUNI		70	(75)	-	%	(5)
Color Chromaticity	Red	Rx		0.530	0.580	0.630	-	(1),(4)
		Ry		0.310	0.360	0.410	-	
	Green	Gx		0.300	0.350	0.400	-	
		Gy		0.530	0.580	0.630	-	
	Blue	Bx		0.100	0.150	0.200	-	
		By	0.090	0.140	0.190	-		
	White	Wx	0.270	0.320	0.370	-		
		Wy	0.300	0.350	0.400	-		
Viewing Angle	Horizontal	θ_{x+}	CR \geq 10	55	(65)	-	deg.	
		θ_{x-}		55	(65)	-		
	Vertical	θ_{y+}		45	(55)	-		
		θ_{y-}		55	(65)	-		

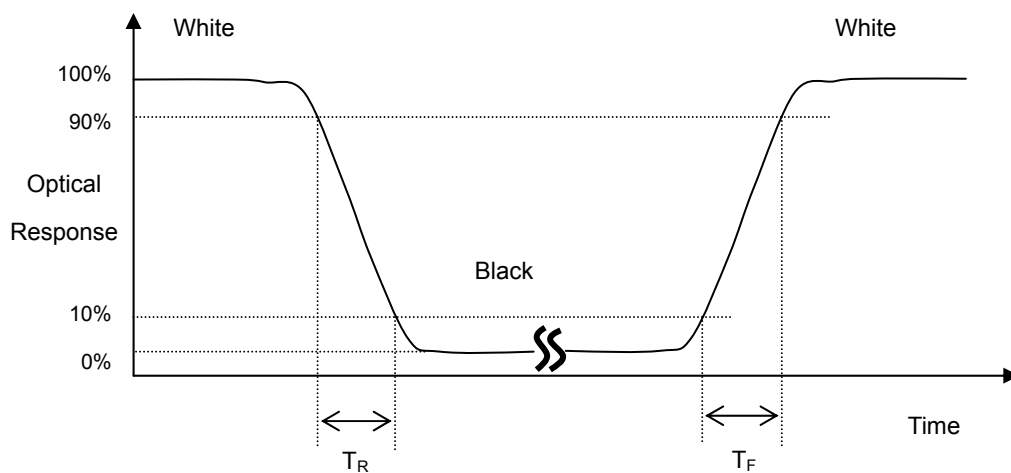
Note (1) Definition of Viewing Angle (θ_x , θ_y):



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

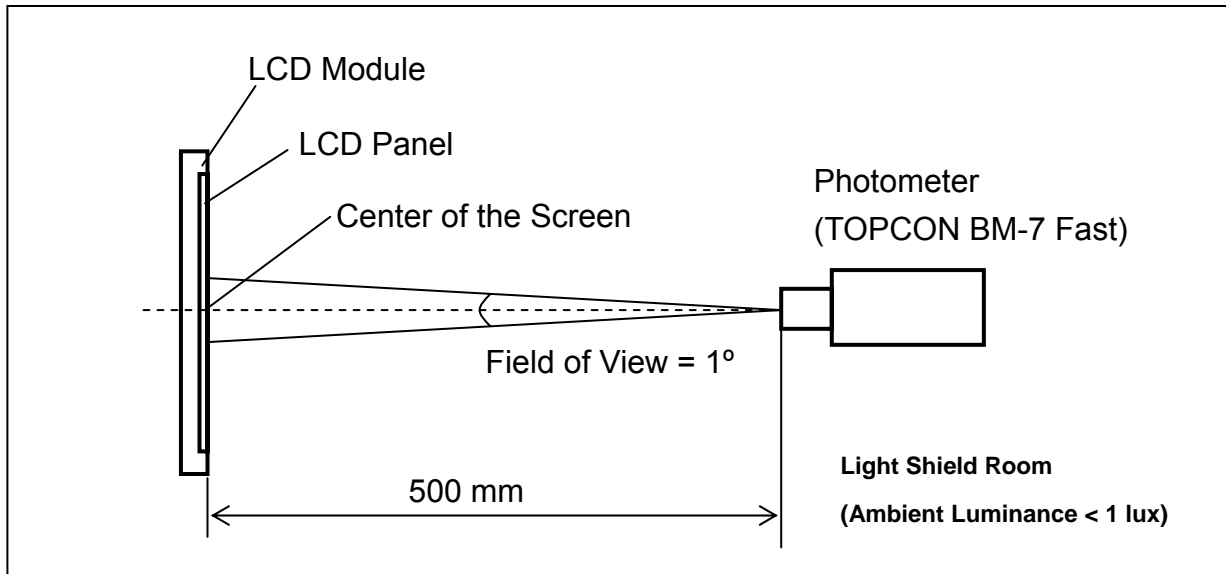
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

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



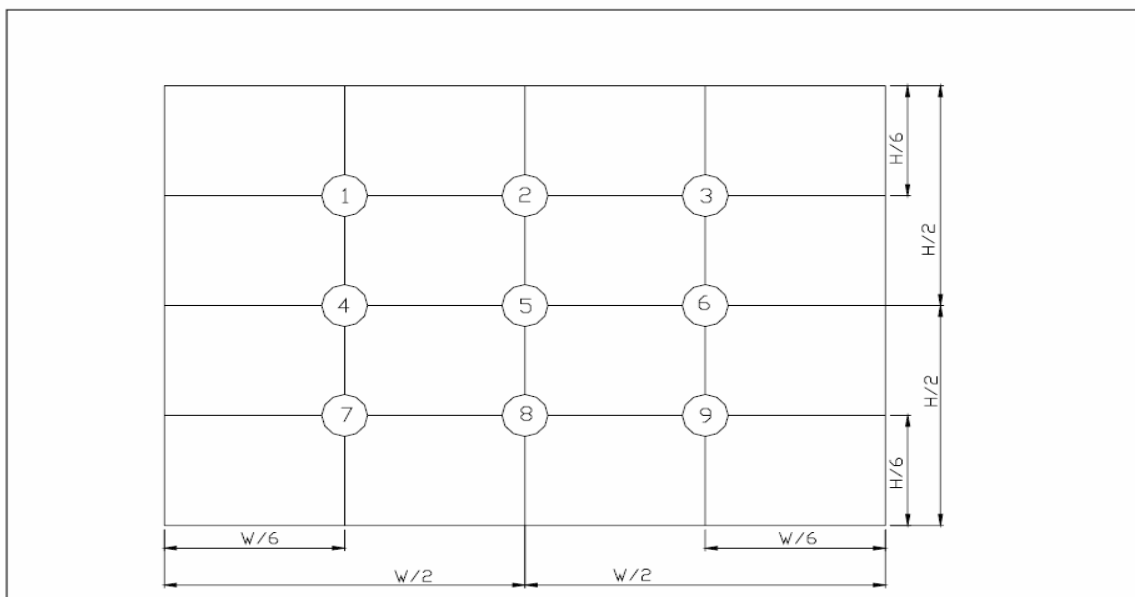
Note (4) Measurement Set-Up:

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

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



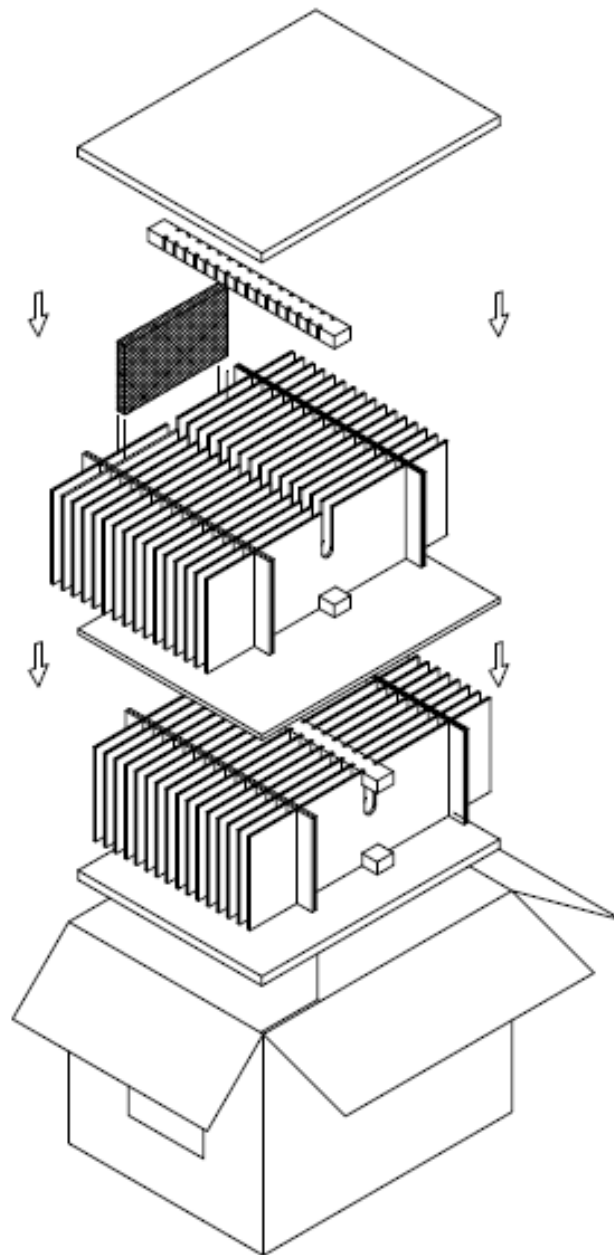
(單位 : mm)

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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, 100G, 6ms 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



PARTS LIST

	ITEM	SIZE(LxWxH) unit:mm	MATERIAL	Q.T.Y	NOTE
1	STATIC SHIELDING BAGS	255.0x145.0*0.09		30	
2	EPE PLATE	440.0x340.0x15.0	EPE	2	
3	EPE PAD	345.0x30.0x20.0	EPE	4	
4	CARD BOARD	345.0x150.0x3.5	CARTON	4	
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	174.4x113.44.6x12		30	

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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.

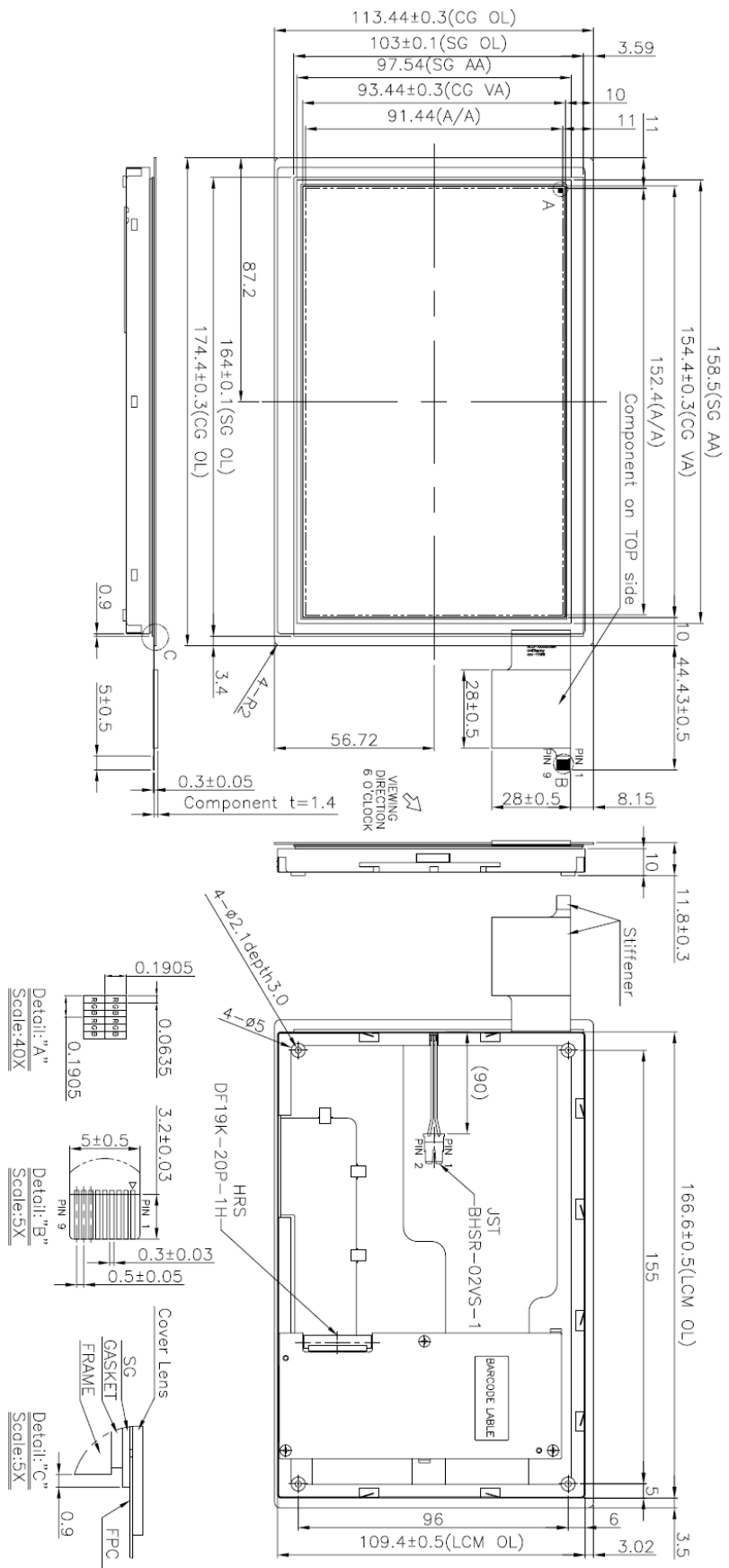
15.2 Safety Precautions

- (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.

15.3 Terms of Warrant

- (1) Acceptance inspection period
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- (2) Applicable warrant period
The period is within twelve months since the date of shipping out under normal using and storage conditions.

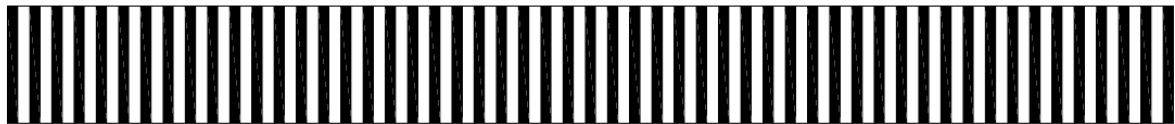
16.Outline Drawing



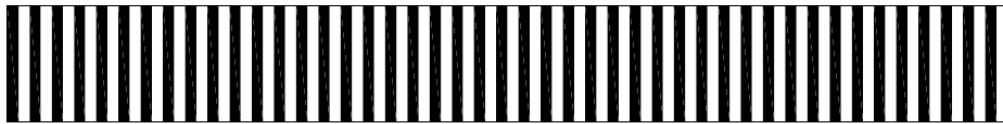
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17. Definition of Labels

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



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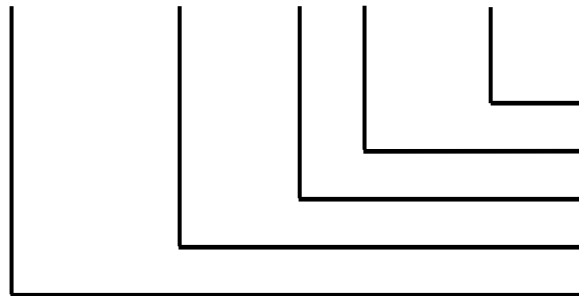


ABCDEFGHIJKLM

(a) Module Name: VGG804808-6UFLWB

(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
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Mark	A	B	C	D	E	F	G	H	I	J

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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.

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

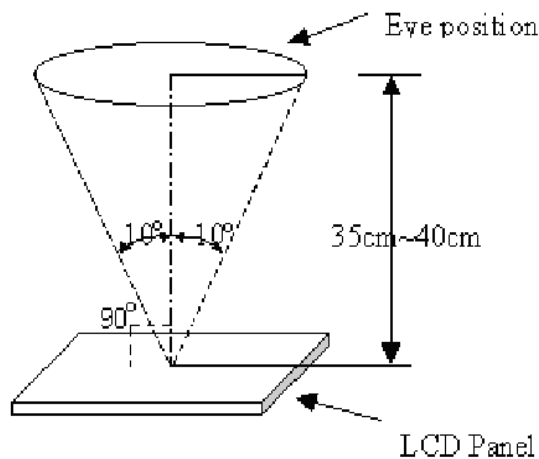


Fig _ 1

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.

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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	$N \leq 3$	$N \leq 3$	$N \leq 8$	
		DARK DOT	$N \leq 5$	$N \leq 6$		
		TOTAL DOT	$N \leq 5$	$N \leq 6$		
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	Note:2	
		$L \leq 2.5$	$W \leq 0.1$	4		
		$L > 2.5$	$W > 0.1$	0		
	Dent or bubble on the polarizer	Dimension(mm)		Acceptable number		Note:3
		$D \leq 0.5$		4		
		$D \leq 0.15$		Disregard		
	Foreign material on the polarizer	Dimension(mm)		Acceptable number		Note:3
		$D \leq 0.5$		4		
		$D \leq 0.15$		Disregard		

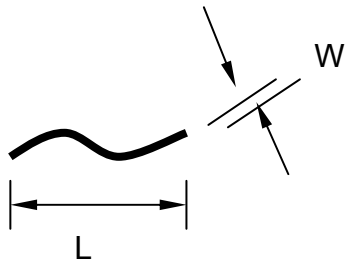
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Item		Specification/Description			Note
Touch Panel	Scratch	L(mm)	W(mm)	Acceptable number	Note:2、 8、9
		$L \leq 3$	$W \leq 0.05$	Disregard	
		$L \leq 3$	$0.05 < W \leq 0.1$	$N \leq 3$	
		$L > 3$	$0.1 < W$	0	
	Foreign Materials (Linear shape)	L(mm)	W(mm)	Acceptable number	Note:2、 8、9
		$L \leq 3$	$W \leq 0.05$	Disregard	
		$L \leq 3$	$0.05 < W \leq 0.1$	$N \leq 3$	
		$L > 3$	$W > 0.1$	0	
	Foreign Materials (Circular shape)	Dimension(mm)		Acceptable number	Note:3、 8、9
		$D \leq 0.2$		Disregard	
		$0.2 < D \leq 0.3$		$N \leq 5$	
		$0.3 < D$		0	
	Glass chipping	Dimension(mm)		Acceptable number	Note:8
		$D \leq 0.1$ (Front side)		$N \leq 2$	
		$D \leq 0.2$ (Backside & side)		$N \leq 2$	
	UV Glue spill	Width(mm)		Acceptable number	Note:10
		$W \leq 1$		Disregard	
		$1 < W$		0	
	Bubble Defects	Dimension(mm)		Acceptable number	Note:8
		$D \leq 0.2$		Disregard	
$0.2 < D \leq 0.3$		$N \leq 5$			
$0.3 < D$		0			
Pin hole (Ink Area/Logo Area)	Front side inspection: Not Allowed The pin hole is acceptable if invisible after fabrication				

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.

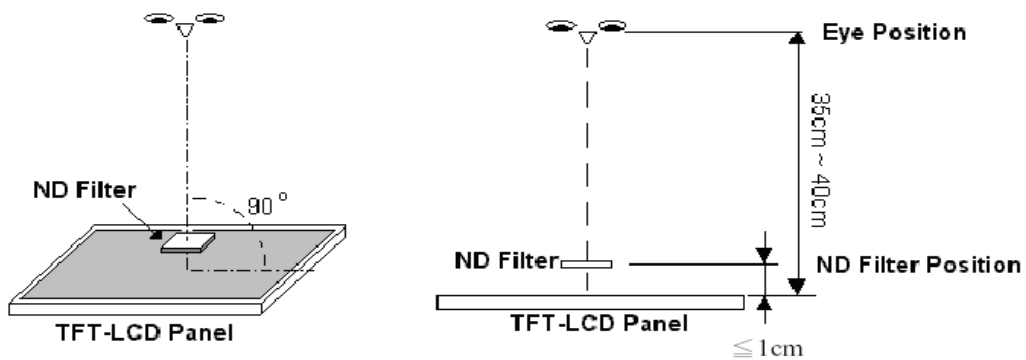
Note2.



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



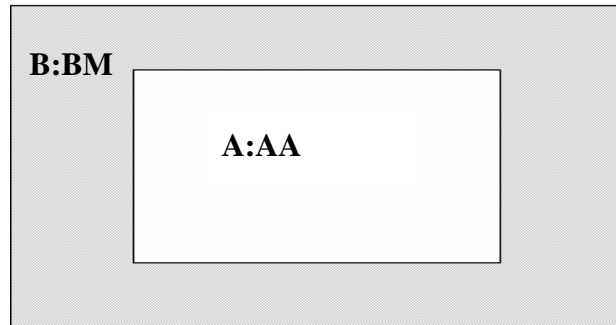
Note4. Bright dot is defined through 6% transmission ND Filter as following.



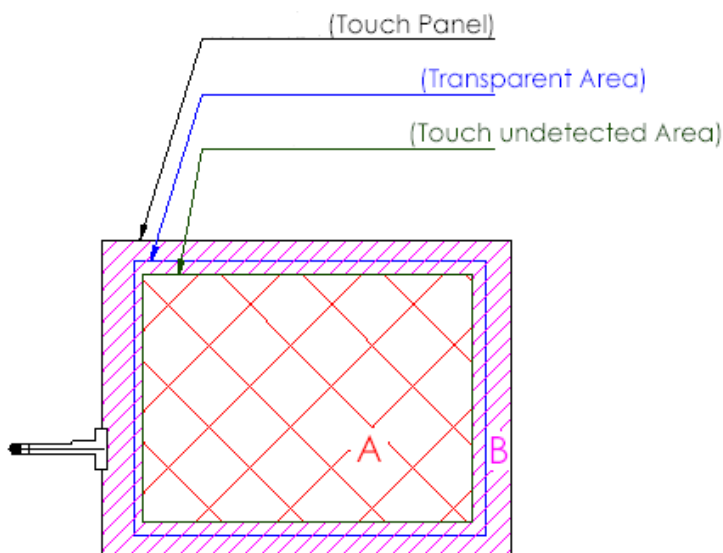
Note5. ADJACENT DOT



Note6.



Note7.



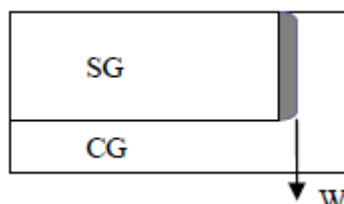
A area : Without any defect point effect on normal operation.

B area : None-specify

Note 8. The minimum distance of defects must be above 10mm.

Note 9. The particle will be ignored when it is removable by cleaning.

Note 10.



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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.