

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. : VGG128021-0TSLWH(RoHS)

REVISION : 1

☒ APPROVAL FOR SPECIFICATIONS ONLY





☐ APPROVAL FOR SPECIFICATIONS AND SAMPLE

CUSTOMER :

STD.

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[illegible]

3. Module Numbering System

V G G 1280 21 – 0 T S L W H

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:

A: ASTN; B: STN Blue; C: CSTN; D: DSTN;

E: MSLC; F: TFT; G: STN Gray;

H: HTN ; I: IBN; K: Black Mask TN; L: LTPS; M: MVA;

N: Others; O: OLED; P: PLED; S: IPS;

T: TN; U: FSC TN; W: FSTN Black/White;

X: FFSTN; Y: STN Yellow

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

LCM Type:

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

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4. Application

This specification is applied to the 12.1 inch WXGA supported TFT-LCD module and can display true 262K/16.7M colors (6/8 bit color). This module is composed of a 12.1" TFT-LCD panel, a driver circuit built in LED Driver.

5. Features

- WXGA (1280×800 pixels) resolution.
- 6 bit & 8 bit LVDS Interface.
- LED driver circuit is built in this module to provide PWM Dimmer function.
- Projected Capacitive Touch
 - USB Interface
 - Multi Touch (Five points)
 - 16384x16384 resolution

6. General Specifications

Item	Specifications	Unit
Screen Size	12.1 (Diagonal)	inch
Display Format	1280RGB(H)×800(V)	dot
Active Area	261.12(H)×163.2(V)	mm
Pixel Pitch	0.204(H)×0.204(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	AAS Type / Transmissive Mode / Normally Black	-
Surface Treatment	Clear(7H)	-
Viewing Direction	Full view angle	-
Outline Dimension	278(W)×184(H)×12.7(D)	mm
Weight	(TBD.)	g
RoHS Compliance	RoHS Compliance	-

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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)(2)
Operating Ambient Temperature	T _{OP}	-30	+80	°C	(1)(2)

Note1: Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note2: Please refer to item of RELIABILITY.

7.2 Electrical Absolute Ratings

7.2.1 TFT-LCD Module

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VCC	-0.3	+3.6	V	(1)
Logic Input Voltage	V _{in}	-0.3	+3.6	V	(1)

7.2.2 LED CONVERTER

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Converter Voltage	V _i	-0.3	18	V	(1), (2)
Enable Voltage	EN	---	5.5	V	
Backlight Adjust	Dimming	---	5.5	V	

Note (1) Permanent damage to the device may occur if maximum values are exceeded.

Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for LED (Refer to Section 8.2 for further information).

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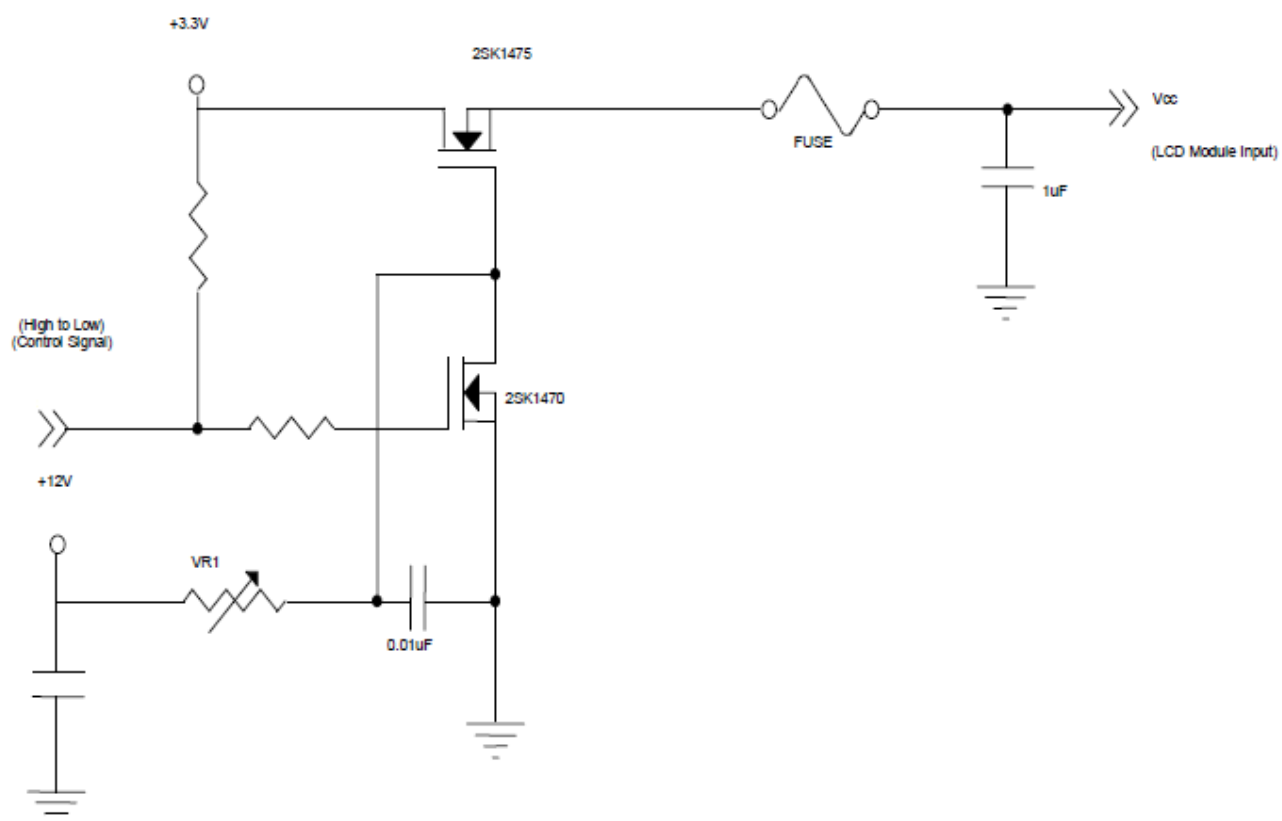
8. Electrical Characteristics

8.1 TFT-LCD Module

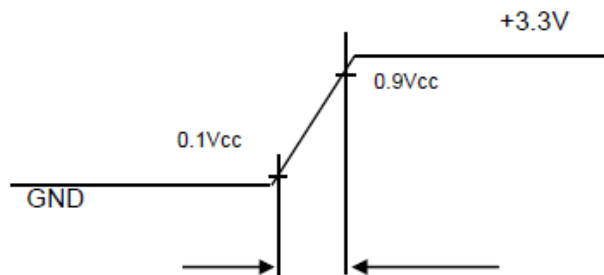
Parameter		Symbol	Value			Unit	Note
			Min.	Typ	Max.		
Power Supply Voltage		VCC	3.0	3.3	3.6	V	-
Ripple Voltage		V _{RP}	-	50	-	mVp-p	-
Inrush Current		I _{INRUSH}	1.5			A	(2)
Power Supply Current	White	ICC	-	560	675	mA	(3)a
	Black	ICC	-	360	430	mA	(3)b
LVDS differential input voltage		V _{id}	100	-	600	mV	
LVDS common input voltage		V _{ic}	1.125	1.2	1.375	V	-
Differential Input Voltage for LVDS Receiver Threshold	"H" Level	V _{IH}	100	-	-	mV	-
	"L" Level	V _{IL}	-	-	-100	mV	-
Terminating Resistor		R _T	-	100	-	Ohm	-

Note (1) The assembly should be always operated within above ranges.

Note (2) Measurement Conditions:

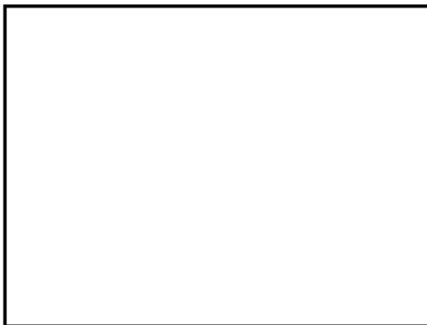


VCC rising time is 470us



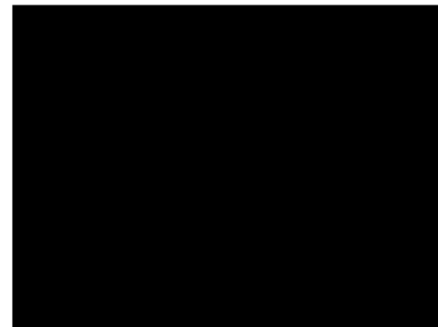
Note (3) The specified power supply current is under the conditions at $V_{cc} = 3.3\text{ V}$, $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$, $f_v = 60\text{ Hz}$, whereas a power dissipation check pattern below is

a. White Pattern



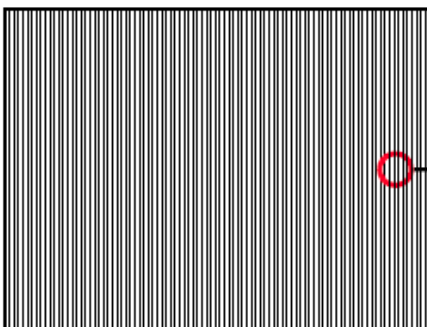
Active Area

b. Black Pattern

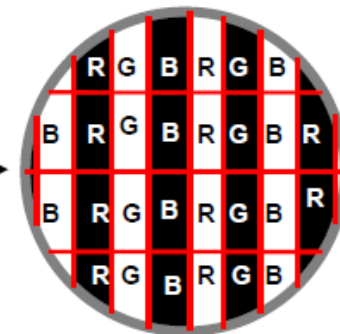


Active Area

c. Vertical Stripe Pattern



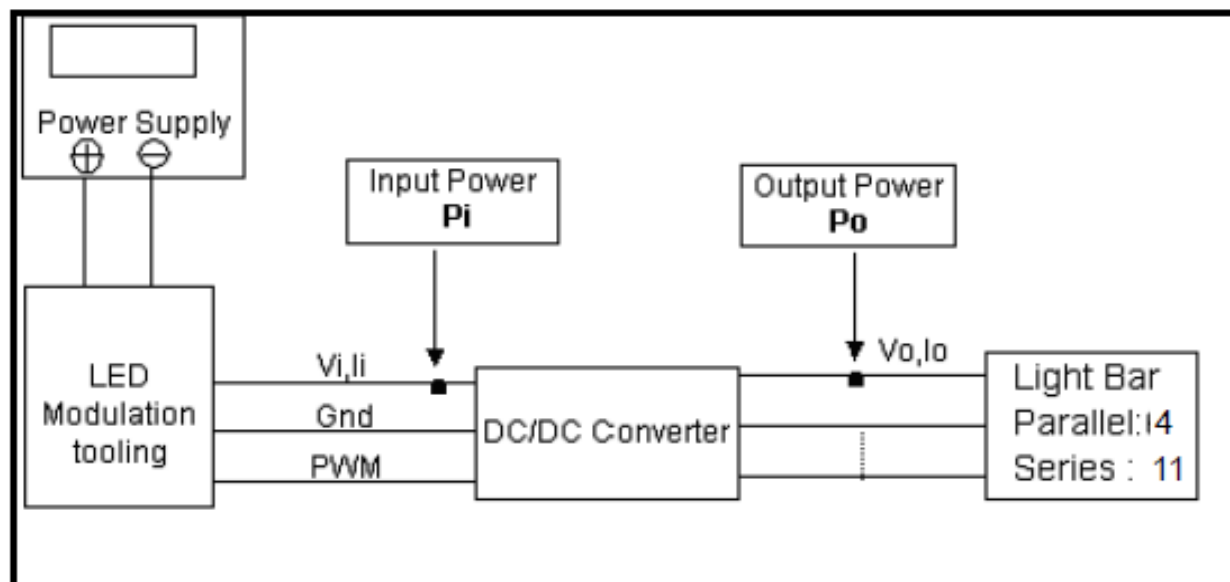
Active Area



8.2 Backlight Unit

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Input Voltage		V_i	10.8	12.0	13.2	V _{DC}	(Duty 100%)
Converter Input Ripple Voltage		V_{iRP}	-	-	350	mV	
Converter Input Current		I_i	-	0.8	1.0	A _{DC}	@ $V_i = 12V$ (Duty 100%)
Converter Inrush Current		I_{iRUSH}	-	-	3.0	A	@ V_i rising time=20ms ($V_i=12V$)
Input Power Consumption		P_i	-	9.6	12	W	(1)
EN Control Level	Backlight on	ENLED (BLON)	2.5	3.3	5.0	V	
	Backlight off		0	-	0.3	V	
PWM Control Level	PWM High Level	Dimming (E_PWM)	2.5	-	5.0	V	
	PWM Low Level		0	-	0.15	V	
PWN Noise Range		V_{Noise}	-	-	0.1	V	
PWM Control Frequency		f_{PWM}	190	200	20k	Hz	(2)
PWM Dimming Control Duty Ratio		-	5	-	100	%	(2), Suggestion @ 190Hz< f_{PWM} <1kHz
			20	-	100	%	(2), @ 1kHz≤ f_{PWM} <20kHz
LED Life Time		L_{LED}	50,000		-	Hrs	(3)

Note (1) LED current is measured by utilizing a high frequency current meter as shown below:



Note (2) The lifetime of LED is estimated data and defined as the time when it continues to operate under the conditions at $T_a = 25 \pm 2^\circ\text{C}$ and Duty 100% until the brightness becomes $\leq 50\%$ of its original value. Operating LED at high temperature condition will reduce life time and lead to color shift.

Note (3) At 190~1kHz PWM control frequency, duty ratio range is restricted from 5% to 100%.


1K~20kHz PWM control frequency, duty ratio range is restricted from 20% to 100%.

8.3 Projected Capacitive Touch

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

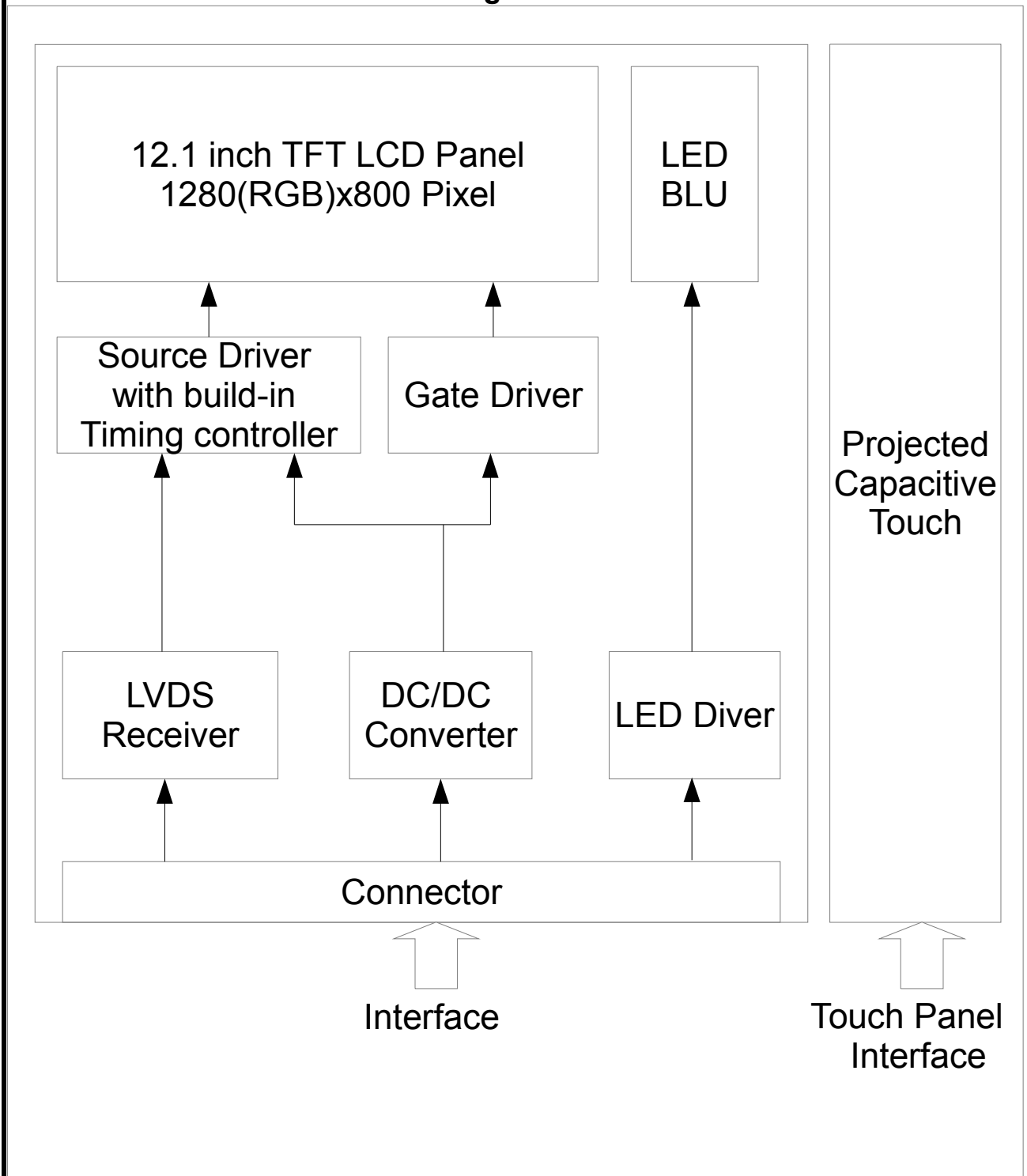
Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V_{TP}	4.8	5.0	5.2	V	-
Power Supply Current	I_{TP}	-	TBD	TBD	mA	(1)
Output High Threshold Voltage	V_{OH}	2.8	-	-	V	-
Output Low Threshold Voltage	V_{OL}	-	-	0.8	V	-
Differential Input Sensitivity (D+)-(D-)	V_{DI}	0.2	-	-	V	-
Differential Input Common Mode Range	V_{CM}	0.8	-	2.5	V	
Power Consumption	P_L	-	TBD	TBD	mW	@5.0V
Report Rate	R_R	-	60	-	Hz	-
Interface	USB					-
Function	Multi Touch					-
IC Type	ILI2510					-
FW Version	TBD					-

Note (1) This test condition is touched with 5 points.

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9. Block Diagram

9.1 TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment

10.1 TFT-LCD Module

Pin No.	Symbol	Description	Note
1	12V	LED power	-
2	12V	LED power	-
3	12V	LED power	-
4	12V	LED power	-
5	ENLED	Enable pin	(3)
6	Dimming	Backlight Adjust	(3)
7	NC	No Connection or Ground	-
8	NC	No Connection or Ground	-
9	VCC	Power supply	-
10	VCC	Power supply	-
11	GND	Ground	-
12	GND	Ground	-
13	RX0-	Negative transmission data of pixel 0	-
14	RX0+	Positive transmission data of pixel 0	-
15	GND	Ground	-
16	RX1-	Negative transmission data of pixel 1	-
17	RX1+	Positive transmission data of pixel 1	-
18	GND	Ground	-
19	RX2-	Negative transmission data of pixel 2	-
20	RX2+	Positive transmission data of pixel 2	-
21	GND	Ground	-
22	RXCLK-	Negative of clock	-
23	RXCLK+	Positive of clock	-
24	GND	Ground	-
25	RX3-	Negative transmission data of pixel 3	-
26	RX3+	Positive transmission data of pixel 3	-
27	GND	Ground	-
28	SEL6/8	LVDS 6/8 bit select function control, Low → 6 bit Input Mode High → 8bit Input Mode	(2)(3)
29	GND	Ground	-
30	NC	No Connection or Ground	-

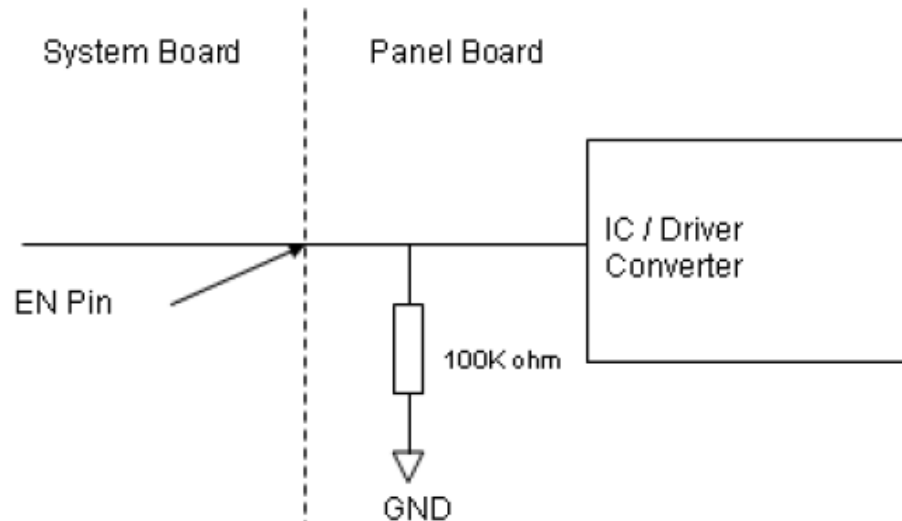
Note (1) Connector Part No.: P2 187114-30091

User's connector Part No.; JAE FI-X30HL or FI-X30HL-B or equivalent.

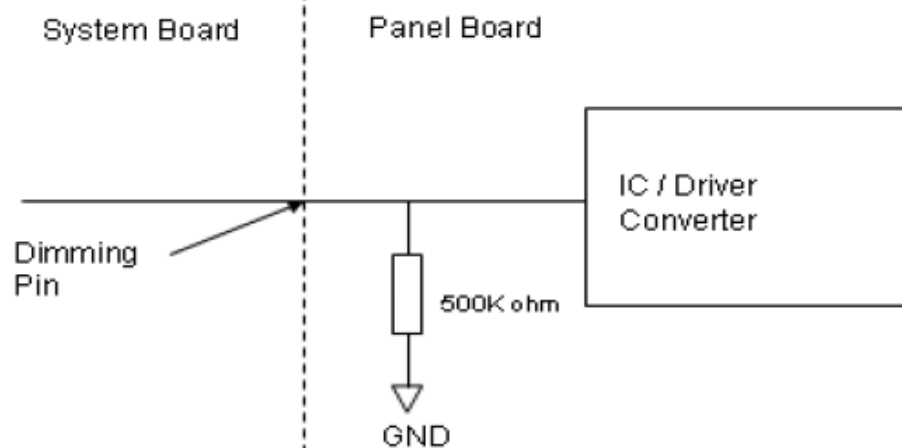
Note (2) “Low” stands for 0V. “High” stands for 3.3V

Note (3) ENLED(BLON), Dimming(E_PWM), SEL6/8 as shown below :

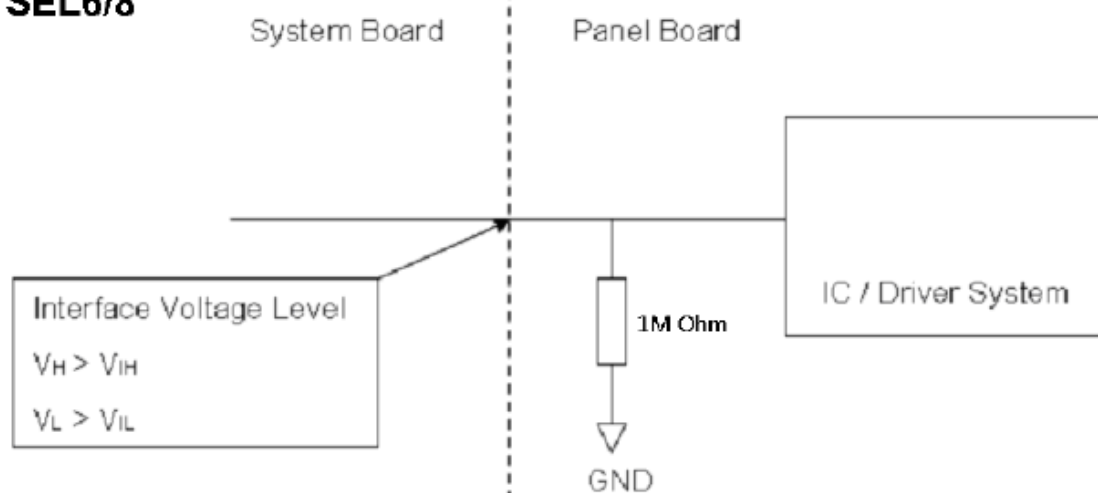
BLON Pin



E_PWM Pin



SEL6/8



10.2 Projected Capacitive Touch

Connector: CI0105M1HR0-NH or equivalent

Pin No.	Symbol	I/O	Description
1	V _{TP}	I	+5.0V power supply.
2	D-	I/O	USB D-
3	D+	I/O	USB D+
4	GND	I	System ground.
5	GND	I	System ground.

10.2 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 below provides the assignment of color.

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	1	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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	1	0	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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	

Note (1) 0: Low Level Voltage, 1: High Level Voltage

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color.

Color		Data Signal																													
		Red								Green								Blue													
R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	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	0	0	0	0	0	0	0	0	0	0	0	
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	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	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	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	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	0	0	0	0	0	0	0	0	0	0	0	
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
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	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	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	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	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	0	0	0	0	0	0	0	0	0	0	1	0	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	
Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1		

Note: 0: Low Level Voltage, 1: High Level Voltage

11. Interface Timing

11.1 Input Signal Characteristics

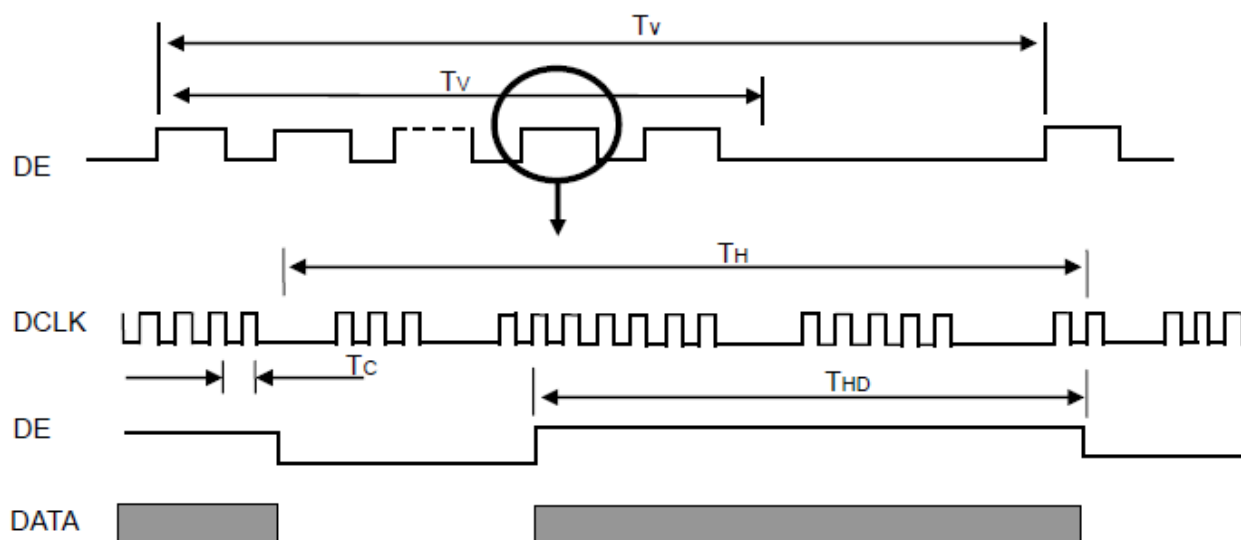
The input signal timing specifications are shown as the following table and timing diagram.

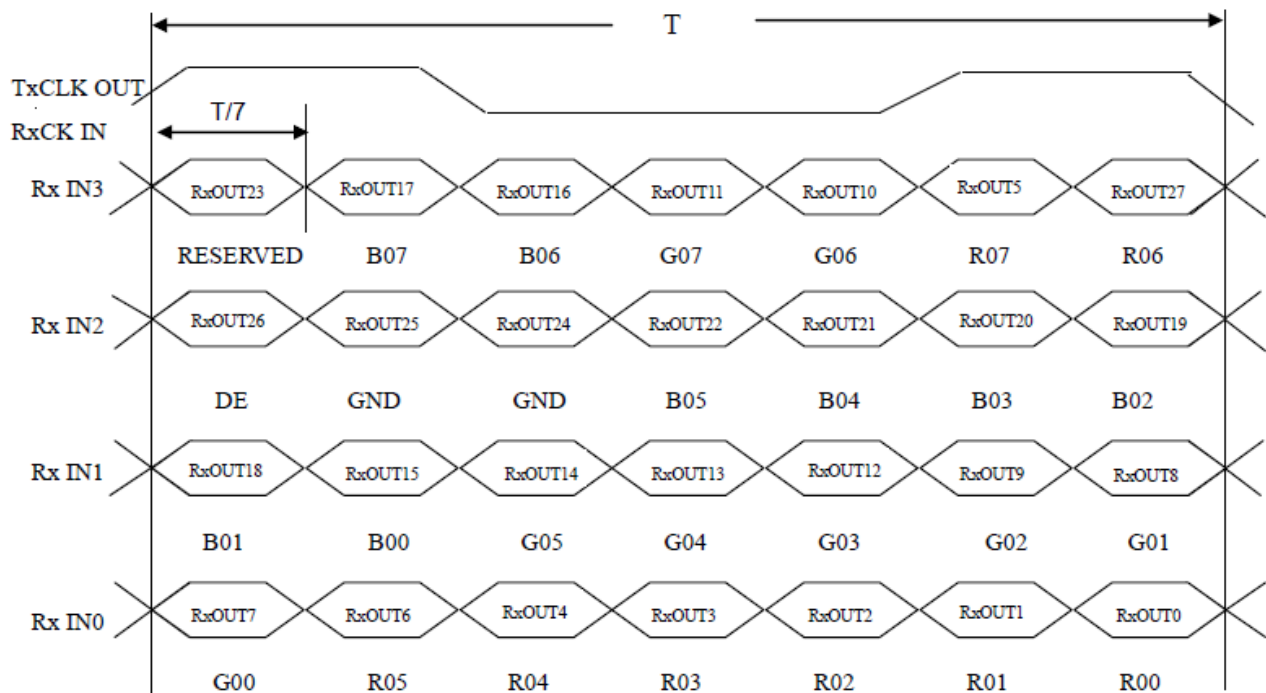
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	F_r	65.9	71	85	MHz	-
	Period	T_c	13.4	14.1	15.2	ns	-
	Input cycle to cycle jitter	T_{rd}	---	---	200	ns	(a)
	Input Clock to data skew	TLVCCS	$-0.02 \cdot T_c$	---	$0.02 \cdot T_c$	ps	(b)
	Spread spectrum modulation range	F_{clkin_mod}	$0.987 \cdot F_c$	---	$1.013 \cdot F_c$	MHz	(c)
	Spread spectrum modulation frequency	F_{SSM}	---	---	200	KHz	
Vertical Display Term	Frame Rate	F_r	---	60	---	Hz	$T_v = T_{vd} + T_{vb}$
	Total	T_v	808	823	885	T_h	-
	Active Display	T_{vd}	800	800	800	T_h	-
	Blank	T_{vb}	8	23	85	T_h	-
Horizontal Display Term	Total	T_h	1360	1440	1600	T_c	$T_h = T_{hd} + T_{hb}$
	Active Display	T_{hd}	1280	1280	1280	T_c	-
	Blank	T_{hb}	80	160	320	T_c	-

Note (1) Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

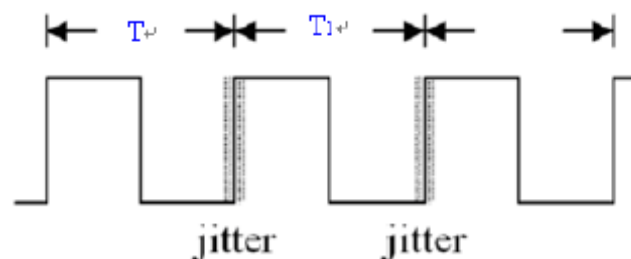
Note (2) The $T_v(T_{vd}+T_{vb})$ must be integer, otherwise, the module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM

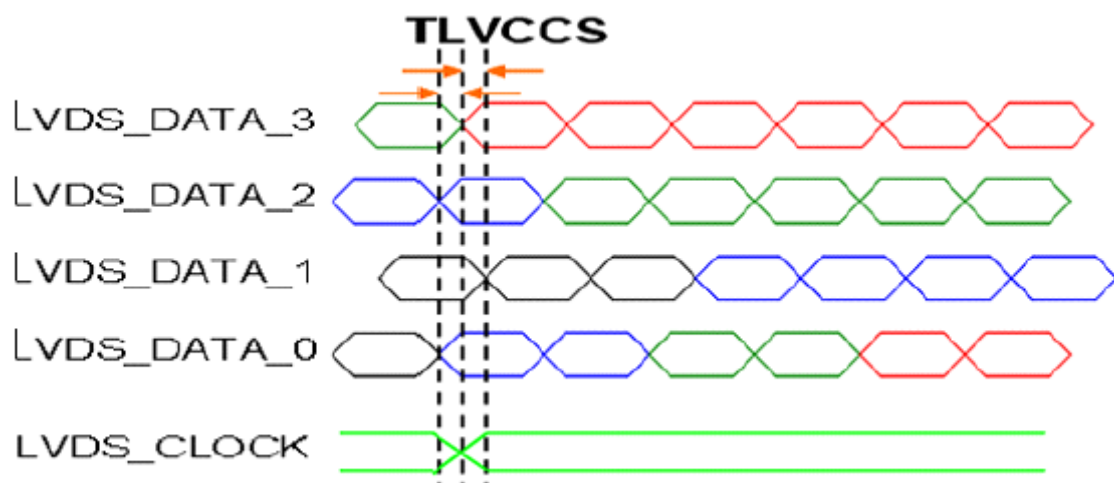




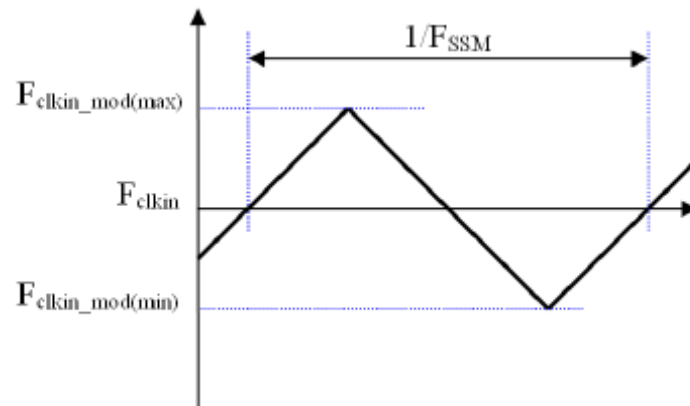
Note (a) The input clock cycle-to-cycle jitter is defined as below figures. $Trcl = |T_1 - T_1|$



Note (b) Input Clock to data skew is defined as below figures.

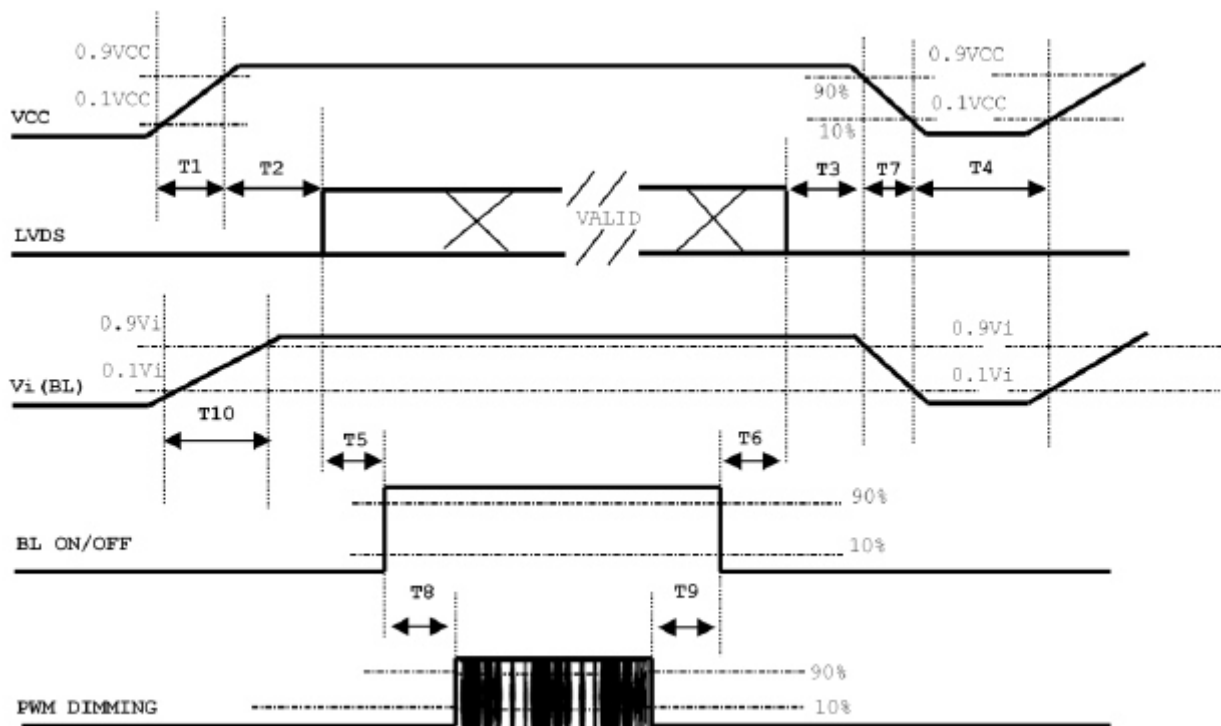


Note (c) The SSCG (Spread spectrum clock generator) is defined as below figures.



11.2 POWER ON/OFF SEQUENCE

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



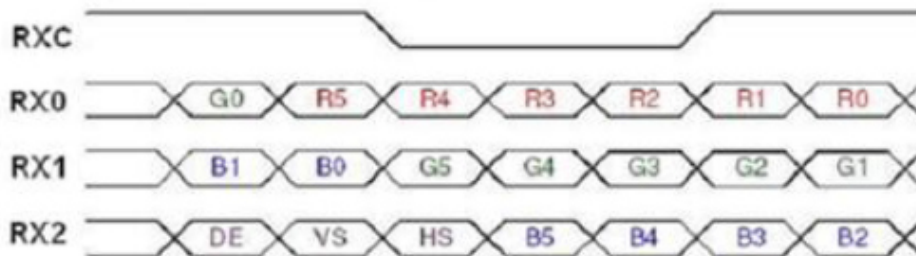
Note:

- (1) The supply voltage of the external system for the module input should be the same as the definition of Vcc.
- (2) When the backlight turns on before the LCD operation of the LCD turns off, the display may momentarily become abnormal screen.
- (3) In case of VCC = off level, please keep the level of input signals on the low or keep a high impedance.
- (4) T4 should be measured after the module has been fully discharged between power off and on period.
- (5) Interface signal shall not be kept at high impedance when the power is on.
- (6) EVERVISION won't take any responsibility for the products which are damaged by the customers not following the Power Sequence.
- (7) There might be slight electronic noise when LCD is turned off (even backlight unit is also off). To avoid this symptom, we suggest "Vcc falling timing" to follow "T7 spec".

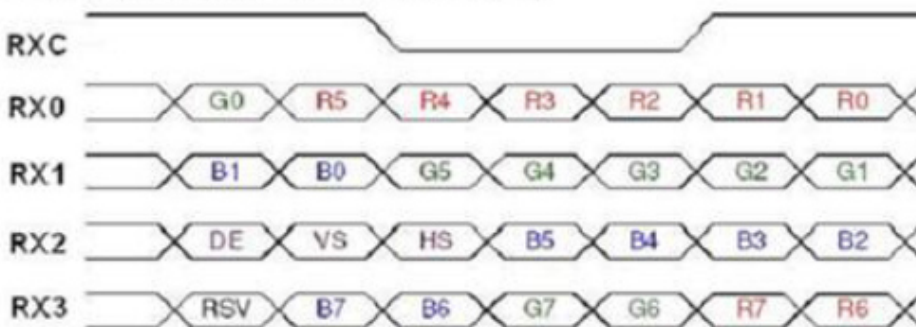
Parameter	Value			Units
	Min	Typ	Max	
T1	0.5	---	10	ms
T2	0	---	50	ms
T3	0	---	50	ms
T4	500	---	---	ms
T5	450	---	---	ms
T6	200	---	---	ms
T7	10	---	100	ms
T8	10	---	---	ms
T9	10	---	---	ms
T10	20	---	50	ms

11.3 The Input Data Format

SEL 6/8="Low" for 6 Bits LVDS



SEL 6/8="High" for 8 Bits LVDS



Note (1) R/G/B data 7: MSB, R/G/B data 0: LSB

Note (2) Please follow PSWG

Signal Name	Description	Remark
R7 R6 R5 R4 R3 R2 R1 R0	Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
G7 G6 G5 G4 G3 G2 G1 G0	Green Data 7 (MSB) GreenData 6 GreenData 5 GreenData 4 GreenData 3 GreenData 2 GreenData 1 GreenData 0 (LSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
B7 B6 B5 B4 B3 B2 B1 B0	Blue Data 7 (MSB) Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
RXCLKIN+ RXCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

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11.4 USB Interface

11.4.1 Single Touch Function

Single Touch Function works with plug'n play under system Windows 2000, Windows XP and Windows 7.

For other operating systems like Linux a driver must be programmed.

11.4.2 Multi Touch Function

The Multi Touch Function works with plug'n play under system Windows 7.

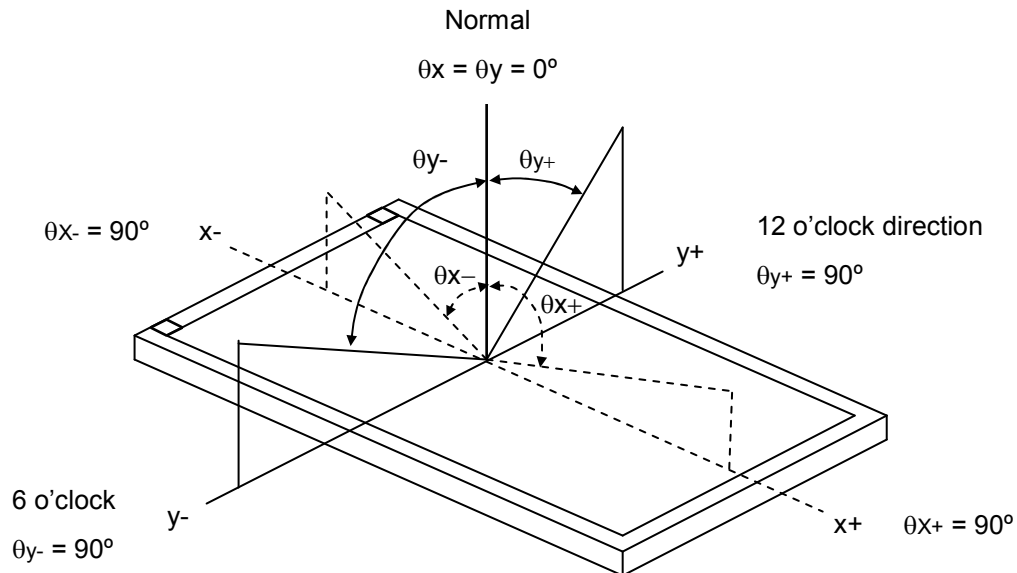
For older Windows systems or other operating systems a driver must be programmed.

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	800	(1000)	-	-	(2)
Response Time		T_R		-	12	17	ms	(3)
		T_F		-	8	13		
Luminance(Center)		Y		410	(520)	-	cd/m ²	(4)
White Variation		δW		70	(80)	-	%	(5)
Color Chromaticity	Red	R _x		0.602	0.652	0.702	-	(1),(4)
		R _y		0.288	0.338	0.388	-	
	Green	G _x		0.276	0.326	0.376	-	
		G _y		0.558	0.608	0.658	-	
	Blue	B _x		0.100	0.150	0.200	-	
		B _y		0.003	0.053	0.103	-	
	White	W _x		0.263	0.313	0.363	-	
		W _y		0.279	0.329	0.379	-	
Viewing Angle	Horizontal	θ_{x+}	CR \geq 10	80	(85)	-	deg.	
		θ_{x-}		80	(85)	-		
	Vertical	θ_{y+}		80	(85)	-		
		θ_{y-}		80	(85)	-		

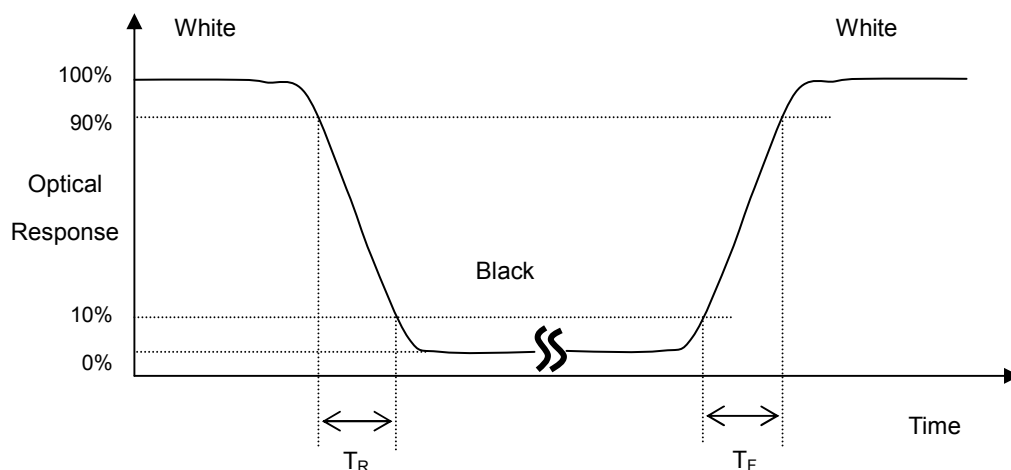
Note (1) Definition of Viewing Angle (θ_x , θ_y):



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

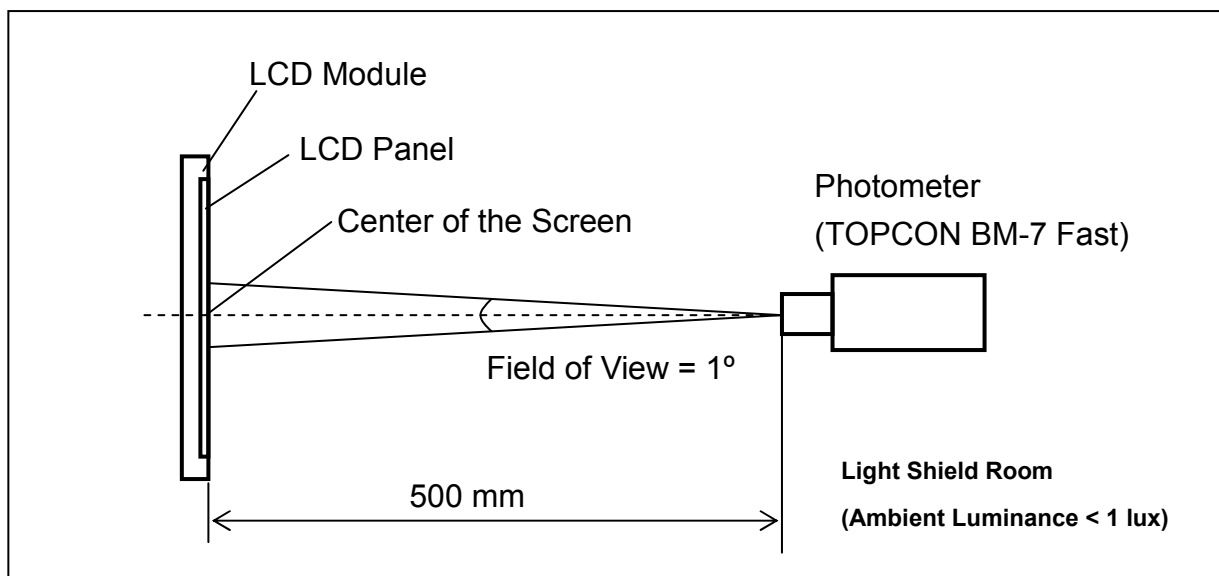
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

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



Note (4) Measurement Set-Up:

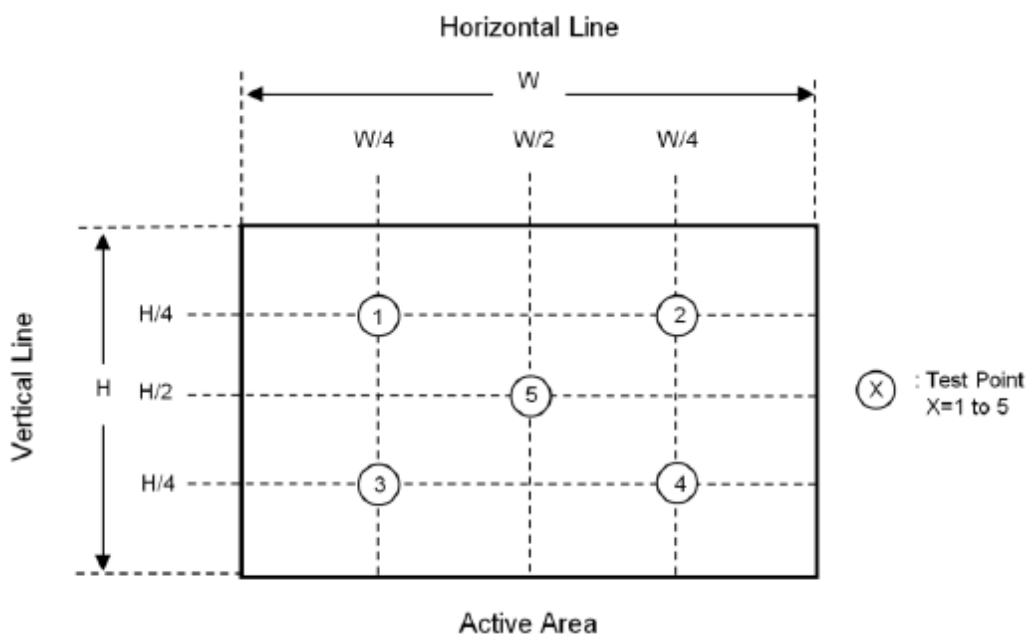
The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a dark room or equivalent condition.


Note (5) Definition of White Variation (δW) :

Measure the luminance of White at 5 points.

Luminance of White : $L(X)$, where X is from 1 to 5.

$$\delta W = \frac{\text{Minimum [} L(1) \text{ to } L(5) \text{]}}{\text{Maximum [} L(1) \text{ to } L(5) \text{]}} \times 100\%$$



13. Reliability Test

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	T _a = 80℃ 240 hours	(1),(3),(4)
2	Low Temperature Storage Test	T _a = -30℃ 240 hours	(1),(3),(4)
3	High Temperature Operation Test	T _s = 80℃ 240 hours	(2),(3),(4)
4	Low Temperature Operation Test	T _a = -30℃ 240 hours	(1),(3),(4),
5	High Temperature and High Humidity Operation Test	T _a =60℃ 90%RH 240 hours	(3), (4)
6	Mechanical Shock Test (non-operating)	Half sine wave, 100G, 6ms 3 times shock of each six surfaces	(3)
7	Vibration Test (non-operating)	Sine wave : 10 ~ 55 ~ 10Hz amplitude : 1.5mm 3 axis, 2 hours/axis	(3)
8	Thermal Shock Test (non-operating)	-30℃ (30min) ~ 80℃ (30min) , 10 cycles	(3) , (4)
9	Drop Test(with Carton)	Height : 80 _{cm} 1 corner, 3 edges, 6 surfaces	(3)

Note 1 : T_a is the ambient temperature of samples.

Note 2 : T_s is the temperature of panel's surface.

Note 3 : In the standard condition, there shall be no practical problem that may affect the display function.
After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note 4 : Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

	PARTS LIST				
	ITEM	SIZE(L×W×H) unit : mm	MATERIAL	Q.T.Y	NOTE
1	BUBBLE BAG	360.0×335.0		12	
2	EPE PAD	430.0×315.0×12.0	EPE	6	
3	EPE PAD	430.0×315.0×35.0	EPE	12	
4	INTERNAL BOX	470.0×328.0×95.0	CARTON	6	
5	EXTERNAL BOX	666.0×475.0×310.0	CARTON	1	
6	PRODUCT	278.0×184.0×12.7		12	

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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.

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15.4 Caution

This Evervision LCD module has been specifically designed for use only in electronic devices in the areas of audio control, office automation, industrial control, home appliances, etc. The modules should not be used in applications where module failure could result in physical harm or loss of life, and Evervision expressly disclaims any and all liability relating in any way to the use of the module in such applications.

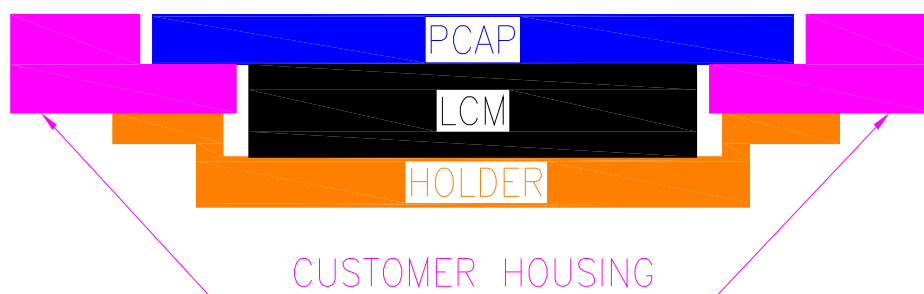
15.5 Precautions of Storage

If the displays are going to be stored for years, please be aware the following notices.

- (1) Please store the displays in a dark room to avoid any damages from sunlight and other sources of UV light.
- (2) The recommended long term storage temperature is between 10 ~35°C and <60% humidity to avoid causing bubbles between polarizer and LCD glasses, and polarizer peeling from LCD glasses.
- (3) It would be better to keep the displays in the container, which is shipped from Evervision, and do not unpack it.
- (4) Please do not stick any labels on the display surface for a long time, especially on the polarizer.

15.6 Cautions for LCM installation

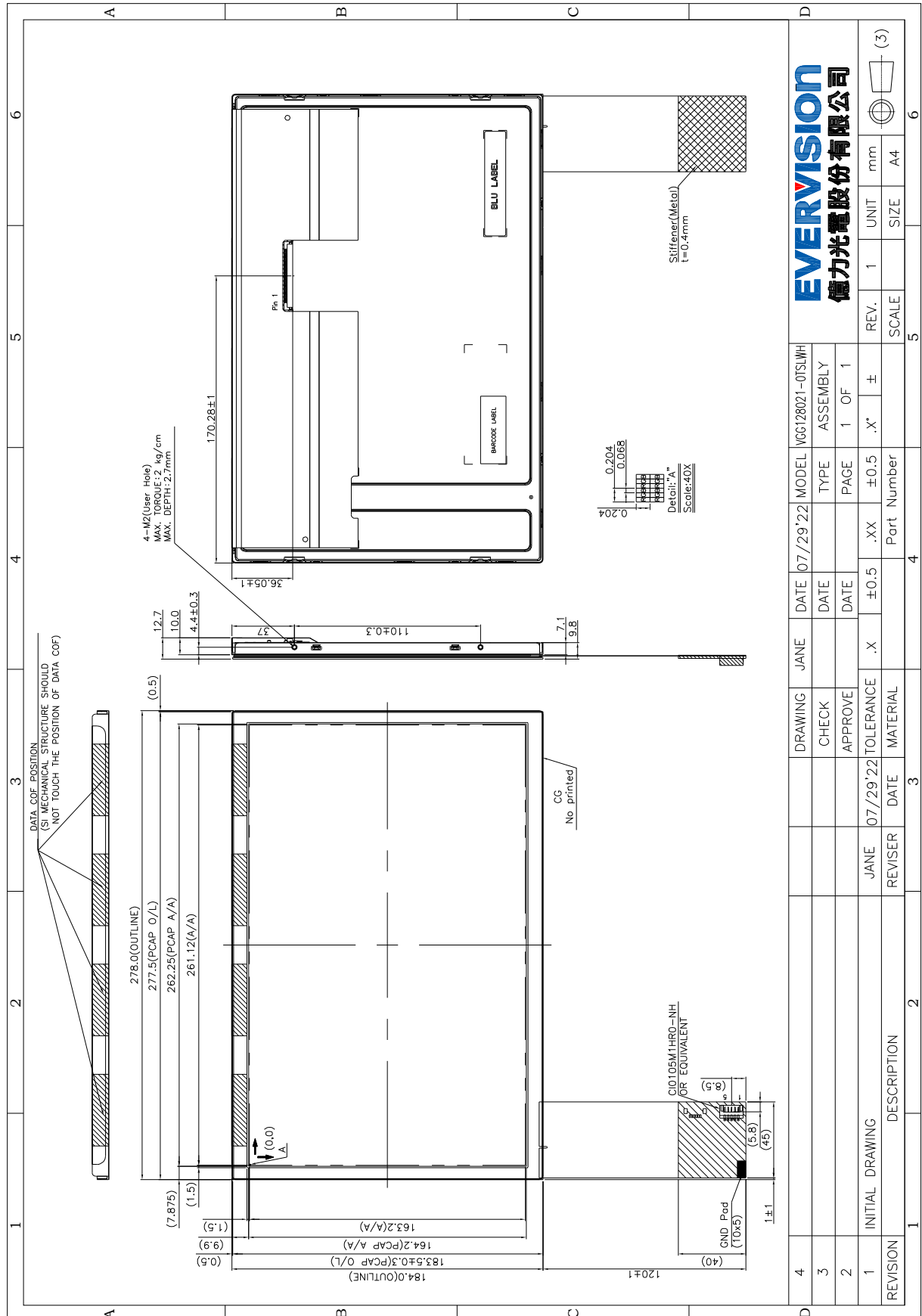
To secure the LCM within customer housing, having appropriate structural support underneath the LCM is a must. The recommended LCM installation with a holder type of the structure into the customer housing is shown below figure. By attaching ONLY the protruding edges of the PCAP with cover lens onto the customer housing does not provide a proper structural support required for the LCM. Such construction may deteriorate the adhesivity between the PCAP with cover lens and the TFT module, especially after a long period of time or from the vibrations encountered during product transportation.



15.7 Cautions for PCAP

To prevent un-expected touch issue and suppress influence noise from system, the LCM metal frame should be connected to system ground in customer's device.

16.Outline Drawing



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17.Definition of Labels

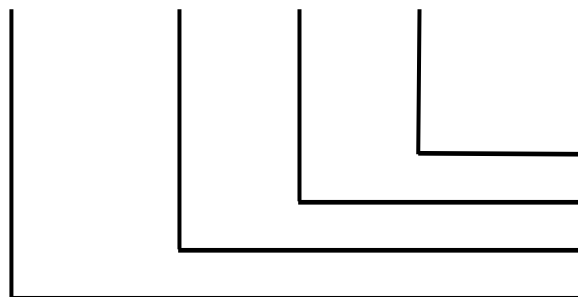
The bar code nameplate is pasted on each module as illustration, and its definitions are as following explanation.



(a) Module Name : VGG128021-0TSLWH

(b) Serial ID :

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



Serial No.
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
Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Mark	K	L	M	N	O	P	Q	R	S	T
Year	2030	2031	2032	2033	2034	2035				
Mark	U	V	W	X	Y	Z				

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) Serial No. (IJKL) :

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

18. Incoming Inspection Standards

1.The environmental condition of inspection

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

- (1) Ambient temperature $20 \pm 5^{\circ}\text{C}$
- (2) Humidity: $50 \pm 25\%$ RH
- (3) Viewing distance is approximately 35 cm
- (4) Viewing angle is normal to the LCD panel as Fig _1(15°)
- (5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection

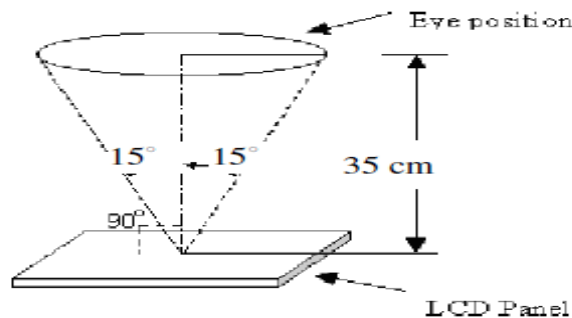


Fig _ 1


2.The defects classify of AQL as following:

- (1) Test method :According to **ANSI/ASQC Z 1.4** .General Inspection Level II take a single time
- (2) The defects classify of AQL as following:

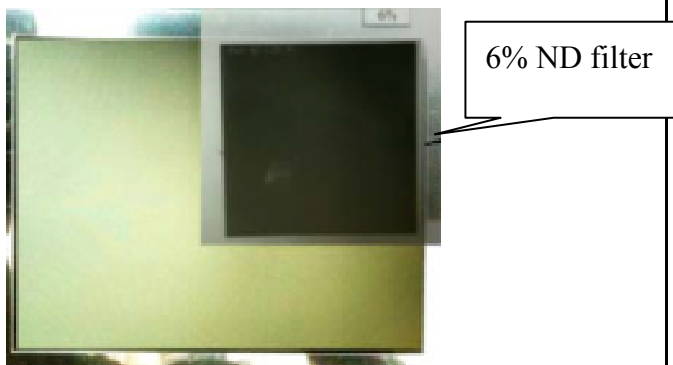
Class of defects	AQL	Definition
Major	0.65%	It is defect that is likely to result in failure or to reduce materially the usability of the intended function.
Minor	1.5%	It is a defect that will not result in functioning problem with deviation classified.


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.	-


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4. Inspection Parameters

Item		Specification/Description		Note
Operating	Point Defect (red ,green ,blue ,dark ,white)	Item	Acceptable number	Note: 1 、 4 、 5
		BRIGHT DOT	$N \leq 3$	
		DARK DOT	$N \leq 5$	
		TOTAL DOT	$N \leq 5$	
		Minimum Distance Between Dark dots ≥ 10 mm		
		Minimum Distance Between Bright dots ≥ 10 mm		
		TWO ADJACENT DOT	$N \leq 1$	
		THREE OR MORE ADJACENT DOT	NOT ALLOWED	
	Foreign Material	Circular Foreign Material : Dark/ Bright Spot	$D \leq 0.15\text{mm}$; Ignore $0.15\text{mm} < D \leq 0.5\text{mm}$, $N \leq 4$	Note:2
		Linear Foreign Material : Bright or Dark Line	$W \leq 0.05\text{mm}$; Ignore $0.05 < W \leq 0.1\text{mm}$ $0.3\text{mm} < L \leq 2.0\text{mm}$ $N \leq 4$	Note:3
	Polarizer	Scratches	$W \leq 0.05\text{mm}$, Ignore $0.05 < W \leq 0.1\text{mm}$, $0.3 < L \leq 2.0\text{mm}$ $N \leq 4$	Note:2
		Dent/Bubble	Avg $0.15 < D \leq 0.5\text{mm}$ $N \leq 4$	Note:3
	MURA&Leak	Weak defect will be defined as mura if it can be observed through ND filter 6% in 50% gray or judge by limit sample if necessary 		-

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Item			Specification/ Description	Note
External Inspection (non-operati ng)	Polarizer	Linear Scratch(Linear Dent)	$W \leq 0.05\text{mm}$, Ignore $0.05 < W \leq 0.1\text{mm}$, $0.3 < L \leq 10.0\text{mm}$ $N \leq 4$	Note:2
		Bubble(Circular Dent)	Avg $0.15 < D \leq 0.5 \text{ mm}$, $N \leq 4$	

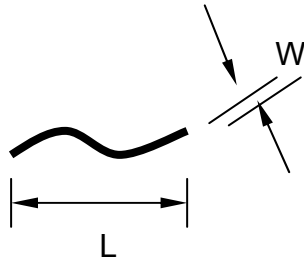
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Incoming Inspection Touch Panel

TBD.

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.

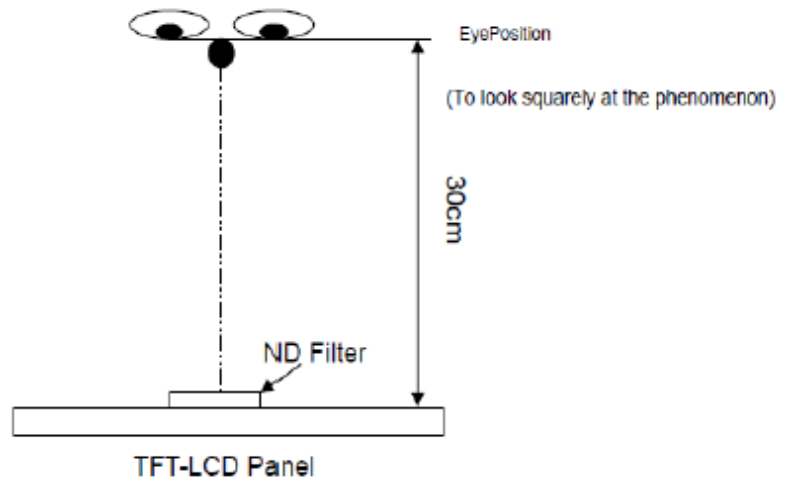
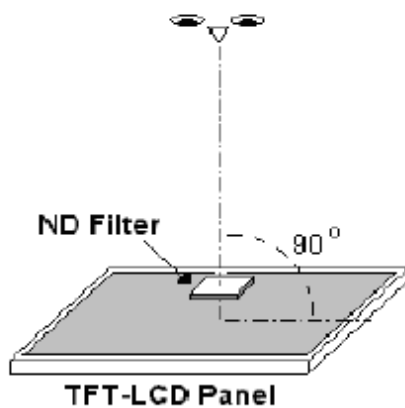
Note2.




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



Note4. Bright dot is defined through 8% transmission ND Filter as following.



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Note5. ADJACENT DOT



5. 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.