Doc. Number :

□ Tentative Specification
□ Preliminary Specification
■ Approval Specification

MODEL NO.: M270KCJ
SUFFIX: K7B

Customer:

APPROVED BY **SIGNATURE**

Name / Title _____ _____
Note
Product Version C1

Please return 1 copy for your confirmation with your signature and comments.

Approved By	Checked By	Prepared By
陳立錚	張耀元	林致成

CONTENTS

REVISION HISTORY

<table>
<tr><th>Version</th><th>Date</th><th>Page</th><th>Description</th></tr>
<tr><td>3.0</td><td>2018.02.21</td><td>All</td><td>Spec Ver.3.0 was first issued.</td></tr>
<tr><td>3.1</td><td>2018.03.06</td><td>6</td><td>Before
<table><tr><td>Display Colors</td><td>1.073G</td></tr><tr><td>Transmissive Mode</td><td>Normally black</td></tr></table>
After
<table><tr><td>Display Colors</td><td>1.073G (8 bits +FRC)</td></tr><tr><td>Transmissive Mode</td><td>AAS mode (Azimuthal Anchoring Switching), Normally Black</td></tr></table></td></tr>
<tr><td>3.2</td><td>2018.06.01</td><td>6</td><td>1.2
Color Gamut 100%sRGB→99%sRGB
Power Consumption :Total 33.5W→36.67W, BL 25.34W→28.51W</td></tr>
<tr><td>3.2</td><td>2018.06.01</td><td>8</td><td>3.1 Note(2)
(a)Compliance condition under normal mode (60Hz,180mA, duty 75%)
(b) when enabling the HDR mode, the required supported ambient temperature range is 15 through 30℃. Please make a note it should keep panel surface temperature under 70℃while operated.</td></tr>
<tr><td>3.2</td><td>2018.06.01</td><td>9</td><td>3.2.2 Backlight unit:
LED Forward Current Per Input Pin: Typ.160→180, Max.168→189
Note(3): Duty=85% → Duty=75%</td></tr>
<tr><td>3.2</td><td>2018.06.01</td><td>11</td><td>Add Ripple Voltage Max:300</td></tr>
<tr><td>3.2</td><td>2018.06.01</td><td>15</td><td>4.3..2
Before
<table><tr><th rowspan="2">Parameter</th><th rowspan="2">Symbol</th><th colspan="3">Value</th><th rowspan="2">Unit</th><th rowspan="2">Note</th></tr><tr><th>Min.</th><th>Typ.</th><th>Max.</th></tr><tr><td>LED Light Bar Input Voltage Per Input Pin</td><td>VPIN</td><td>27.84</td><td>33</td><td>39.6</td><td>V</td><td>(1),(5) IPIN=160mA</td></tr><tr><td>LED Light Bar Current Per Input Pin</td><td>IPIN</td><td>0</td><td>160</td><td>168</td><td>mA</td><td>(1), (2), (5)</td></tr><tr><td>LED Life Time</td><td>LLED</td><td>30000</td><td></td><td></td><td>Hrs</td><td>(3)</td></tr><tr><td>Power Consumption</td><td>PBL</td><td>---</td><td>21.12</td><td>25.344</td><td>W</td><td>(1), (5) IPIN=160mA</td></tr></table>Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:
Note (2) PBL = IPIN × VPIN × (4) input pins ,
Note (3) The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at Ta = 25 ±2 ℃ and I= (80)mA (per chip) until the brightness becomes ≦ 50% of its original value.
Note (4) The module must be operated with constant driving current.
Note (5) Duty=85% for normal mode/ Duty=5%~100% for HDR mode</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td></td>
<td>
After
Normal mode.
<table>
<tr><th rowspan="2">Parameter</th><th rowspan="2">Symbol</th><th colspan="3">Value</th><th rowspan="2">Unit</th><th rowspan="2">Note</th></tr>
<tr><th>Min.</th><th>Typ.</th><th>Max.</th></tr>
<tr><td>LED Light Bar Input Voltage Per Input Pin</td><td>VPIN</td><td>27.84</td><td>33</td><td>39.6</td><td>V</td><td>(1),(5) IPIN=180mA</td></tr>
<tr><td>LED Light Bar Current Per Input Pin</td><td>IPIN</td><td>0</td><td>180</td><td>189</td><td>mA</td><td>(1), (2), (5),(6) Duty=75%</td></tr>
<tr><td>LED Life Time</td><td>LLED</td><td>30000</td><td></td><td></td><td>Hrs</td><td>(3)</td></tr>
<tr><td>Power Consumption</td><td>PBL</td><td>---</td><td>23.76</td><td>28.512</td><td>W</td><td>(1), (5) IPIN=180mA</td></tr>
</table>
HDR mode.
<table>
<tr><th rowspan="2">Parameter</th><th rowspan="2">Symbol</th><th colspan="3">Value</th><th rowspan="2">Unit</th><th rowspan="2">Note</th></tr>
<tr><th>Min.</th><th>Typ.</th><th>Max.</th></tr>
<tr><td>LED Light Bar Input Voltage Per Input Pin</td><td>VPIN</td><td>27.84</td><td>33</td><td>39.6</td><td>V</td><td>(1),(5) IPIN=160mA</td></tr>
<tr><td>LED Light Bar Current Per Input Pin</td><td>IPIN</td><td>0</td><td>180</td><td>189</td><td>mA</td><td>(1), (2), (5),(6) Duty=5%~100%</td></tr>
<tr><td>Power Consumption</td><td>PBL</td><td>---</td><td>23.76</td><td>28.512</td><td>W</td><td>(1), (5) IPIN=160mA</td></tr>
</table>
Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:
Note (2) PBL = IPIN × VPIN × (4) input pins ,
Note (3) The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at Ta = 25 ±2 ℃ and I= (90)mA (per chip) until the brightness becomes ≦ 50% of its original value.
Note (4) The module must be operated with constant driving current.
Note (5) Duty=75% for normal mode/ Duty=5%~100% for HDR mode.
Note (6) When enabling the HDR mode, the required supported ambient temperature range is 15 through 30℃. Please make a note it should keep panel surface temperature under 70℃while operated.
</td>
</tr>
<tr>
<td>3.2</td>
<td>2018.06.01</td>
<td>18</td>
<td>
4.5
Before
Normal mode
<table>
<tr><th>Signal</th><th>Item</th><th>Symbol</th><th>Min.</th><th>Typ.</th><th>Max.</th><th>Unit</th><th>Note</th></tr>
<tr><td rowspan="5">V by One</td><td>Frequency</td><td>Fc</td><td>26.4</td><td>32</td><td>47.6</td><td>MHz</td><td>(1)</td></tr>
<tr><td>Intra-Pair skew</td><td></td><td>-0.3</td><td>-</td><td>0.3</td><td>UI</td><td>(2)</td></tr>
<tr><td>Inter-Pair skew</td><td></td><td>-5</td><td>-</td><td>5</td><td>UI</td><td>(3)</td></tr>
<tr><td>Spread spectrum modulation range</td><td>Fclkin_mod</td><td>F_{clkin}-0.5%</td><td>-</td><td>F_{clkin}+0.5%</td><td>MHz</td><td rowspan="2">(4)</td></tr>
<tr><td>Spread spectrum modulation frequency</td><td>F_{SSM}</td><td>-</td><td>-</td><td>30</td><td>KHz</td></tr>
<tr><td rowspan="4">Vertical Display Term</td><td>Frame Rate</td><td>Fr</td><td>50</td><td>60</td><td>75</td><td>Hz</td><td>(5)(6)</td></tr>
<tr><td>Total</td><td>Tv</td><td>1470</td><td>1481</td><td>1670</td><td>Th</td><td>Tv=Tvd+Tvb</td></tr>
<tr><td>Active Display</td><td>Tvd</td><td>1440</td><td>1440</td><td>1440</td><td>Th</td><td>-</td></tr>
<tr><td>Blank</td><td>Tvb</td><td>30</td><td>41</td><td>230</td><td>Th</td><td>-</td></tr>
<tr><td rowspan="3">Horizontal Display Term</td><td>Total</td><td>Th</td><td>359</td><td>360</td><td>380</td><td>Tc</td><td>Th=Thd+Thb</td></tr>
<tr><td>Active Display</td><td>Thd</td><td>320</td><td>320</td><td>320</td><td>Tc</td><td>-</td></tr>
<tr><td>Blank</td><td>Thb</td><td>35</td><td>40</td><td>60</td><td>Tc</td><td>-</td></tr>
</table>
Gaming mode
<table>
<tr><th>Signal</th><th>Item</th><th>Symbol</th><th>Min.</th><th>Typ.</th><th>Max.</th><th>Unit</th><th>Note</th></tr>
<tr><td rowspan="5">V by One</td><td>Frequency</td><td>Fc</td><td>25</td><td>-</td><td>90</td><td>MHz</td><td>(1)</td></tr>
<tr><td>Intra-Pair skew</td><td></td><td>-0.3</td><td>-</td><td>0.3</td><td>UI</td><td>(2)</td></tr>
<tr><td>Inter-Pair skew</td><td></td><td>-5</td><td>-</td><td>5</td><td>UI</td><td>(3)</td></tr>
<tr><td>Spread spectrum modulation range</td><td>Fclkin_mod</td><td>F_{clkin}-0.5%</td><td>-</td><td>F_{clkin}+0.5%</td><td>MHz</td><td rowspan="2">(4)</td></tr>
<tr><td>Spread spectrum modulation frequency</td><td>F_{SSM}</td><td>-</td><td>-</td><td>30</td><td>KHz</td></tr>
<tr><td rowspan="4">Vertical Display Term</td><td>Frame Rate</td><td>Fr</td><td>30</td><td>-</td><td>165</td><td>Hz</td><td>(5)(6)</td></tr>
<tr><td>Total</td><td>Tv</td><td>1452</td><td>-</td><td>8192</td><td>Th</td><td>Tv=Tvd+Tvb</td></tr>
<tr><td>Active Display</td><td>Tvd</td><td>1440</td><td>1440</td><td>1440</td><td>Th</td><td>-</td></tr>
<tr><td>Blank</td><td>Tvb</td><td>12</td><td>-</td><td>6752</td><td>Th</td><td>-</td></tr>
<tr><td rowspan="3">Horizontal Display Term</td><td>Total</td><td>Th</td><td>359</td><td>360</td><td>1023</td><td>Tc</td><td>Th=Thd+Thb</td></tr>
<tr><td>Active Display</td><td>Thd</td><td>320</td><td>320</td><td>320</td><td>Tc</td><td>-</td></tr>
<tr><td>Blank</td><td>Thb</td><td>35</td><td>40</td><td>703</td><td>Tc</td><td>-</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>
After
Normal mode
<table>
<tr><th>Signal</th><th>Item</th><th>Symbol</th><th>Min.</th><th>Typ.</th><th>Max.</th><th>Unit</th><th>Note</th></tr>
<tr><td rowspan="5">V by One</td><td>Frequency</td><td>Fc</td><td>24.6</td><td>30.2</td><td>47.6</td><td>MHz</td><td>(1)</td></tr>
<tr><td>Intra-Pair skew</td><td></td><td>-0.3</td><td>-</td><td>0.3</td><td>UI</td><td>(2)</td></tr>
<tr><td>Inter-Pair skew</td><td></td><td>-5</td><td>-</td><td>5</td><td>UI</td><td>(3)</td></tr>
<tr><td>Spread spectrum modulation range</td><td>Fclkin_mod</td><td>F_{clkin}-0.5%</td><td>-</td><td>F_{clkin}+0.5%</td><td>MHz</td><td rowspan="2">(4)</td></tr>
<tr><td>Spread spectrum modulation frequency</td><td>F_{SSM}</td><td>-</td><td>-</td><td>30</td><td>KHz</td></tr>
<tr><td rowspan="4">Vertical Display Term</td><td>Frame Rate</td><td>Fr</td><td>50</td><td>60</td><td>75</td><td>Hz</td><td>(5)(6)</td></tr>
<tr><td>Total</td><td>Tv</td><td>1470</td><td>1481</td><td>1670</td><td>Th</td><td>Tv=Tvd+Tvb</td></tr>
<tr><td>Active Display</td><td>Tvd</td><td>1440</td><td>1440</td><td>1440</td><td>Th</td><td>-</td></tr>
<tr><td>Blank</td><td>Tvb</td><td>30</td><td>41</td><td>230</td><td>Th</td><td>-</td></tr>
<tr><td rowspan="3">Horizontal Display Term</td><td>Total</td><td>Th</td><td>335</td><td>340</td><td>380</td><td>Tc</td><td>Th=Thd+Thb</td></tr>
<tr><td>Active Display</td><td>Thd</td><td>320</td><td>320</td><td>320</td><td>Tc</td><td>-</td></tr>
<tr><td>Blank</td><td>Thb</td><td>15</td><td>20</td><td>60</td><td>Tc</td><td>-</td></tr>
</table>
Gaming mode
<table>
<tr><th>Signal</th><th>Item</th><th>Symbol</th><th>Min.</th><th>Typ.</th><th>Max.</th><th>Unit</th><th>Note</th></tr>
<tr><td rowspan="5">V by One</td><td>Frequency</td><td>Fc</td><td>25</td><td>-</td><td>88</td><td>MHz</td><td>(1)</td></tr>
<tr><td>Intra-Pair skew</td><td></td><td>-0.3</td><td>-</td><td>0.3</td><td>UI</td><td>(2)</td></tr>
<tr><td>Inter-Pair skew</td><td></td><td>-5</td><td>-</td><td>5</td><td>UI</td><td>(3)</td></tr>
<tr><td>Spread spectrum modulation range</td><td>Fclkin_mod</td><td>F_{clkin}-0.5%</td><td>-</td><td>F_{clkin}+0.5%</td><td>MHz</td><td rowspan="2">(4)</td></tr>
<tr><td>Spread spectrum modulation frequency</td><td>F_{SSM}</td><td>-</td><td>-</td><td>30</td><td>KHz</td></tr>
<tr><td rowspan="4">Vertical Display Term</td><td>Frame Rate</td><td>Fr</td><td>30</td><td>-</td><td>165</td><td>Hz</td><td>(5)(6)</td></tr>
<tr><td>Total</td><td>Tv</td><td>1452</td><td>-</td><td>8192</td><td>Th</td><td>Tv=Tvd+Tvb</td></tr>
<tr><td>Active Display</td><td>Tvd</td><td>1440</td><td>1440</td><td>1440</td><td>Th</td><td>-</td></tr>
<tr><td>Blank</td><td>Tvb</td><td>12</td><td>-</td><td>6752</td><td>Th</td><td>-</td></tr>
<tr><td rowspan="3">Horizontal Display Term</td><td>Total</td><td>Th</td><td>335</td><td>-</td><td>1023</td><td>Tc</td><td>Th=Thd+Thb</td></tr>
<tr><td>Active Display</td><td>Thd</td><td>320</td><td>320</td><td>320</td><td>Tc</td><td>-</td></tr>
<tr><td>Blank</td><td>Thb</td><td>15</td><td>-</td><td>703</td><td>Tc</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>3.2</td><td>2018.06.01</td><td>26</td><td>
5.1

Before
<table>
<tr><th>Item</th><th>Symbol</th><th>Value</th><th>Unit</th></tr>
<tr><td>Ambient Temperature</td><td>Ta</td><td>25±2</td><td>°C</td></tr>
<tr><td>Ambient Humidity</td><td>Ha</td><td>50±10</td><td>%RH</td></tr>
<tr><td>Supply Voltage</td><td>V_{CC}</td><td>10</td><td>V</td></tr>
<tr><td>Input Signal</td><td colspan="3">According to typical value in "3. ELECTRICAL CHARACTERISTICS"</td></tr>
<tr><td>LED Light Bar Input Current Per Input Pin</td><td>I_{PIN}</td><td>160 ± 1.2</td><td>mA_{DC}</td></tr>
<tr><td>PWM Duty Ratio for normal mode</td><td>D</td><td>85</td><td>%</td></tr>
<tr><td>PWM Duty Ratio for HDR mode</td><td>D_{HDR}</td><td>5~100</td><td>%</td></tr>
<tr><td>LED Light Bar Test Converter</td><td colspan="3">INX 27-D041745</td></tr>
</table>
After
<table>
<tr><th>Item</th><th>Symbol</th><th>Value</th><th>Unit</th></tr>
<tr><td>Ambient Temperature</td><td>Ta</td><td>25±2</td><td>°C</td></tr>
<tr><td>Ambient Humidity</td><td>Ha</td><td>50±10</td><td>%RH</td></tr>
<tr><td>Supply Voltage</td><td>V_{CC}</td><td>10</td><td>V</td></tr>
<tr><td>Input Signal</td><td colspan="3">According to typical value in "3. ELECTRICAL CHARACTERISTICS"</td></tr>
<tr><td>LED Light Bar Input Current Per Input Pin</td><td>I_{PIN}</td><td>180 ± 1.2</td><td>mA_{DC}</td></tr>
<tr><td>PWM Duty Ratio for normal mode</td><td>D</td><td>75</td><td>%</td></tr>
<tr><td>PWM Duty Ratio for HDR mode</td><td>D_{HDR}</td><td>5~100</td><td>%</td></tr>
<tr><td>LED Light Bar Test Converter</td><td colspan="3">INX 27-D041745</td></tr>
</table>
</td></tr>
<tr><td>3.2</td><td>2018.06.01</td><td>29</td><td>5.2

Add Center Luminance of White (Center of Screen) :Min.400

Add Note(9)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

1. GENERAL DESCRIPTION

1.1 OVERVIEW

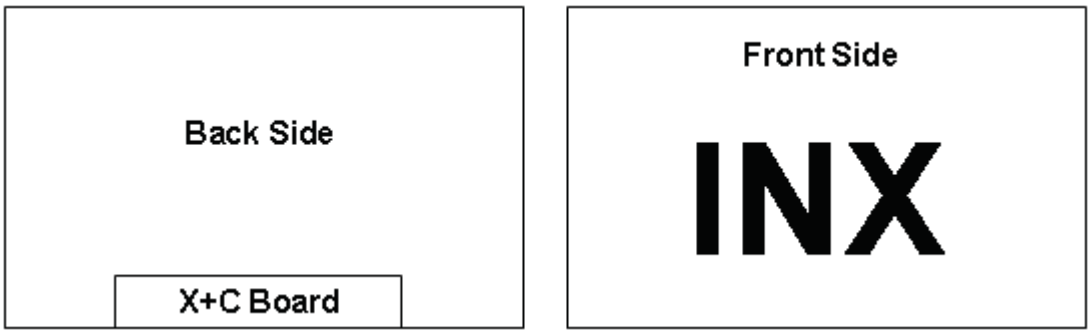
M270KCJ-K7B is a 27.0" TFT Liquid Crystal Display MNT module with WLED Backlight unit and 51 pins 8 lane – V by 1 interface. This module supports 2560 x 1440 QHD mode and can display up to 1.07GM colors. The converter module for Backlight is not built in.

1.2 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Screen Size	27.0" real diagonal		
Driver Element	a-si TFT active matrix	-	-
Pixel Number	2560 x R.G.B. x 1440	pixel	-
Pixel Pitch	0.2331 (H) x 0.2331 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	1.073G (8 bits +FRC)	color	-
Transmissive Mode	AAS mode（Azimuthal Anchoring Switching), Normally Black	-	-
Surface Treatment	AG type, 3H hard coating, Haze 25	-	-
Luminance, White	350	Cd/m2	
Color Gamut	95% of DCI-P3(Typ.)&99% of sRGB.	-	(3)
Display Orientation	Signal input with " INX"		(2)
RoHS, Halogen Free , TCO 6.0& VESA HDR400	RoHS, Halogen Free TCO 6.0 VESA HDR 400 compliance		
Power Consumption	Total 36.67 W (Max.) @ cell 8.16 W (Max.), BL 28.51 W (Max.)		(1)

Note (1) The specified power consumption : Total= cell (reference 4.3.1)+BL (reference 4.3.2)

Note (2)



Note(3) Based on Coverage of DCI-P3/ sRGB color-space on CIE-1976 system

2. MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	608.3	608.8	609.8	mm	(1)
	Vertical (V)	354.63	355.13	356.13	mm	
	Thickness (T)	-	12.8		mm	
Bezel Area	Horizontal	NA	NA	NA	mm	
	Vertical	NA	NA	NA	mm	
Active Area	Horizontal	-	596.736	-	mm	
	Vertical	-	335.664	-	mm	

Weight	2580	2870	3010	g	

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

3. ABSOLUTE MAXIMUM RATINGS

3.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	TST	-20	60	ºC	(1)
Operating Ambient Temperature	TOP	0	50	ºC	(1), (2)

Note (1)

(a) 90 %RH Max..

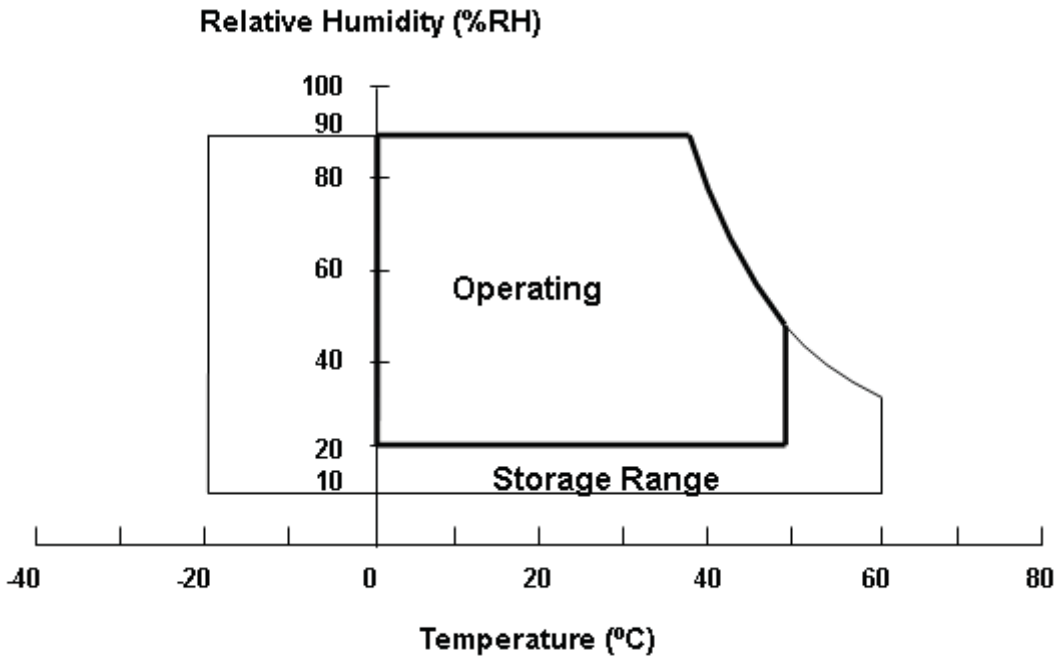
(b) Wet-bulb temperature should be 39 ºC Max.

(c) No condensation.

Note (2)

(a) Compliance condition under normal mode (60Hz,180mA, duty 75%).

(b) When enabling the HDR mode, the required supported ambient temperature range is 15 through 30℃. Please make a note it should keep panel surface temperature under 70℃while operated.



3.2 ELECTRICAL ABSOLUTE RATINGS

3.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VCCS	-0.3	13.5	V	(1)
Logic Input Voltage	V_{IN}	-0.3	3.6	V	

3.2.2 BACKLIGHT UNIT

Item	Symbol	Value			Unit	Note
		Min.	Typ	Max.		
LED Forward Current Per Input Pin	I_F	---	180	189	mA	(1), (2), (3)
LED Reverse Voltage Per Input Pin	V_R	---	---	---	V	
LED Pulse Forward Current Per Input Pin	I_P	---	---	500	mA	(1), (2) Pulse Width≦10msec. and Duty≦10%

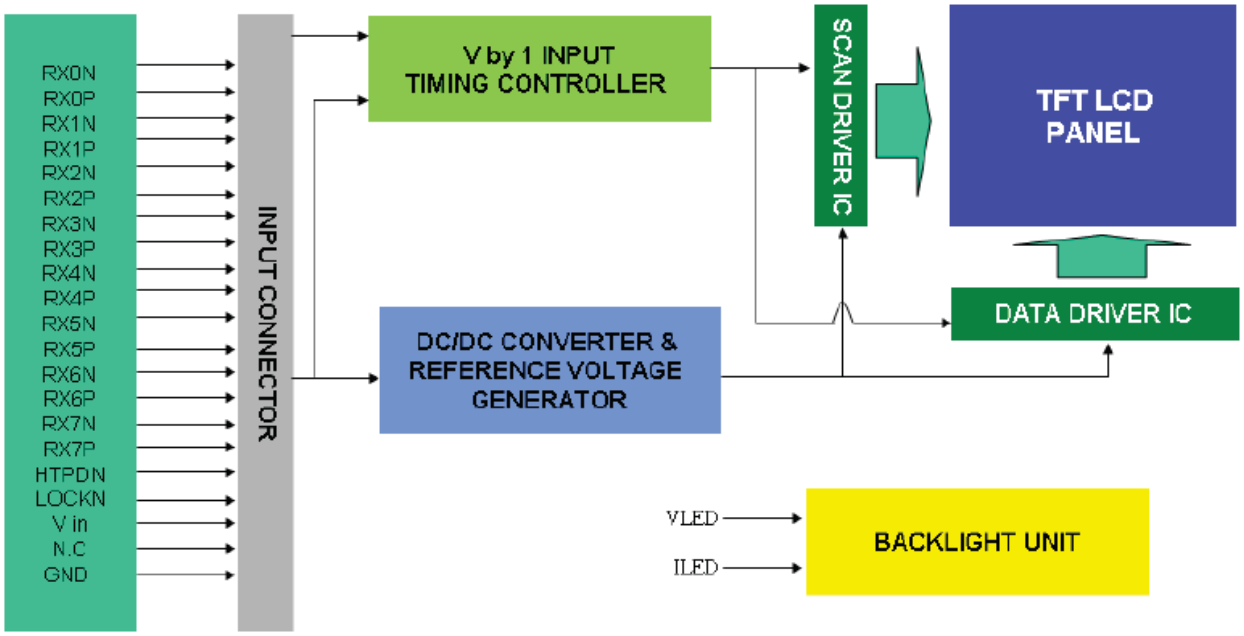
Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for input pin of LED light bar at Ta=25±2 ℃ (Refer to 4.3.3 and 4.3.4 for further information).

Note (3) Duty=75% for normal mode/ Duty=5%~100% for HDR mode

4. ELECTRICAL SPECIFICATIONS

4.1 FUNCTION BLOCK DIAGRAM



4.2. INTERFACE CONNECTIONS

PIN ASSIGNMENT

Pin	Name	Description	Note
1	Vin	Power input (+12V)	
2	Vin	Power input (+12V)	
3	Vin	Power input (+12V)	
4	Vin	Power input (+12V)	
5	Vin	Power input (+12V)	
6	Vin	Power input (+12V)	
7	Vin	Power input (+12V)	
8	Vin	Power input (+12V)	
9	N.C.	No Connection	(2)
10	GND	Ground	
11	GND	Ground	
12	GND.	Ground	
13	GND.	Ground	
14	GND.	Ground	
15	N.C.	No Connection	(2)
16	N.C.	No Connection	(2)
17	N.C.	No Connection	(2)
18	N.C	For internal use, no connection	
19	N.C	For internal use, no connection	
20	N.C.	No Connection	(2)
21	N.C.	No Connection	(2)
22	N.C.	No Connection	(2)
23	N.C.	No Connection	(2)
24	N.C.	No Connection	(2)
25	HTPDN	Hot plug detect output, Open drain.	
26	LOCKN	Lock detect output, Open drain.	
27	GND	Ground	
28	RX0N	1st Pixel Negative VbyOne differential data input in area A. Lan 0	(1)
29	RX0P	1st Pixel Positive VbyOne differential data input in area A. Lan 0	
30	GND	Ground	
31	RX1N	2nd Pixel Negative VbyOne differential data input in area A. Lan 1	(1)
32	RX1P	2nd Pixel Positive VbyOne differential data input in area A. Lan 1	
33	GND	Ground	
34	RX2N	3rd Pixel Negative VbyOne differential data input in area A. Lan 2	(1)
35	RX2P	3rd Pixel Positive VbyOne differential data input in area A. Lan 2	
36	GND	Ground	
37	RX3N	4th Pixel Negative VbyOne differential data input in area A. Lan 3	(1)
38	RX3P	4th Pixel Positive VbyOne differential data input in area A. Lan 3	
39	GND	Ground	
40	RX4N	5th Pixel Negative VbyOne differential data input in area A. Lan 4	(1)
41	RX4P	5th Pixel Positive VbyOne differential data input in area A. Lan 4	
42	GND	Ground	
43	RX5N	6th Pixel Negative VbyOne differential data input in area A. Lan 5	(1)
44	RX5P	6th Pixel Positive VbyOne differential data input in area A. Lan 5	
45	GND	Ground	
46	RX6N	7th Pixel Negative VbyOne differential data input in area A. Lan 6	(1)
47	RX6P	7th Pixel Positive VbyOne differential data input in area A. Lan 6	
48	GND	Ground	

Pin	Name	Description	Note
49	RX7N	8th Pixel Negative VbyOne differential data input in area A. Lan 7	(1)
50	RX7P	8th Pixel Positive VbyOne differential data input in area A. Lan 7	
51	GND	Ground	

Connector Information

Item	Description
Manufacturer	FCN/ P-TWO
Type part number	FCN: WF23-402-5133 P-TWO: 187059-51221
User's Mating housing part number	JAE: FI-RE51HL

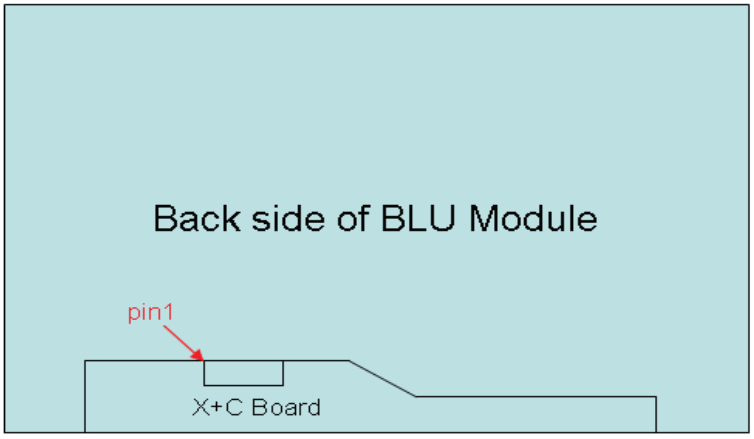
*Notice: There would be compatible issues if not using the indicated connectors in the matching list.

Note (1) V-by-One® HS Data Mapping

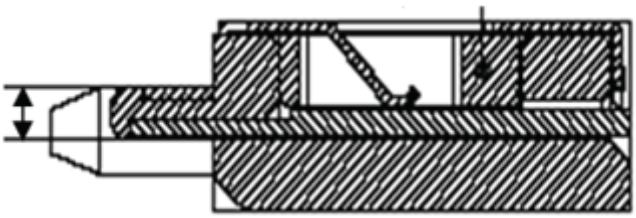
Lan	Data Stream
Lan 0	1, 9, 17, ..., 2545, 2553
Lan 1	2, 10, 18, ..., 2546, 2554
Lan 2	3, 11, 19, ..., 2547, 2555
Lan 3	4, 12, 20, ..., 2548, 2556
Lan 4	5, 13, 21, ..., 2549, 2557
Lan 5	6, 14, 22, ..., 2550, 2558
Lan 6	7, 15, 23, ..., 2551, 2559
Lan 7	8, 16, 24, ..., 2552, 2560

Note (2) Reserved for internal use. Please leave it open.

Note (3) V-by-One HS connector pin order defined as following:

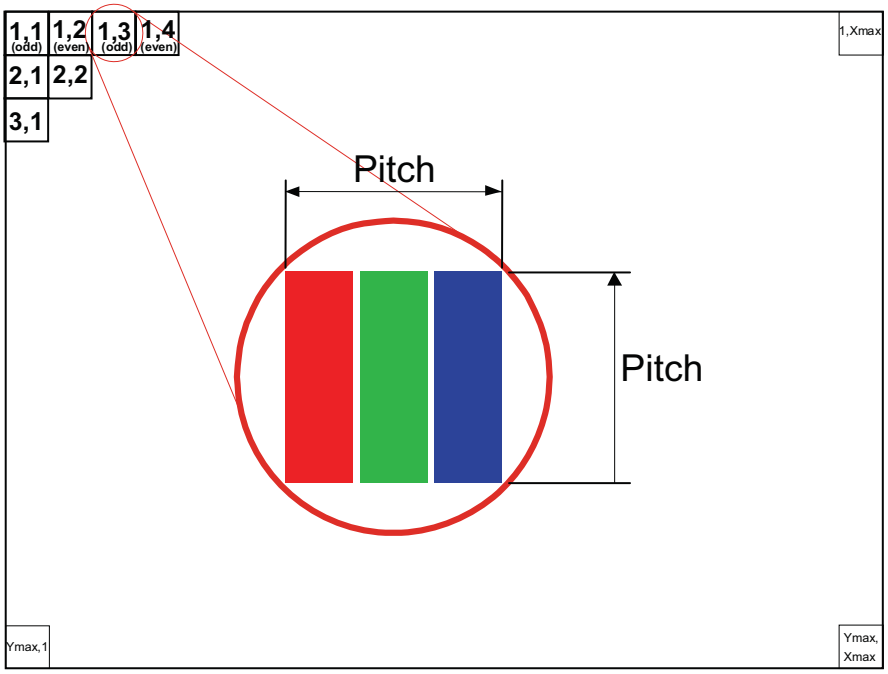


Note (4) V-by-One connector mating dimension range request is 0.93mm~1.0mm as below:



Note (5) The first pixel is odd.

Note (6) Input signal of even and odd clock should be the same timing



4.3 ELECTRICAL CHARACTERISTICS

4.3.1 LCD ELETRONICS SPECIFICATION

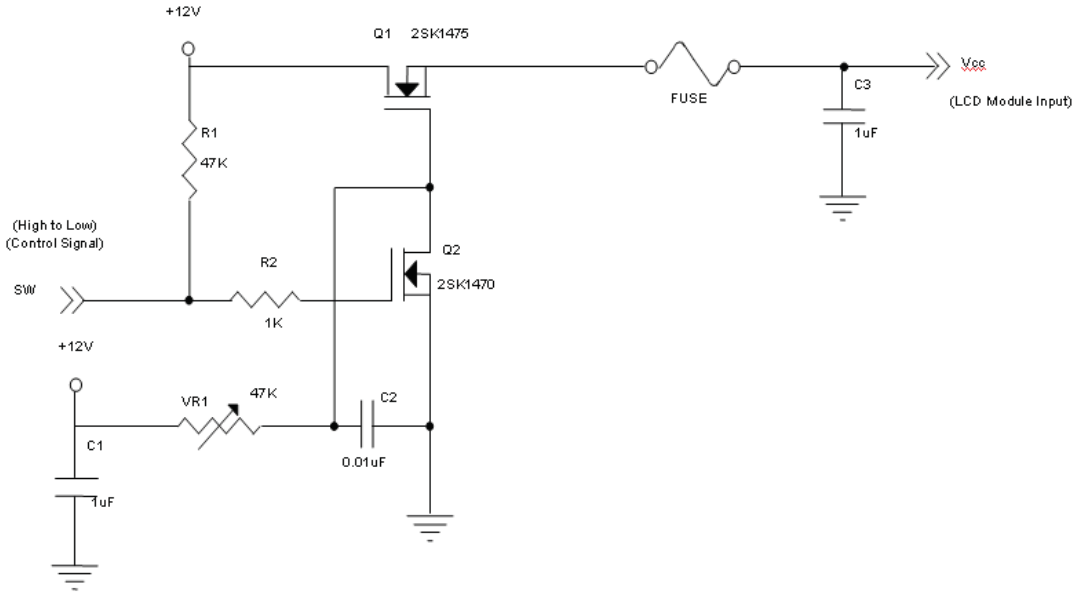
(Ta = 25 ± 2 ºC)

Normal mode (Typ.60Hz)

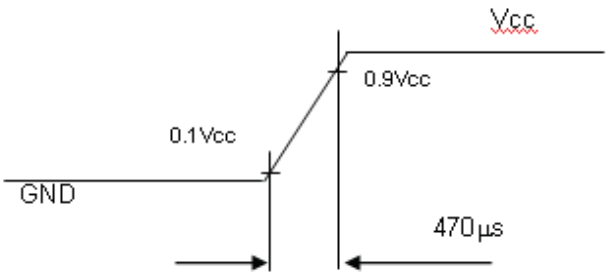
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V_{CC}	10.8	12	13.2	V	(1)
Ripple Voltage		V_{RP}	—	—	300	mV	-
Rush Current		I_{RUSH}	—	—	3	A	(2)
Power Consumption	White Pattern	P_T	—	6.36	8.16	W	(3)
	Black Pattern	P_T	—	6.36	8.16	W	
	Horizontal Stripe	P_T	—	8.88	11.52	W	
Power Supply Current	White Pattern	—	—	0.53	0.68	A	(3)
	Black Pattern	—	—	0.53	0.68	A	
	Horizontal Stripe	—	—	0.74	0.96	A	
VbyOne HS	Differential Input High Threshold Voltage	VLVTH	—	—	+50	mV	
	Differential Input Low Threshold Voltage	VLVTL	-50	—	—	mV	
	Differential Input Resistor	RRIN	80	100	120	ohm	
CMOS interface	Input High Threshold Voltage	VIH	2.7	—	3.3	V	

Note (1) The module should be always operated within the above ranges. The ripple voltage should be controlled under 10 % of Vcc (Typ.)

Note (2) Measurement Conditions:



Vcc rising time is 470µs



Note (3) The specified power supply current is under the conditions at Vcc = 12.0 V, Ta = 25 ± 2 ºC, Fr = 60Hz, whereas a power dissipation check pattern below is displayed.

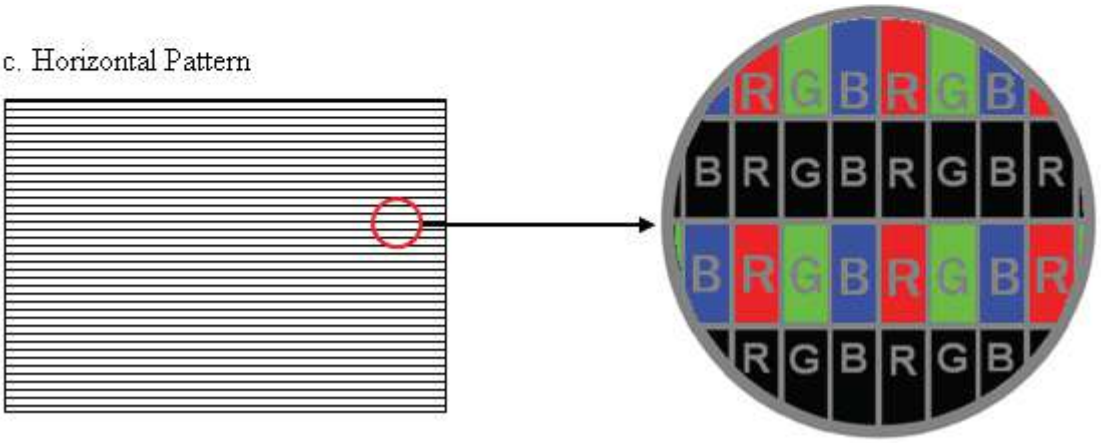
a. White Pattern

Active Area

b. Black Pattern

Active Area

c. Horizontal Pattern



.

4.3.2 BACKLIGHT UNIT

Normal mode

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Light Bar Input Voltage Per Input Pin	VPIN	27.84	33	39.6	V	(1),(5) IPIN=180mA
LED Light Bar Current Per Input Pin	IPIN	0	180	189	mA	(1), (2), (5),(6) Duty=75%
LED Life Time	LLED	30000			Hrs	(3)
Power Consumption	PBL	---	23.76	28.512	W	(1), (5) IPIN=180mA

HDR mode

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Light Bar Input Voltage Per Input Pin	VPIN	27.84	33	39.6	V	(1),(5) IPIN=180mA
LED Light Bar Current Per Input Pin	IPIN	0	180	189	mA	(1), (2), (5),(6) Duty=5%~100%
Power Consumption	PBL	---	23.76	28.512	W	(1), (5) IPIN=180mA

Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:

Note (2) PBL = IPIN × VPIN × (4) input pins ,

Note (3) The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at Ta = 25 ±2 ℃ and I= (90)mA (per chip) until the brightness becomes ≦ 50% of its original value.

Note (4) The module must be operated with constant driving current.

Note (5) Duty=75% for normal mode/ Duty=5%~100% for HDR mode

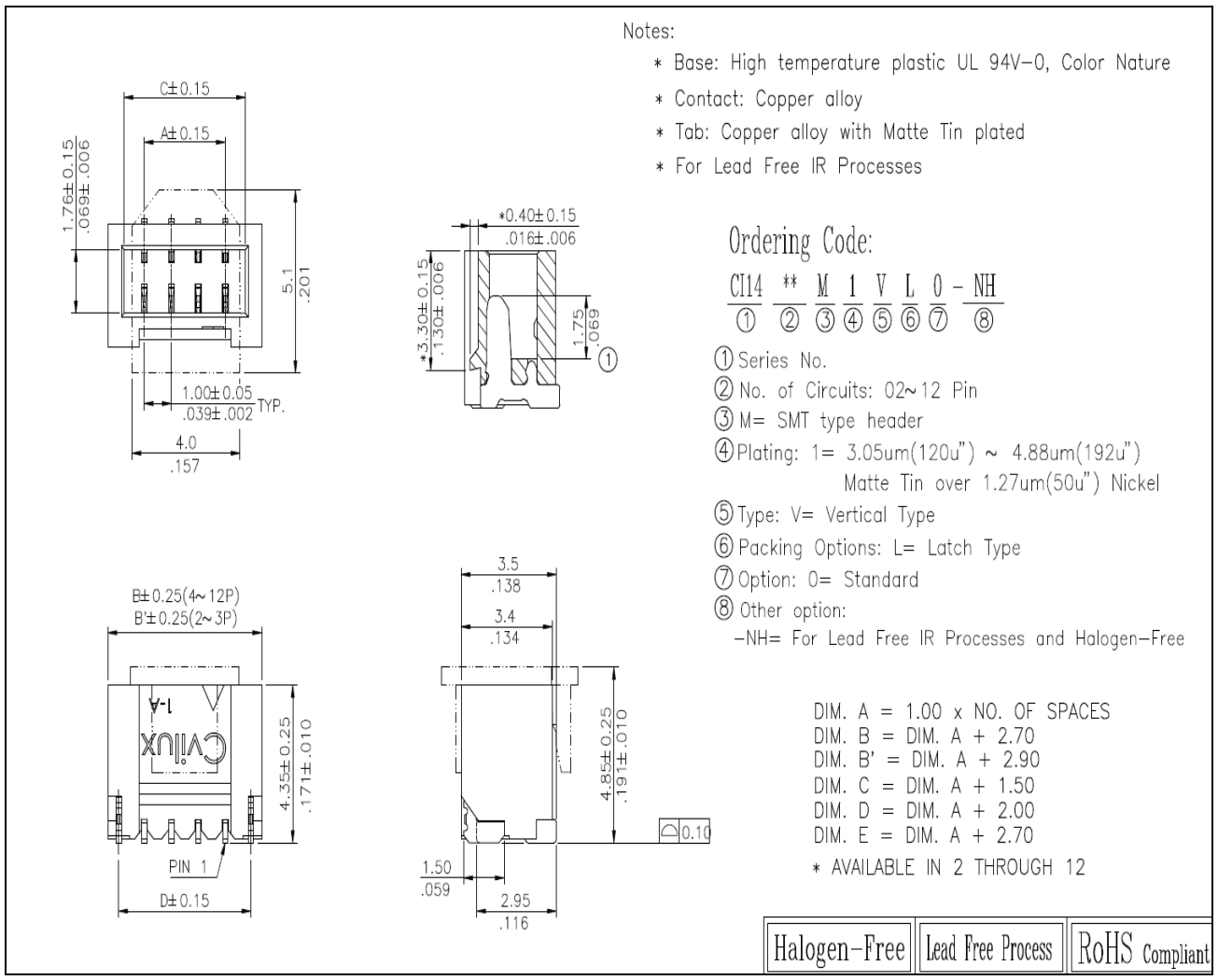
Note (6) When enabling the HDR mode, the required supported ambient temperature range is 15 through 30℃. Please make a note it should keep panel surface temperature under 70℃while operated.

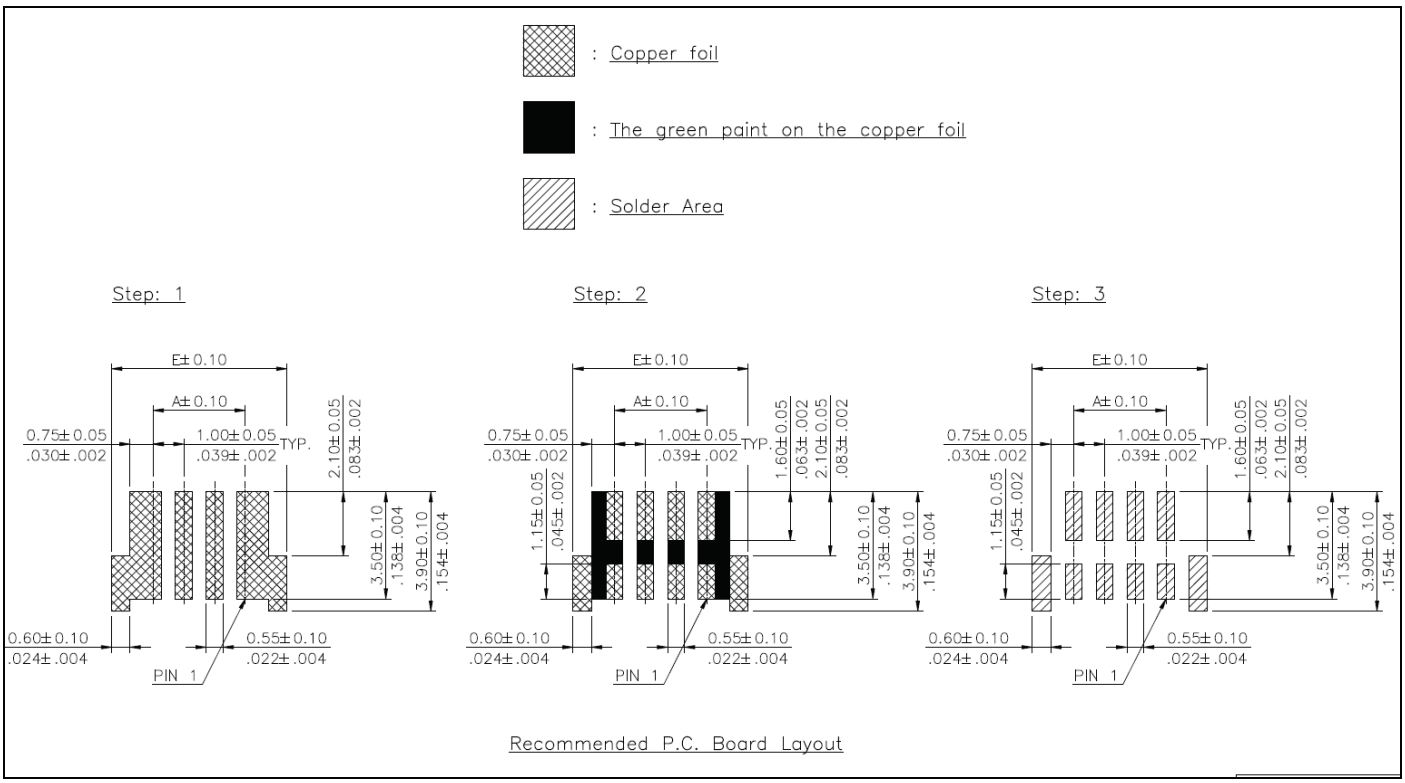
4.3.3 LIGHTBAR CONNECTOR PIN ASSIGNMENT

Connector:

Note(1) Connector(wire type): CviLux(CI1406M1VL0-NH)or equivalent.

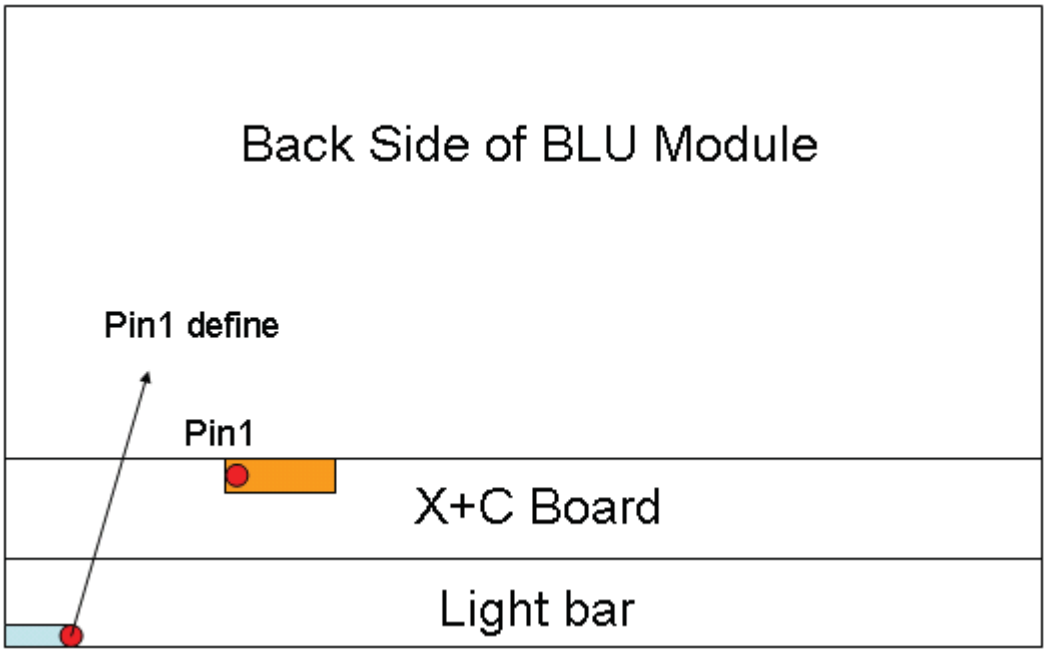
Note(2) User's mating connector part No.: FCN(WF1300106-B) or CviLux(CI1406SL000-NH) and hook width must be less than 4.5mm.





CN1

Pin number	Description
1	Cathode of LED string
2	Cathode of LED string
3	VLED
4	VLED
5	Cathode of LED string
6	Cathode of LED string



4.4 V BY ONE INPUT SIGNAL SPECIFICATIONS

4.4.1 V BY ONE DATA MAPPING TABLE

Lan	Data Stream
Lan 0	1, 9, 17, ..., 2545, 2553
Lan 1	2, 10, 18, ..., 2546, 2554
Lan 2	3, 11, 19, ..., 2547, 2555
Lan 3	4, 12, 20, ..., 2548, 2556
Lan 4	5, 13, 21, ..., 2549, 2557
Lan 5	6, 14, 22, ..., 2550, 2558
Lan 6	7, 15, 23, ..., 2551, 2559
Lan 7	8, 16, 24, ..., 2552, 2560

4.4.2 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 10-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 versus data input.

Color		Data Signal																															
		Red										Green										BLUE											
		R9	R8	G7	G6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	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	0
	Red	1	1	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
	Green	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	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	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Cyan	0	0	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
	Magenta	1	1	1	1	1	1	1		1	1	0	0	0	0	0	0	0	0	0	0	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	1	1	1	1	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	0
	Red(1)	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	0	0	0	0	0
	Red(2)	0	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(1021)	1	1	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
	Red(1022)	1	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
	Red(1023)	1	1	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
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	0
	Green(1)	0	0	0	0	0	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
	Green(2)	0	0	0	0	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(1021)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0
	Green(1022)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Green(1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	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	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	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	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(1021)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1
	Blue(1022)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
	Blue(1023)	0	0	0	0	0	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

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

4.5 DISPLAY TIMING SPECIFICATIONS

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

Normal mode

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
V by One	Frequency	Fc	24.6	30.2	47.6	MHz	(1)
	Intra-Pair skew		-0.3	-	0.3	UI	(2)
	Inter-Pair skew		-5	-	5	UI	(3)
	Spread spectrum modulation range	Fclkin_mod	F_{clkin}-0.5%	-	F_{clkin}+0.5%	MHz	(4)
	Spread spectrum modulation frequency	F_{SSM}	-	-	30	KHz	
Vertical Display Term	Frame Rate	Fr	50	60	75	Hz	(5)(6)
	Total	Tv	1470	1481	1670	Th	Tv=Tvd+Tvb
	Active Display	Tvd	1440	1440	1440	Th	-
	Blank	Tvb	30	41	230	Th	-
Horizontal Display Term	Total	Th	335	340	380	Tc	Th=Thd+Thb
	Active Display	Thd	320	320	320	Tc	-
	Blank	Thb	15	20	60	Tc	-

Note (1) Because this module is operated by DE only mode, Hsync and Vsync input signals are ignored.

Fc = Fr X Tv X Th

Please make sure the range of pixel clock has follow the below equation and Fc, Fr, Tv , Th not allowed to get beyond the min or max spec.

Gaming mode

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
V by One	Frequency	Fc	25	-	88	MHz	(1)
	Intra-Pair skew		-0.3	-	0.3	UI	(2)
	Inter-Pair skew		-5	-	5	UI	(3)
	Spread spectrum modulation range	Fclkin_mod	F_{clkin}-0.5%	-	F_{clkin}+0.5%	MHz	(4)
	Spread spectrum modulation frequency	F_{SSM}	-	-	30	KHz	
Vertical Display Term	Frame Rate	Fr	30	-	165	Hz	(5)(6)
	Total	Tv	1452	-	8192	Th	Tv=Tvd+Tvb
	Active Display	Tvd	1440	1440	1440	Th	-
	Blank	Tvb	12	-	6752	Th	-
Horizontal Display Term	Total	Th	335	-	1023	Tc	Th=Thd+Thb
	Active Display	Thd	320	320	320	Tc	-
	Blank	Thb	15	-	703	Tc	-

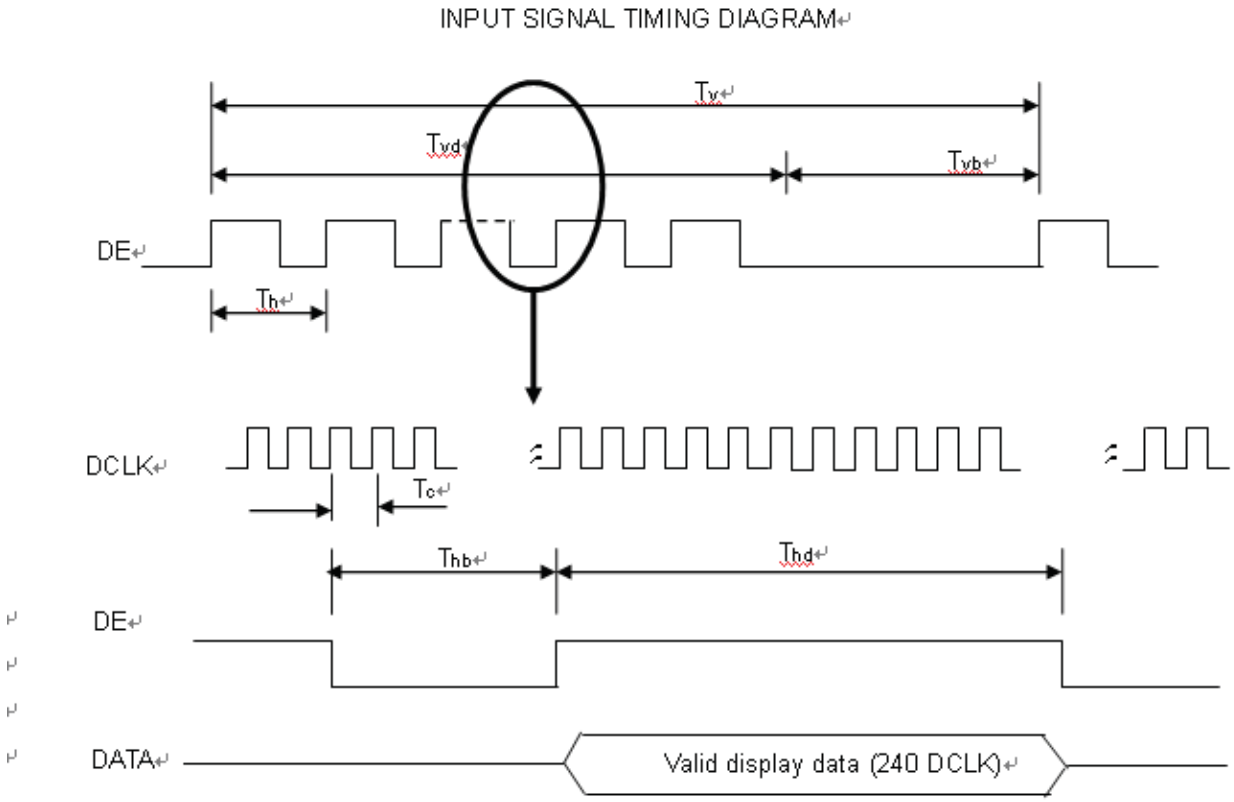
Note : The optimal Vertical Frame Rate is 119~165Hz for best picture quality

Note (1) Because this module is operated by DE only mode, Hsync and Vsync input signals are ignored.

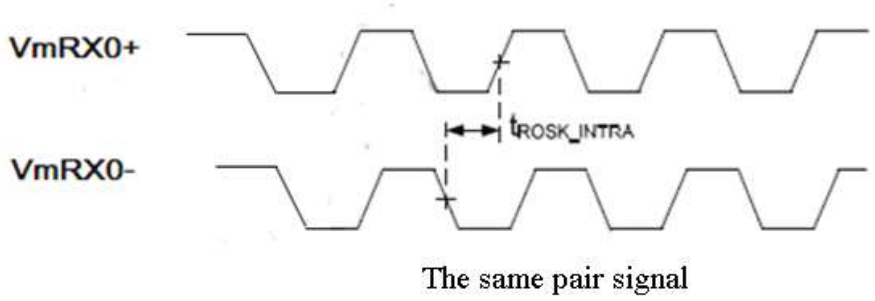
Fc = Fr X Tv X Th

Please make sure the range of pixel clock has follow the below equation and Fc, Fr, Tv , Th not allowed to get beyond the min or max spec.

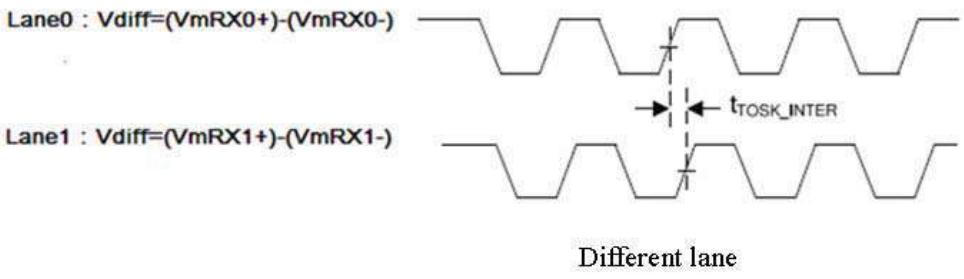
INPUT SIGNAL TIMING DIAGRAM



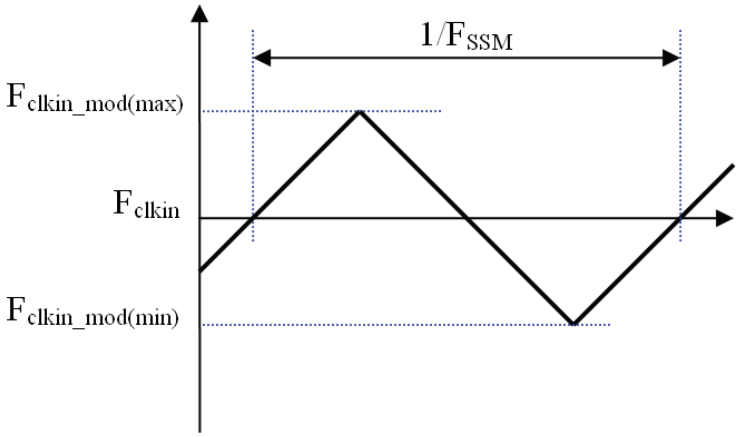
Note (2) V-by-One HS Intra-pair skew



Note (3) V-by-One HS Inter-pair skew

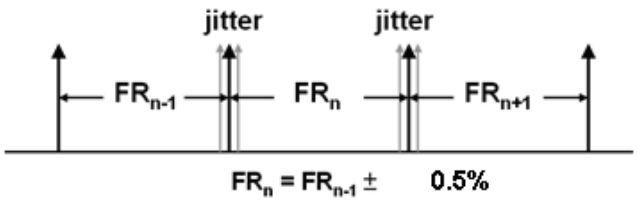


Note (4) The SSCG (Spread spectrum clock generator) is defined as below figures.



Note (5) The frame-to-frame jitter of the input frame rate is defined as the below figures. FRn = FRn-1 ± 0.5%.

Note (6) The setup of the frame rate jitter > 0.5% may result in the cosmetic LED backlight symptom and the electric function is affected.



4.6 V BY ONE INPUT SIGNAL TIMING DIAGRAM

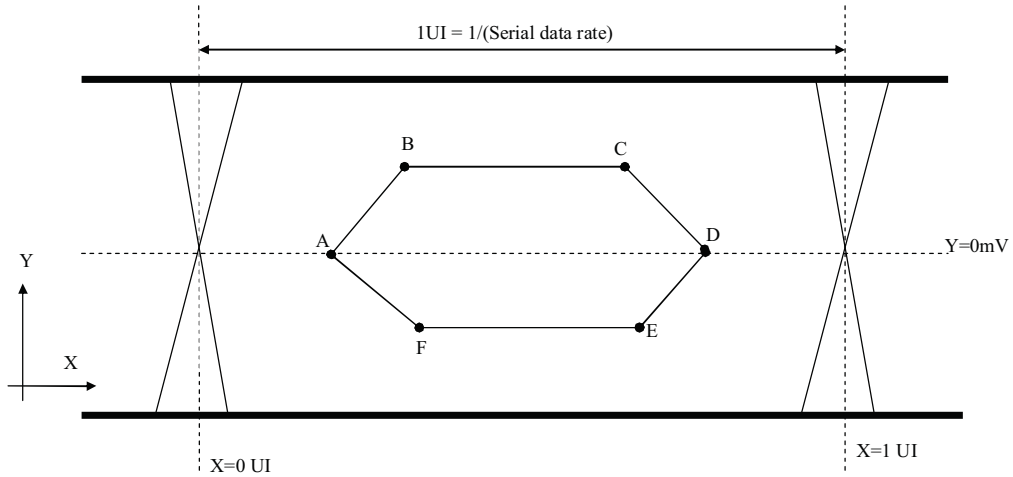


Table 1 Eye Mask Specification

	X [UI]	Y [mV]	Note
A	0.25	0	(1)
B	0.3	50	(1)
C	0.7	50	(1)
D	0.75	0	(1)
E	0.7	-50	(1)
F	0.3	-50	(1)

Note (1) Input levels of V-by-One HS signals are comes from “V-by-One HS Stander Ver.1.4”

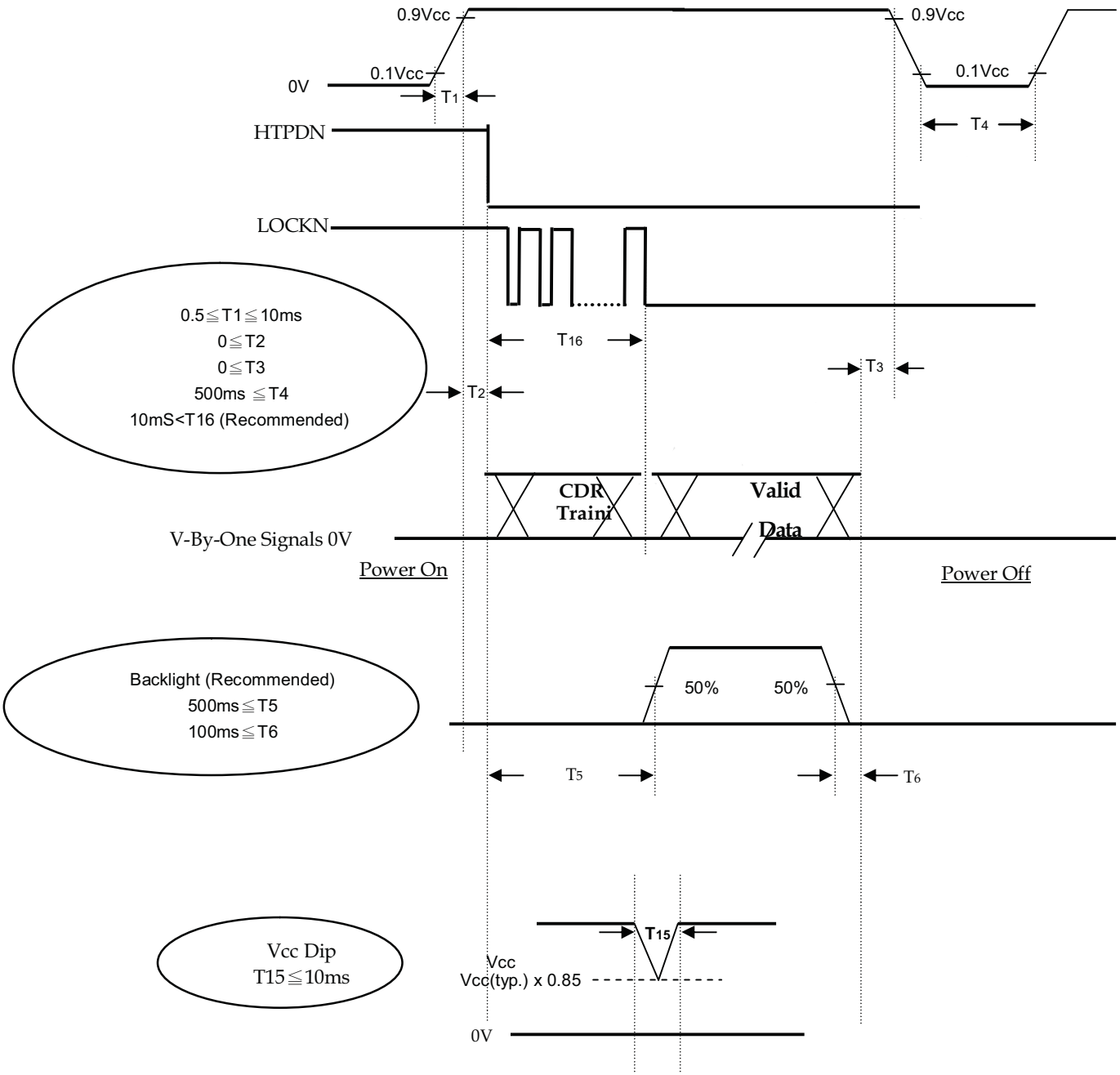
4.7 BYTE LENGTH AND COLOR MAPPING OF V-BY-ONE HS

Packer input & Unpacker output		30bpp RGB (10bit)
Byte 0	D[0]	R[2]
	D[1]	R[3]
	D[2]	R[4]
	D[3]	R[5]
	D[4]	R[6]
	D[5]	R[7]
	D[6]	R[8]
	D[7]	R[9]
Byte 1	D[8]	G[2]
	D[9]	G[3]
	D[10]	G[4]
	D[11]	G[5]
	D[12]	G[6]
	D[13]	G[7]
	D[14]	G[8]
	D[15]	G[9]
Byte 2	D[16]	B[2]
	D[17]	B[3]
	D[18]	B[4]
	D[19]	B[5]
	D[20]	B[6]
	D[21]	B[7]
	D[22]	B[8]
	D[23]	B[9]
Byte 3	D[24]	X
	D[25]	X
	D[26]	B[0]
	D[27]	B[1]
	D[28]	G[0]
	D[29]	G[1]
	D[30]	R[0]
	D[31]	R[1]

4.8 POWER ON/OFF SEQUENCE

(Ta = 25 ± 2 ºC)

To prevent a latch-up or DC operation of LCD module, 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 follow the definition of Vcc.

Note (2) Apply the LED voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen..

Note (3) In case of Vcc is in off level, please keep the level of input signals on the low or high impedance. If T2<0,that maybe cause electrical overstress failure.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period..

Note (5) Interface signal shall not be kept at high impedance when the power is on

Note (6) Vcc must decay smoothly when power-off

5. OPTICAL CHARACTERISTICS

5.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	10	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Light Bar Input Current Per Input Pin	I_{PIN}	180 ± 1.2	mA_{DC}
PWM Duty Ratio for normal mode	D	75	%
PWM Duty Ratio for HDR mode	$D_{\_HDR}$	5~100	%
LED Light Bar Test Converter	INX 27-D041745		

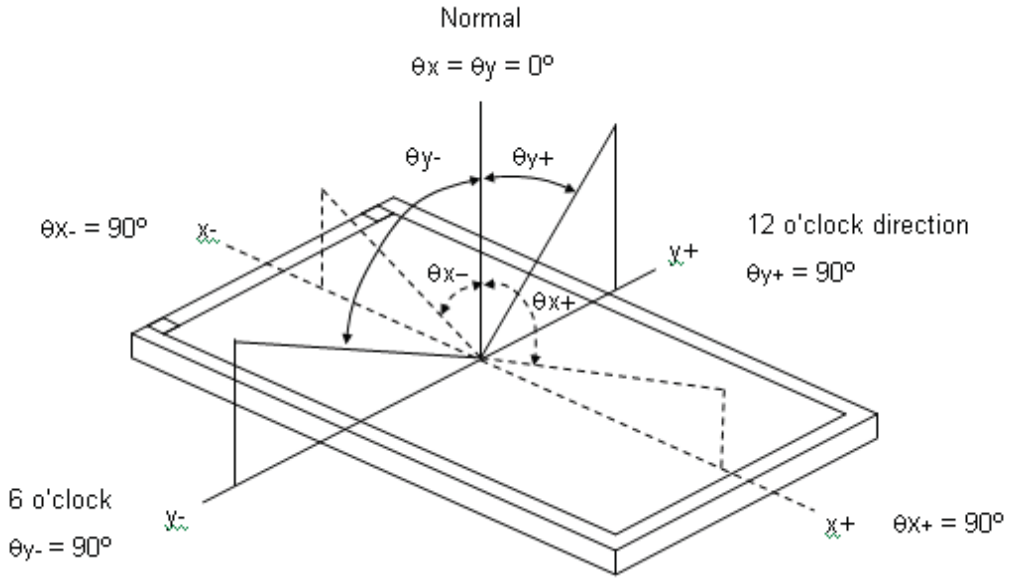
5.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 5.2. The following items should be measured under the test conditions described in 5.1 and stable environment shown in Note (5).

(Ta=25±2 ºC,fv=60Hz

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity (CIE 1931)	Red	Rx	θ_x=0°, θ_Y =0° CS-2000 R=G=B=255 Gray scale	Typ – 0.03	0.678	Typ + 0.03	-	(1), (5)
		Ry			0.310			
	Green	Gx			0.266			
		Gy			0.663			
	Blue	Bx			0.148			
		By			0.053			
	White	Wx			0.313			
		Wy			0.329			
Center Luminance of White (Center of Screen)		L_C		280	350	-	cd/m^2	(4), (5)
Center Luminance of White (Center of Screen)		$Lc_{\_HDR}$		400			cd/m^2	(9)
Contrast Ratio		CR		700	1000	-	-	(2), (5)
Response Time		T_R	θ_x=0°, θ_Y =0°	-	8	13	ms	(3)
		T_F		-	7	12		
White Variation		W	θ_x=0°, θ_Y =0°	75	-	-	%	(5), (6)
Viewing Angle	Horizontal	x- + x+	CR ≧ 10	170	178	---	Deg.	(1), (5)
	Vertical	y- + y+		170	178	---		
Crosstalk		CT				2.0	%	(7)
Flicker		FLK				-15	dB	(8)

Note (1) Definition of Viewing Angle (θx, θy):



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

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

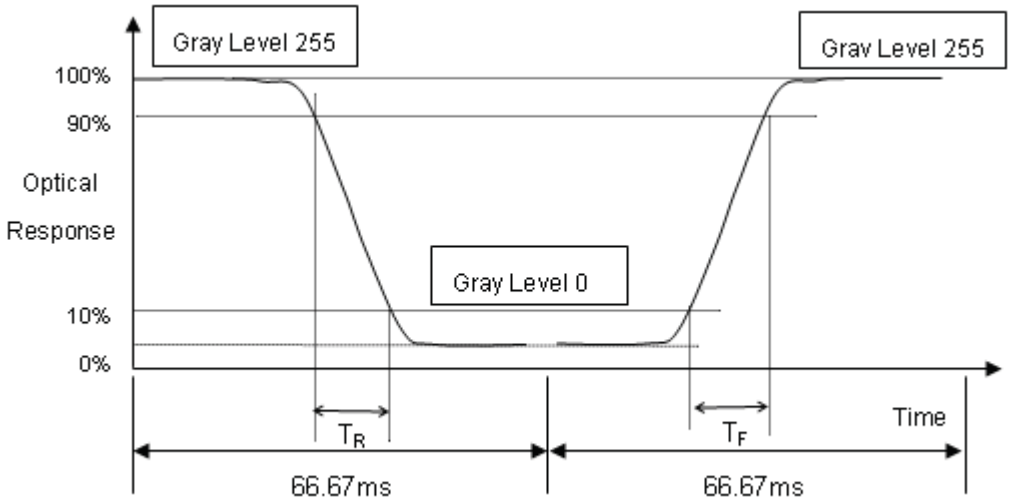
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

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



Note (4) Definition of Luminance of White (L_C):

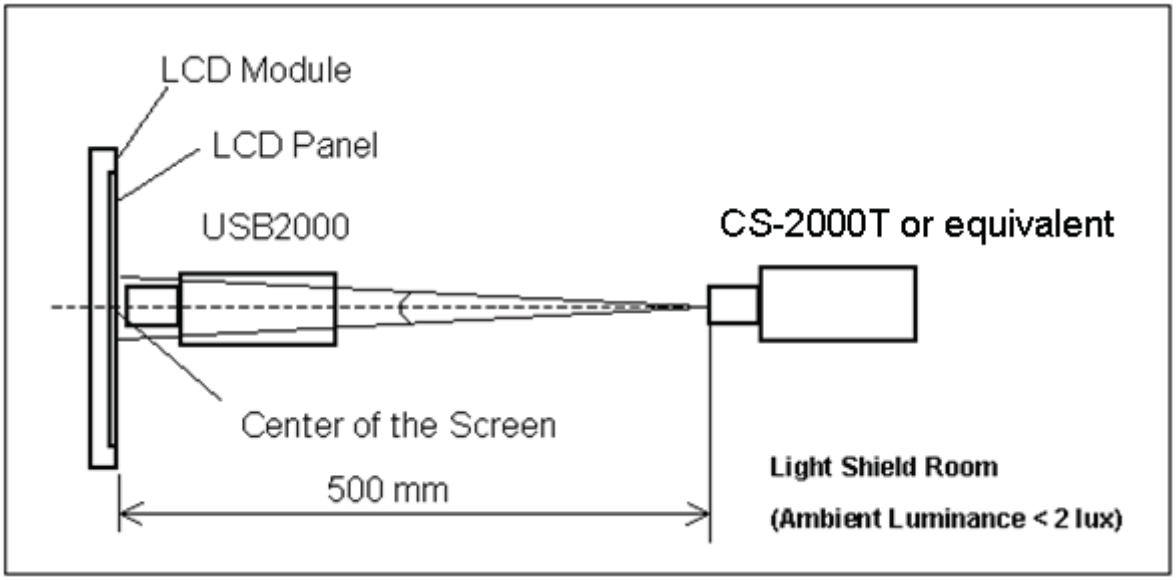
Measure the luminance of gray level 255 at center point

L_C = L (5)

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

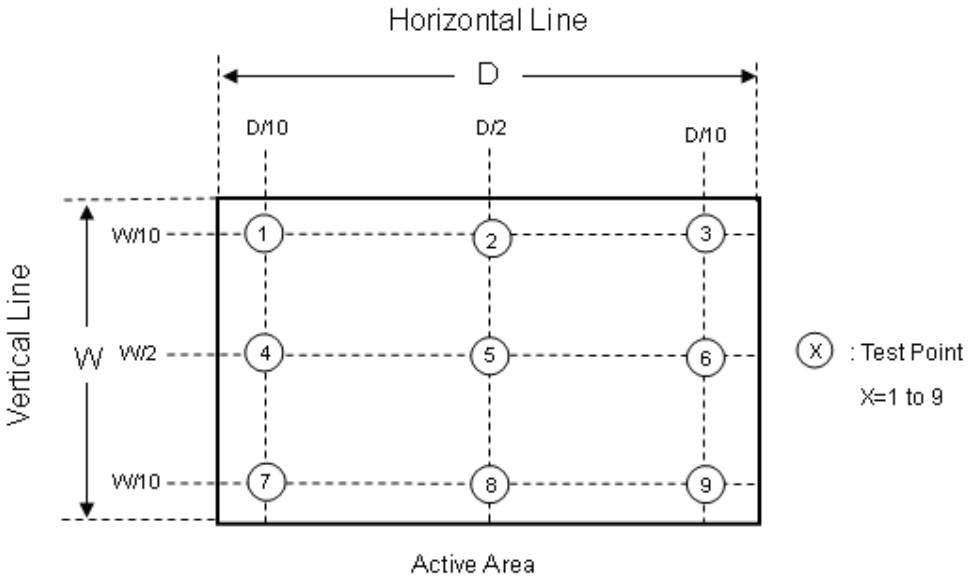
The LCD module should be stabilized at given temperature for 40 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 40 minutes in a windless room.



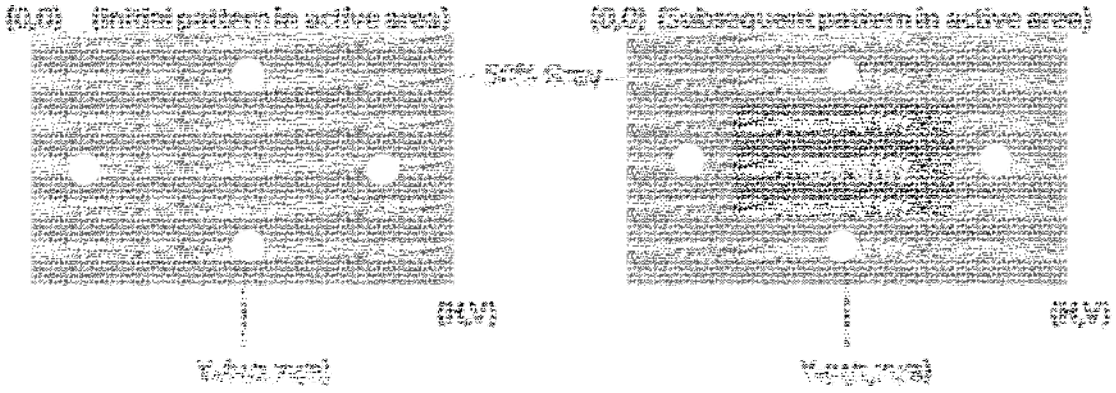
Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 9 points

δW = (Minimum [L (1) ~ L (9)] / Maximum [L (1) ~ L (9)]) *100%



Note (7) Crosstalk measurement



$$CT\% = |(Y_B - Y_A)/Y_A| \times 100\%$$

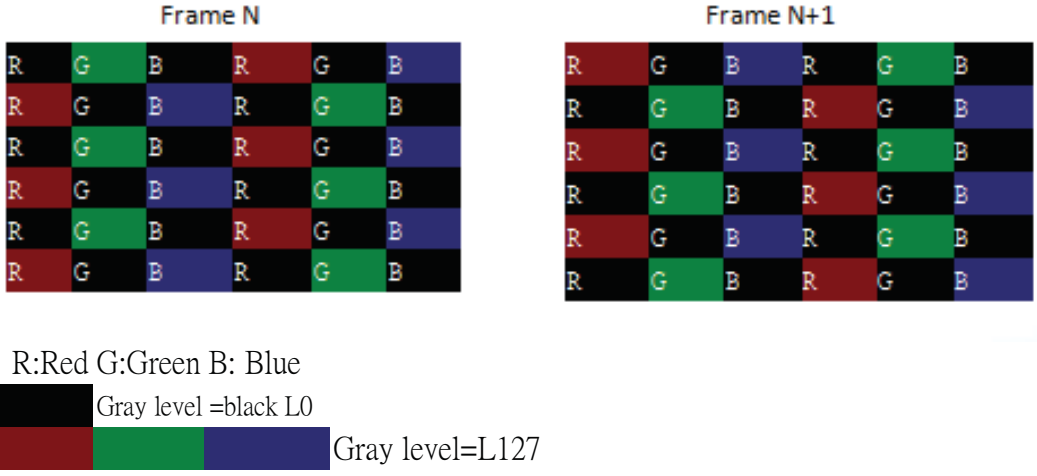
Where YA= Initial pattern's brightness at each specific position.

YB= Subsequent pattern's brightness at each specific position.

Each specific position (H/8,V/2),(H/2,7V/8),(7H/8,V/2) and (H/2,V/8) for measurement should be exactly the same in both patterns.

Note (8) Flicker measurement

Flicker test pattern illustrated as below.



R:Red G:Green B: Blue

Gray level =black L0

Gray level=L127

The measurement position : At the center of screen point(5), instrument is perpendicular to the screen(θ_x=0°, θ_Y =0°)

The flicker value, FLK, obtained by the JIETA Flicker method.

Note (9) Light bar duty 100% for HDR measurement item (10% Center Patch Test and Full-screen Flash Test)

6. RELIABILITY TEST ITEM

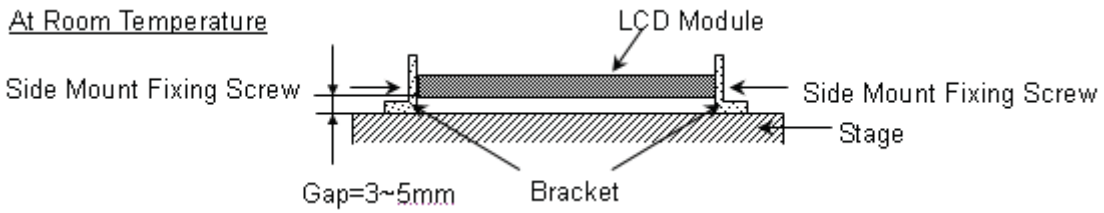
Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃ , 80%RH, 240hours	
High Temperature Operation (HTO)	Ta= 50℃ , 240hours	
Low Temperature Operation (LTO)	Ta= 0℃ , 240hours	
High Temperature Storage (HTS)	Ta= 60℃ , 240hours	
Low Temperature Storage (LTS)	Ta= -20℃ , 240hours	
Vibration Test (Non-operation)	Acceleration: 1.5 G Wave: sine Frequency: 10 - 300 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 11 ms Direction : ± X, ± Y, ± Z.(one time for each Axis)	
Thermal Shock Test (TST)	-20℃/30min , 60℃ / 30min , 100 cycles	
On/Off Test	25℃ ,On/10sec , Off /10sec , 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω)	
	Air Discharge: ± 15KV, 150pF(330Ω)	
Altitude Test	Operation:10,000 ft / 24hours Non-Operation:30,000 ft / 24hours	

Note (1) criteria : Normal display image with no obvious non-uniformity and no line defect.

Note (2) Evaluation should be tested after storage at room temperature for more than two hour

Note (3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

The fixing condition is shown as below:



7. MECHANICAL STRENGTH CHARACTERISTICS

7.1 MECHANICAL STRENGTH SPECIFICATIONS

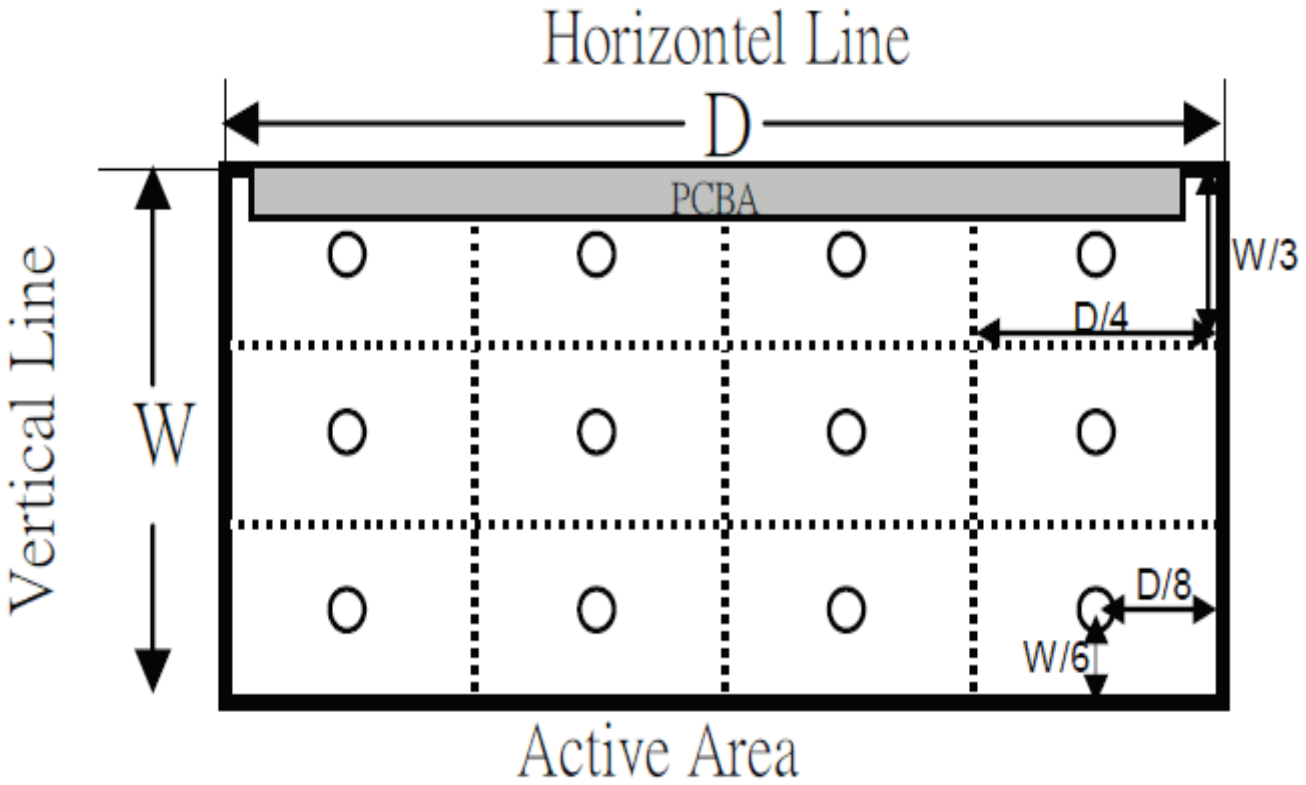
Item	Condition	Min	Unit	Note
Mechanical Strength	128th Gray Pattern	0.6	Kgf	

7.2 TEST CONDITIONS

Items	Description
Test Condition	1. Ambient Illumination : 10~15 lux 2. Test Pattern : 128 Gray 3. Distance of the judgment : 30cm from the surface of module 4. Viewing angle of the judgment : Front
Gage Information	1. Push pull guage a. Model name : HF-50, maker : ALGOL b. Shape of gage tip - Diameter : 2mm - Thickness : 2mm
Definition of Minimum force	To measure minimum force when operator detects any white spot and light leakage that have occurred while operator presses on back side of module with push pull gage.

7.3 DEFINITION OF TEST POINTS

Measure the minimum force of test points at 128th Gray pattern. The test points at back side of module area is showing as below (If the test points on the PCBA, these points are not included)



8. PACKING

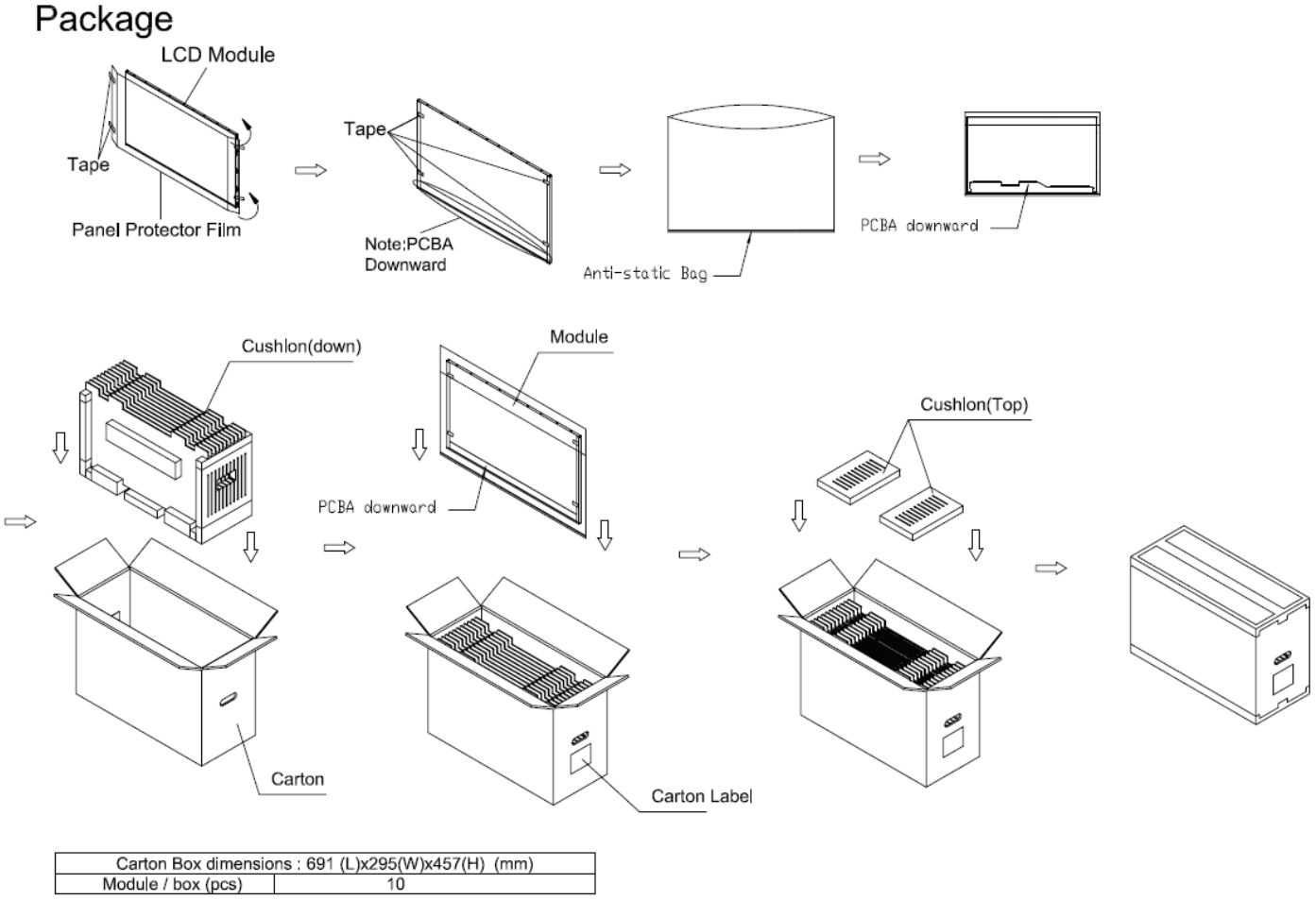
8.1 PACKING SPECIFICATIONS

(1) 10 LCD modules / 1 Box

(2) Box dimensions: 691(L) X 295(W) X 457(H) mm

(3) Weight: approximately: 34 kg

8.2 PACKING METHOD



Carton Box dimensions : 691 (L)x295(W)x457(H) (mm)	
Module / box (pcs)	10

Figure. 8-1 Packing method

8.3 Shipping

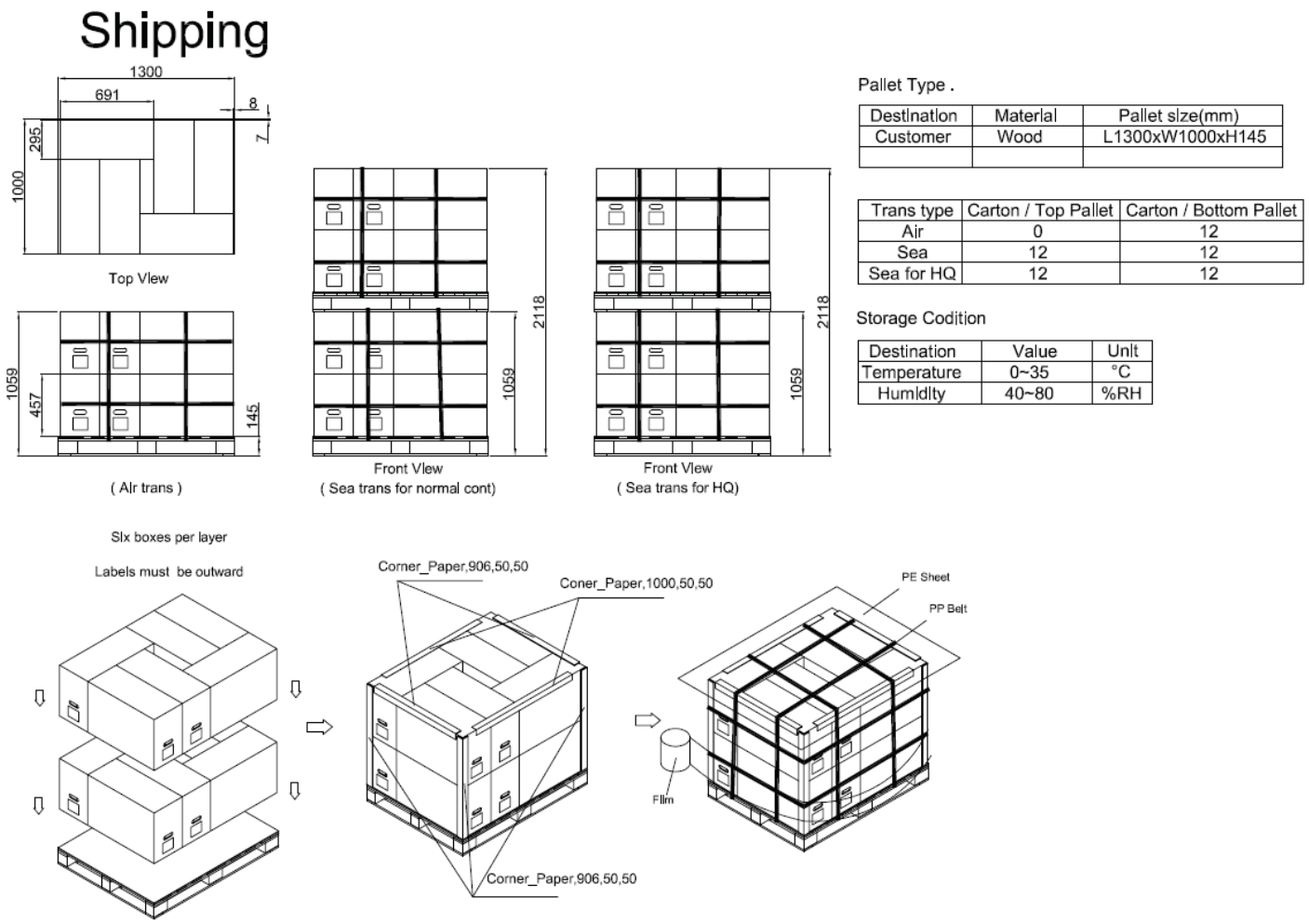


Figure. 8-2 Packing method

8.4 UN-PACKAGING METHOD

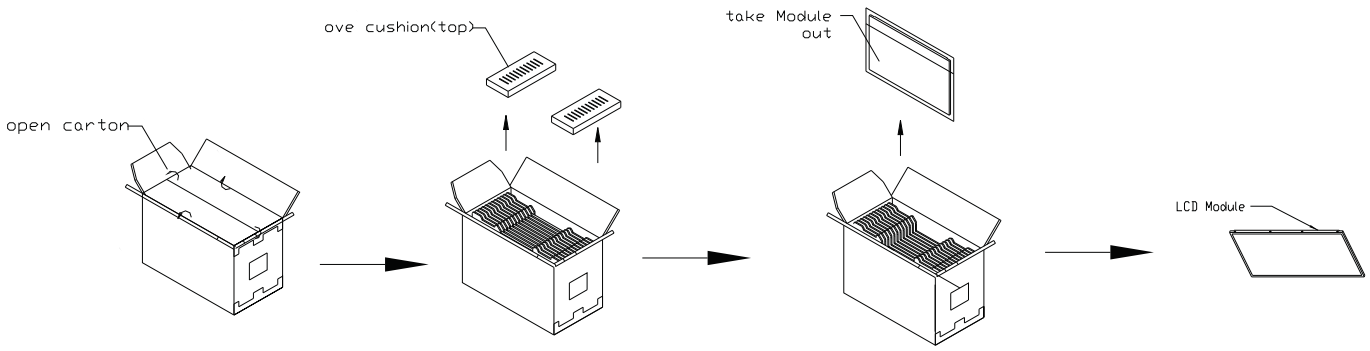


Figure. 8-3 Un-Packing method

9. INX MODULE LABEL

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

(a) Model Name: M270KCJ-K7B

(b) Revision: Rev. XX, for example: A0, A1… B1, B2… or C1, C2…etc.

(c) INX barcode definition:

Serial ID: XX-XX-X-XX-YMD-L-NNNN

Code	Meaning	Description
XX	INX internal use	-
XX	Revision	Cover all the change
X	INX internal use	-
XX	INX internal use	-
YMD	Year, month, day	Year: 0~9, 2001=1, 2002=2, 2003=3…2010=0, 2011=1, 2012=2… Month: 1~12=1, 2, 3, ~, 9, A, B, C Day: 1~31=1, 2, 3, ~, 9, A, B, C, ~, W, X, Y, exclude I, O, and U.
L	Product line #	Line 1=1, Line 2=2, Line 3=3, …
NNNN	Serial number	Manufacturing sequence of product

(d) Customer's barcode definition:

Serial ID: CM-R0J7B-X-X-X-XX-L-XX-L-YMD-NNNN

Code	Meaning	Description
CM	Supplier code	INX=CM
R0J7B	Model number	M270KCJ-K7B= R0J7B
X	Revision code	Non ZBD: 1,2,~,8,9 / ZBD: A~Z
X	Source driver IC code	Century=1, CLL=2, Demos=3, Epson=4, Fujitsu=5, Himax=6, Hitachi=7, Hynix=8, LDI=9, Matsushita=A, NEC=B, Novatek=C, OKI=D, Philips=E, Renasas=F, Samsung=G, Sanyo=H, Sharp=I, TI=J, Topro=K, Toshiba=L, Windbond=M, ILITEK=Q, Fiti=Y, None IC =Z
X	Gate driver IC code	
XX	Cell location	Tainan Taiwan=TN, Ningbo China=CN, Hsinchu Taiwan=SC
L	Cell line #	1,2,~,9,A,B,~,Y,Z
XX	Module location	Tainan, Taiwan=TN ; Ningbo China=NP ; Shenzhen China=SH ; Nanhai China=NH
L	Module line #	1,2,~,9,A,B,~,Y,Z
YMD	Year, month, day	Year: 0~9, 2001=1, 2002=2, 2003=3…2010=0, 2011=1, 2012=2… Month: 1~12=1, 2, 3, ~, 9, A, B, C Day: 1~31=1, 2, 3, ~, 9, A, B, C, ~, T, U, V
NNNN	Serial number	By LCD supplier

(e) FAB ID(UL Factory ID):

Region	Factory ID
TWINX	GEMN
NBINX	LEOO
NBINX	VIRO
NHINX	CAPG

10. PRECAUTIONS

10.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the module during assembly.

(2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.

(4) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.

(5) Do not pull the I/F connector in or out while the module is operating.

(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) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.

(9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

(10)When ambient temperature is lower than 10ºC may reduce the display quality. For example, the response time will become slowly.

10.2 STORAGE PRECAUTIONS

(1) Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0℃ to 35℃ and relative humidity of less than 90%

(2) Do not store the TFT – LCD module in direct sunlight

(3) The module should be stored in dark place. It is prohibited to apply sunlight or fluorescent light in storing

10.3 OPERATION PRECAUTIONS

(1) The LCD product should be operated under normal condition.

Normal condition is defined as below :

Temperature : 20±15℃

Humidity: 65±20%

Display pattern : continually changing pattern(Not stationary)

(2) If the product will be used in extreme conditions such as high temperature,high humidity,high altitude ,display pattern or operation time etc…It is strongly recommended to contact INX for application engineering advice . Otherwise , Its reliability and function may not be guaranteed.

10.4 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.

10.5 SAFETY STANDARDS

The LCD module should be certified with safety regulations as follows:

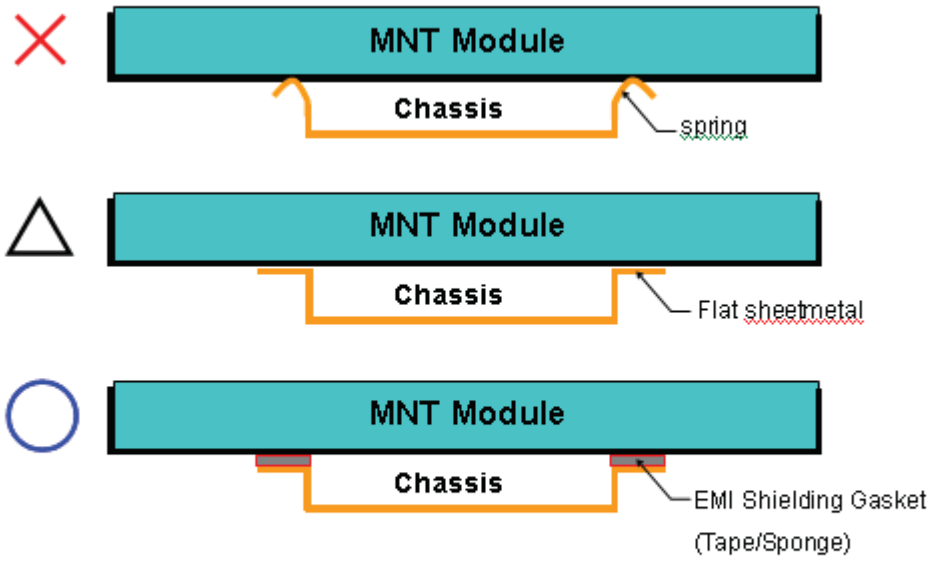
(1) UL60950-1 or updated standard.

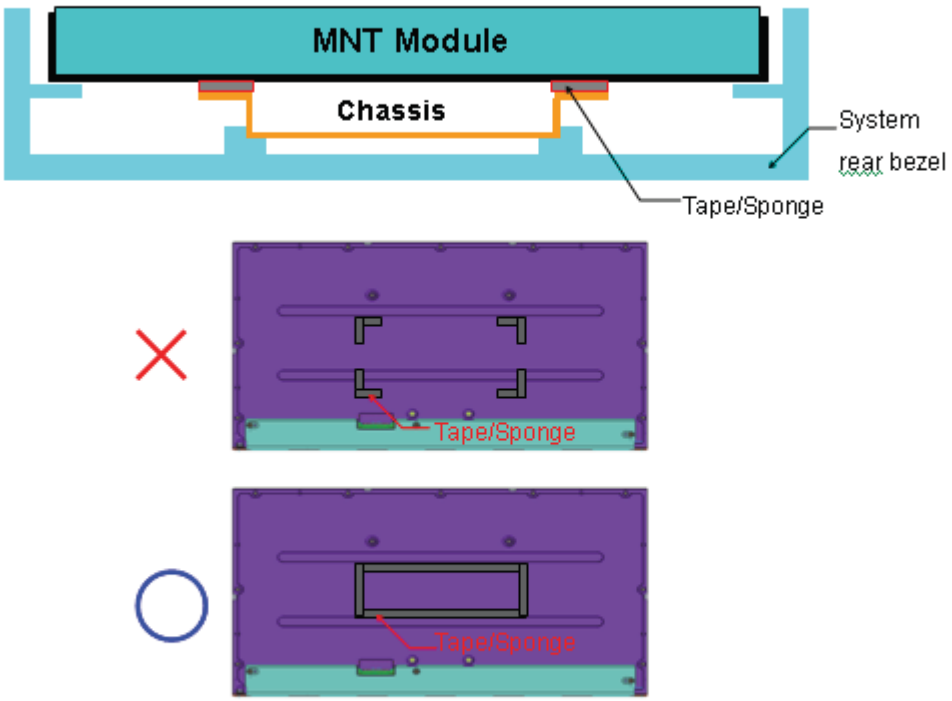
(2) IEC60950-1 or updated standard.

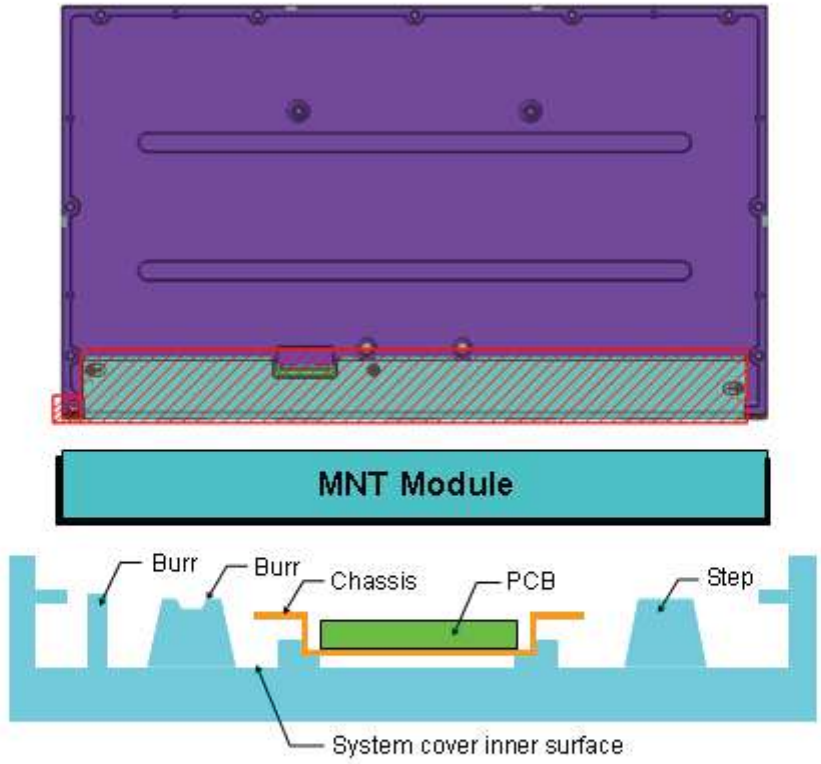
10.6 OTHER

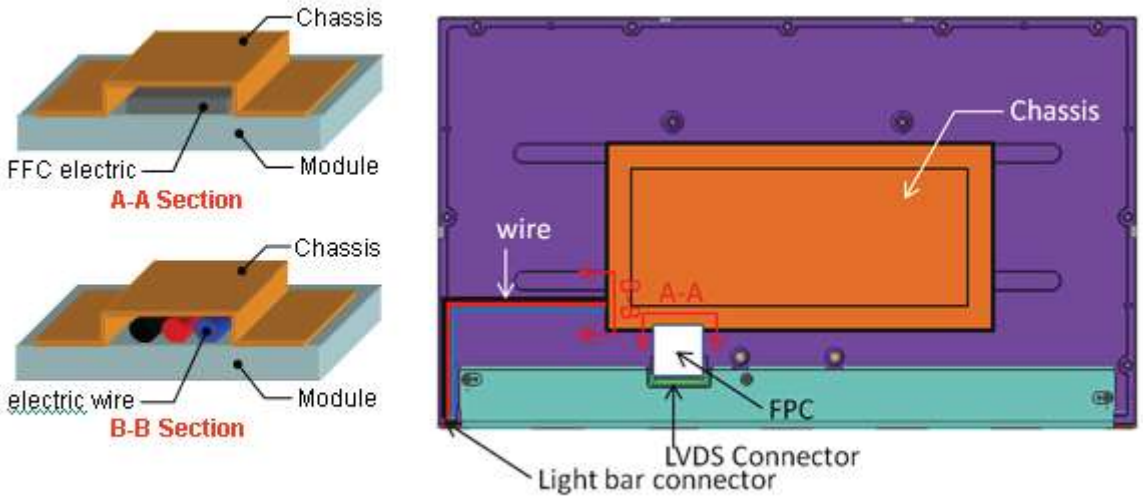
When fixed patterns are displayed for a long time, remnant image is likely to occur.

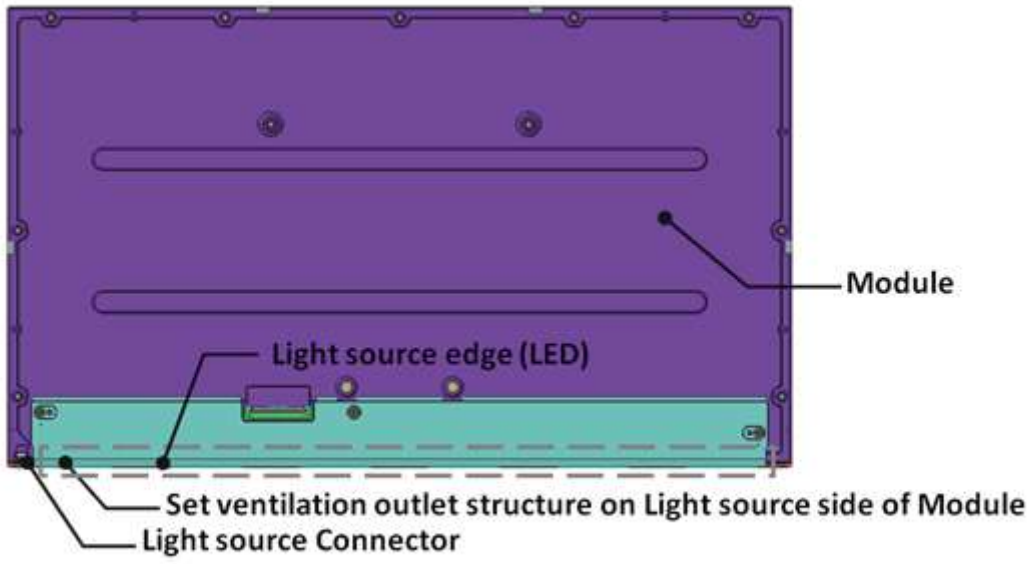
Appendix 1. SYSTEM COVER DESIGN NOTICE

1.	Set Chassis and MNT Module touching Mode
	
Definition	a) To prevent from abnormal display & white spot after Mechanical test, it is not recommended to used spring type chassis. b) We suggest the contact mode between Chassis and Module rear cover is Tape/Sponge, sencond is Flat sheetmetal type chassis.

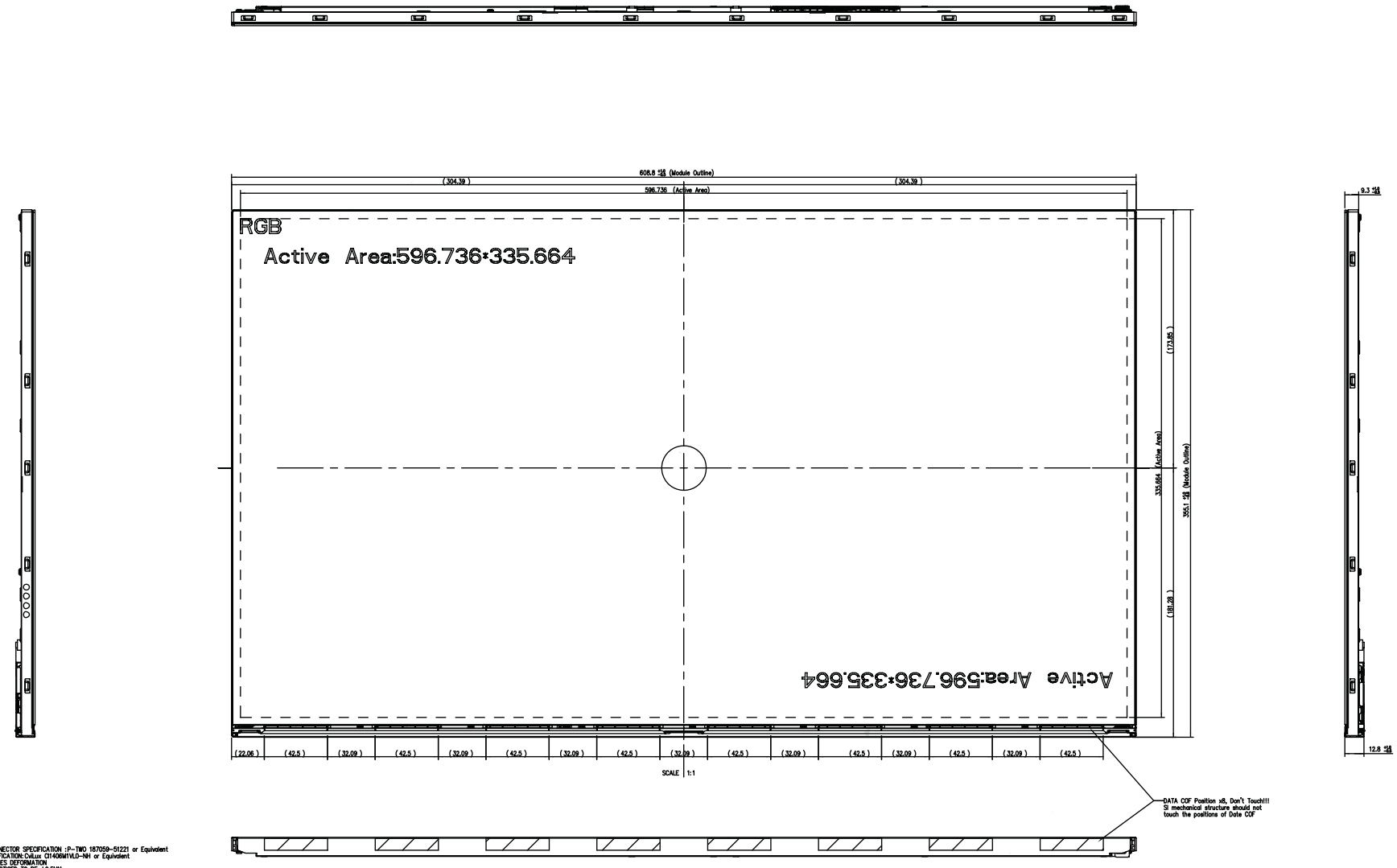
2	Tape/sponge design on system inner surface
	
Definition	a) To prevent from abnormal display & white spot after Mechanical test, We suggest using Tape/Sponge as medium between chassis and Module rear cover could reduce the occurrence of white spot. b) When using the Tape/Sponge, suggest it be lay over between set chassis and module rear cover. it is not recommended to add tape/sponge in separate location. Since each tape/sponge may act as pressure concentration location.

3	System inner surface examination
	
Definition	a). Burr at logo edge, step, protrusion or PCB board will easily cause white spot. b). Keeping flat surface underneath module is recommended. c). The area (▨) on Module PCBA and Light bar connector should keep at least 1mm gap to any structure with System cover inner surface.

4	The overlapping part on System's Chassis and electric wire needs gap structure.
	
Definition	The overlapping part on System's Chassis and electric wire (FPC、FFC and wire) needs gap structure to avoid display of white spot by pressing overlapping part cause interference.

5	System cover's ventilation outlet structure
	
Definition	To prevent from abnormal display of light leakage, We suggest to set ventilation outlet structure on side of Module Light bar in system cover inner surface.

Appendix 2. OUTLINE DRAWING



NOTE:
1.LVDS INPUT 51PIN CONNECTOR SPECIFICATION :P-TWO 187059-51221 or Equivalent
2.LED CONNECTOR SPECIFICATION:CviLux CI1406M1VLD-NH or Equivalent
3.THE DIMENSION EXCLUDES DEFORMATION
4.TOLERANCE WITHOUT NOTICED TO BE ±0.5MM
5.TORQUE OF M3 USER HOLE SHOULD BE WITHIN 5 kgf-cm AND JUST RESCREW 10 TIMES

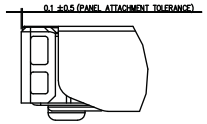
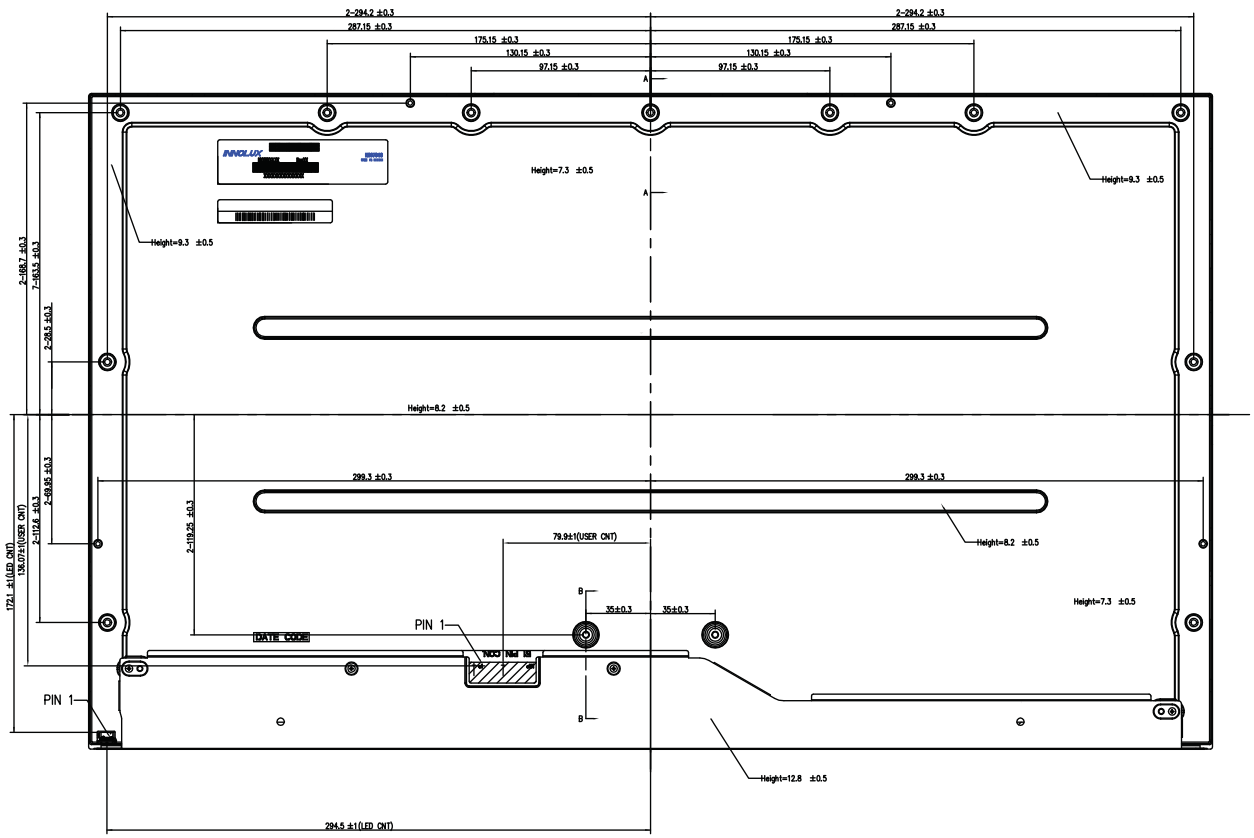
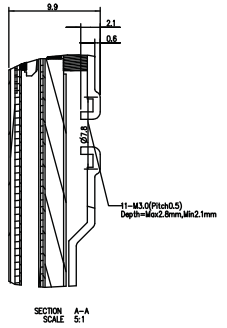


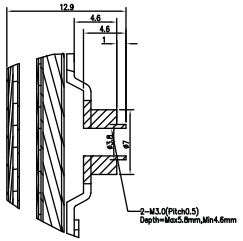
FIG.1



SCALE 1:1



SECTION A-A
SCALE 5:1



SECTION B-B
SCALE 5:1

NOTE:
1.LVDS INPUT 51PIN CONNECTOR SPECIFICATION :P-TWO 187059-51221 or Equivalent
2.LED CONNECTOR SPECIFICATION:CviLux CI1408M1VLD-NH or Equivalent
3.THE DIMENSION EXCLUDES DEFORMATION
4.TOLERANCE WITHOUT NOTICED TO BE ±0.5MM
5.TORQUE OF M3 USER HOLE SHOULD BE WITHIN 5 kgf-cm AND JUST RESCREW 10 TIMES

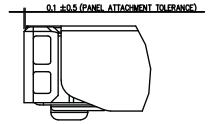


FIG.1