TO：_____

TECHNICAL SPECIFICATION

15.6 Inch EM Touch Display

MODEL NO.: LCM-E-156W01-CMI

The content of this information is subject to be changed without notice.
Please contact HANVON or its agent for further information.

☐ Customer's Confirmation

By _____

Date _____

☐ HANVON's Confirmation

APPROVED	CHECKED	CHECKED	DESIGNED

Revision History

Rev.	Issued Date	Revised
1.0	2012-06-07	Preliminary.
1.0	2012-09-13	Page 5 ERT Control Board: Voltage/Current: 3.3V/<50mA Page 7 VDD : Power Supply(3.3V)
1.0	2012-09-26	Page23 Update Mechanical Drawing
1.0	2012-11-13	Page23 Update Mechanical Drawing Page22 Update Appearance Picture
1.1	2012-12-26	Page5 Update 3.1
		Page7 Update 3.4
		Page23 Update Mechanical Drawing

TECHNICAL SPECIFICATION

CONTENTS TABLE

1. Scope

This specification is applicable to HANVON LCD Module designed for 15.6 inch.
This specification applies to HANVON LCM-E-156W01-CMI only.

2. Features

- Without affecting the screen display
- High screen resolution
- High pressure levels
- High position accuracy
- Low power consumption
- Commercial temperature range
- Support battery-free, cordless and pressure sensitive pens

It is a 15.6" (15.547" diagonal) TFT Liquid Crystal Display module with LED Backlight unit and 40 pins LVDS interface. This module supports 1366 x 768 HD mode and can display 262,144 colors. The optimum viewing angle is at 6 o'clock direction.

3. Technology Specifications

3.1 General Specifications

Item	Specification	Unit	Note
Screen Size	15.547 diagonal		
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1366 x R.G.B. x 768	pixel	-
Pixel Pitch	0.252 (H) x 0.252 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	262,144	color	-
Transmissive Mode	Normally white	-	-
Surface Treatment	Hard coating (3H), AG	-	-
Luminance, White	220	Cd/m2	
Power Consumption	Total 5.354 W (Max.) @ cell 1.07 W (Max.), BL 4.284W (Max.)		(1)

Note (1) The specified power consumption (with converter efficiency) is under the conditions at

VCCS =3.3 V, fv = 60 Hz, LED_VCCS = Typ, fPWM = 200 Hz, Duty=100% and Ta = 25 ± 2 ºC, whereas mosaic pattern is displayed.

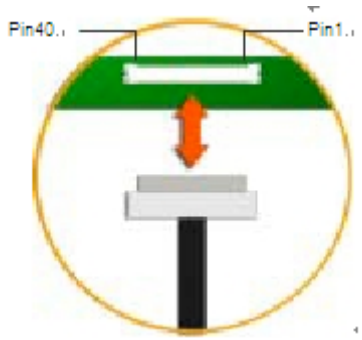
Parameter		Specifications	Unit	Note
ERT Sensor Board	External Dimension	357.78(L)×204.99(W) ×0.8(H)	mm	±0.2mm(L,W) ±0.05mm(H)
	Effective Diagonal Size	15.6	inch	16:9
	Active Area	344.23(L) × 193.54(W)	mm	±0.2 mm
	Material	FR4	-	
	Resolution	10206*7422	-	
	Coordinate Accuracy	±0. 4	mm	
	Detectable Height	>3	mm	
ERT Control Board	External Dimension	120.40(L) ×45.59(W) ×3.5 (H)	mm	±0.2mm
	Material	FR4	-	
	Physical Interface	8 Pins FPC/FCC Connectors	-	
	Pen Accuracy	±1.0/2.0	mm	Center /Edge
	Detectable Angle	±50º	-	
	Data Sending Rate	>200	dots/s	7Bytes/dot
	Response Time	<100	ms	
	Tracking speed	>1	m/s	
	Data Transferring Rate	19.2(adjustable)	kbps	UART
	Voltage/Current	3.3V/<50mA	-	
Others	Module Weight		g	

Note:
This specification is for standard module. For better performance, it needs to be customized by customer's system.

3.2 Mechanical Specifications

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	358.8	359.3	359.8	mm	(1)
	Vertical (V)	209	209.5	210	mm	
	Thickness (T)	-	5.2	5.5	mm	
Bezel Area	Horizontal	349.28	349.58	349.88	mm	
	Vertical	197.99	198.29	198.59	mm	
Active Area	Horizontal	-	344.232	-	mm	
	Vertical	-	193.536	-	mm	
Weight		-	430	445	g	

Connector Type



Please refer Appendix Outline Drawing for detail design.

Connector Part No.: IPEX-20455-040E-12 or equivalent
User's connector Part No: IPEX-20453-040T-01 or equivalent

3.3 Absolute Max. Rating

Absolute Ratings of Environment

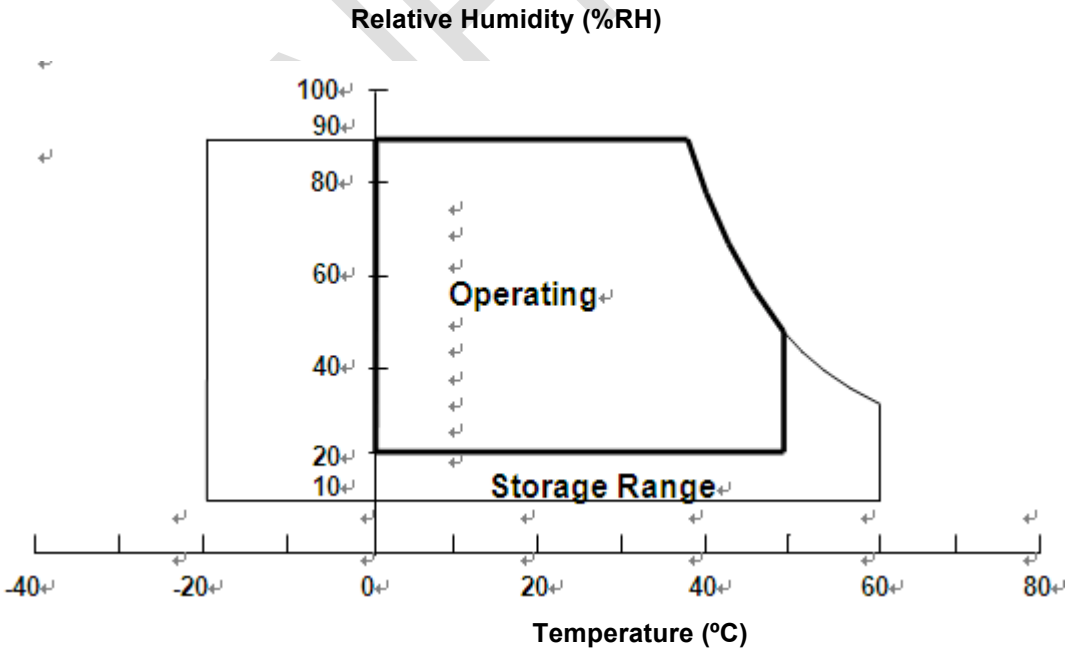
Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	+50	ºC	(1), (2)

Note (1) (a) 90 %RH Max. (Ta <= 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.

Note (2) The temperature of panel surface should be 0 ºC min. and 60 ºC max.



Electrical Absolute Ratings
TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VCCS	-0.3	+4.0	V	(1)
Logic Input Voltage	V_{IN}	-0.3	VCCS+0.3	V	
Converter Input Voltage	LED_VCCS	-0.3	24	V	(1)
Converter Control Signal Voltage	LED_PWM,	-0.3	5	V	(1)
Converter Control Signal Voltage	LED_EN	-0.3	5	V	(1)

Note (1) Stresses beyond those listed in above “ELECTRICAL ABSOLUTE RATINGS” may cause permanent damage to the device. Normal operation should be restricted to the conditions described in “ELECTRICAL CHARACTERISTICS”

3.4 EM Signal Assignment

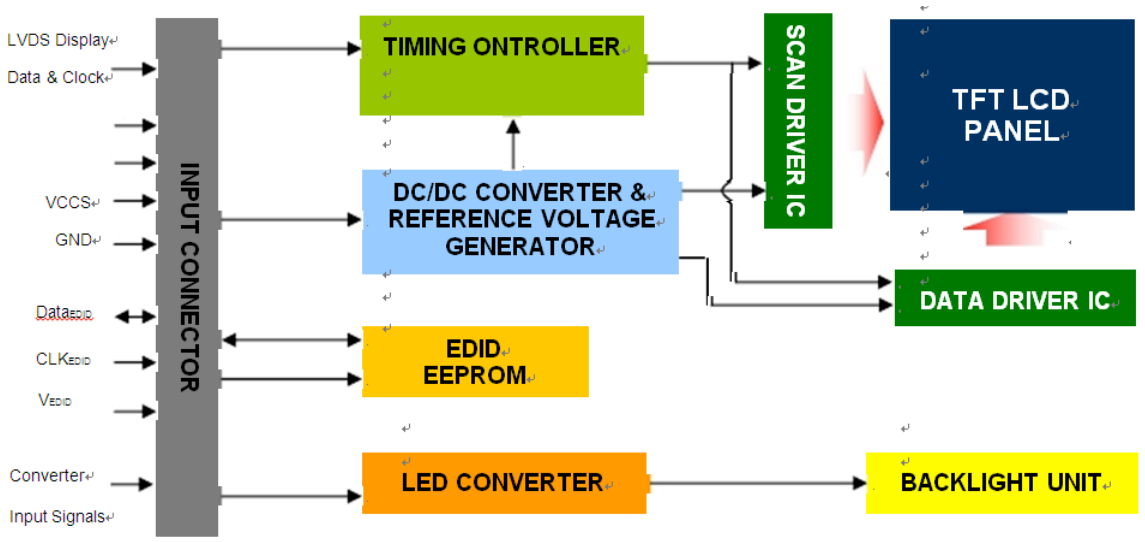
Pin#	Signal	In/out	Description
8	BKGD		No connection, only for HANVON to update program
7	PEN	O	Pen Checking Signal (When the pen is found, output ‘0’; otherwise output ‘1’)
6	TXD	O	Serial Data Output Signal
5	RXD	I	Serial Data Input Signal
4	SLP	I	No use
3	RST	I	Reset (Active: Low)
2	VDD		Power Supply(3.3V)
1	GND		Ground

Note:

1 Logic Low: $0 < U_L < 0.2 \times V_{DD}$;
Logic High: $V_{DD}-0.3 < U_H < V_{DD}$.
2 Connectors（J4）: CF25081DORO-05 or equivalent;

4. ELECTRICAL SPECIFICATIONS

4.1 FUNCTION BLOCK DIAGRAM



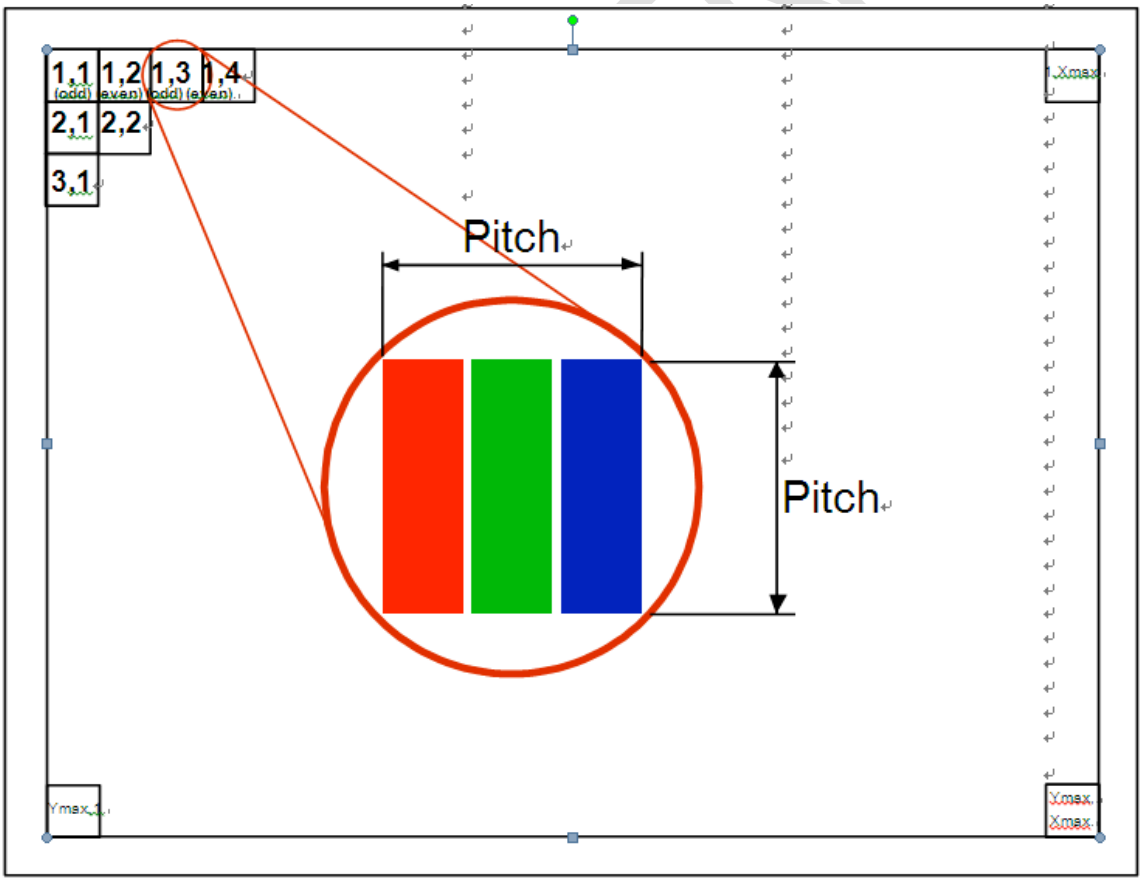
4.2. INTERFACE CONNECTIONS

PIN ASSIGNMENT

Pin	Symbol	Description	Remark
1	NC	No Connection (Reserve)	
2	VCCS	Power Supply (3.3V typ.)	
3	VCCS	Power Supply (3.3V typ.)	
4	VEDID	DDC 3.3V power	
5	NC	No Connection (Reserved for CMI test)	
6	CLKEDID	DDC clock	
7	DATAEDID	DDC data	
8	Rxin0-	LVDS differential data input	R0-R5, G0
9	Rxin0+	LVDS differential data input	
10	VSS	Ground	
11	Rxin1-	LVDS differential data input	G1~G5, B0, B1
12	Rxin1+	LVDS differential data input	
13	VSS	Ground	
14	Rxin2-	LVDS Differential Data Input	B2-B5,HS,VS, DE
15	Rxin2+	LVDS Differential Data Input	
16	VSS	Ground	
17	RxCLK-	LVDS differential clock input	LVDS CLK
18	RxCLK+	LVDS differential clock input	
19	VSS	Ground	
20	NC	No Connection (Reserve)	
21	NC	No Connection (Reserve)	
22	VSS	Ground	
23	NC	No Connection (Reserve)	

24	NC	No Connection (Reserve)	
25	VSS	Ground	
26	NC	No Connection (Reserve)	
27	NC	No Connection (Reserve)	
28	VSS	Ground	
29	NC	No Connection (Reserve)	
30	NC	No Connection (Reserve)	
31	LED_GND	LED Ground	
32	LED_GND	LED Ground	
33	LED_GND	LED Ground	
34	NC	No Connection (Reserve)	
35	LED_PWM	PWM Control Signal of LED Converter	
36	LED_EN	Enable Control Signal of LED Converter	
37	NC	No Connection (Reserve)	
38	LED_VCCS	LED Power Supply	
39	LED_VCCS	LED Power Supply	
40	LED_VCCS	LED Power Supply	

Note (1) The first pixel is odd as shown in the following figure.



4.3 ELECTRICAL CHARACTERISTICS

4.3.1 LCD ELETRONICS SPECIFICATION

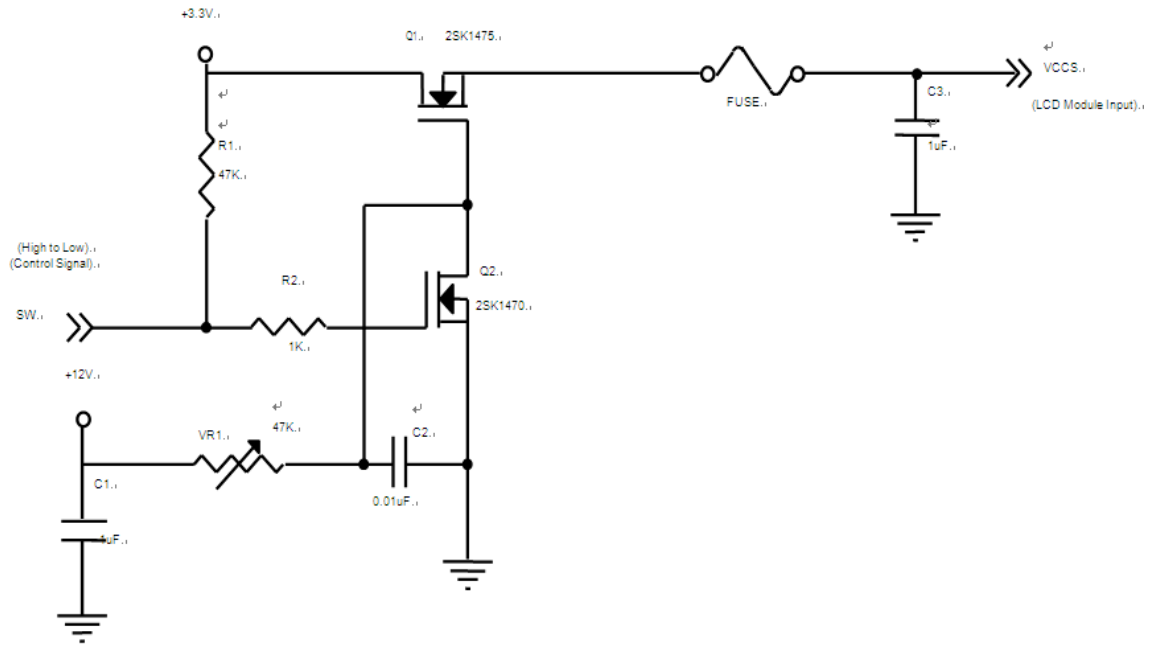
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		VCCS	3.0	3.3	3.6	V	(1)-
Ripple Voltage		V_{RP}	-	50	-	mV	(1)-
Inrush Current		I_{RUSH}	-	-	1.5	A	(1),(2)
Power Supply Current	Mosaic	Icc	217	270	323	mA	(3)a
	Black		270	335	400	mA	(3)b

Note (1) The ambient temperature is Ta = 25 ± 2 ºC.

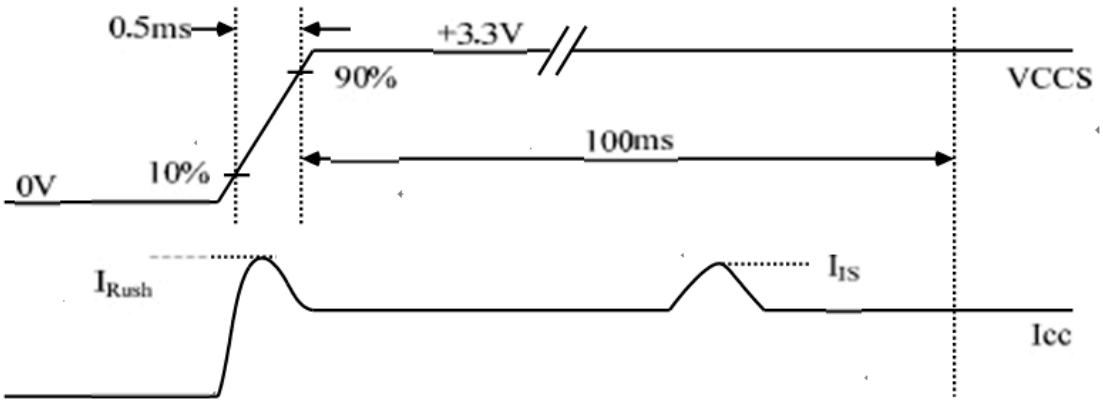
Note (2) I_{RUSH}: the maximum current when VCCS is rising

I_{IS}: the maximum current of the first 100ms after power-on

Measurement Conditions: Shown as the following figure. Test pattern: black.

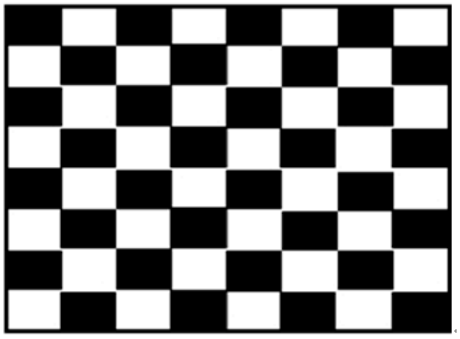


VCCS rising time is 0.5ms



Note (3) The specified power supply current is under the conditions at VCCS = 3.3 V, Ta = 25 ± 2 ºC, DC Current and f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. Mosaic Pattern



Active Area

b. Black Pattern

Active Area

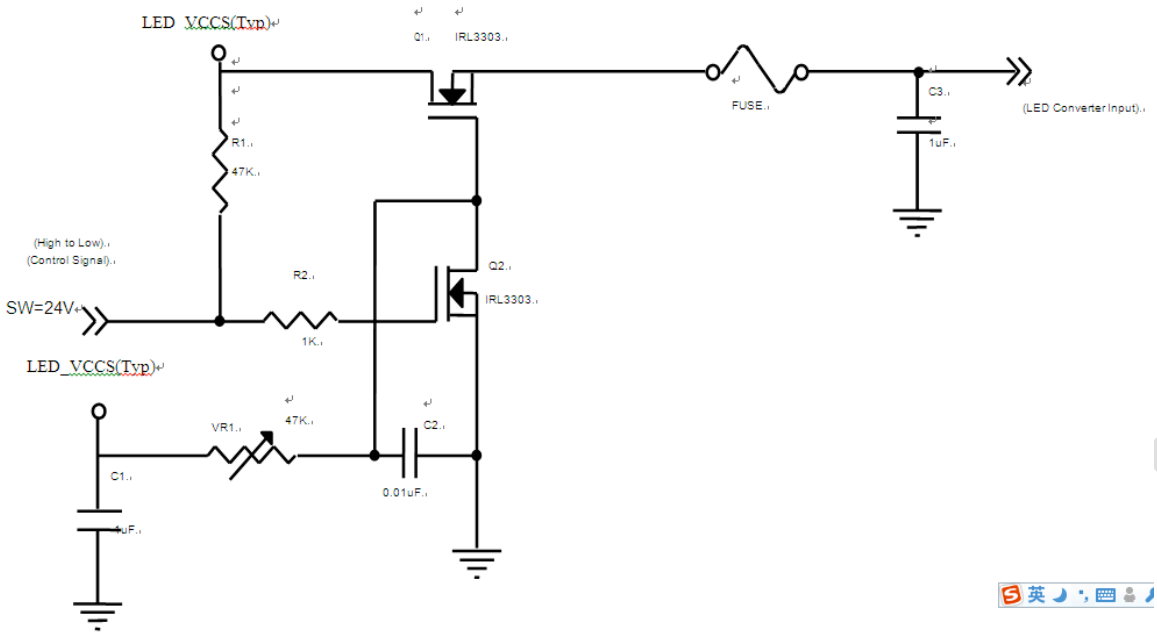
4.3.2 LED CONVERTER SPECIFICATION

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Input power supply voltage		LED_Vccs	6.0	12.0	21.0	V	
Converter Inrush Current		$I_{LED_{RUSH}}$	-	-	1.5	A	(1)
EN Control Level	Backlight On		2.3	-	5	V	
	Backlight Off		0	-	0.5	V	
PWM Control Level	PWM High Level		2.3	-	5	V	
	PWM Low Level		0	-	0.5	V	
PWM Control Duty Ratio			10	-	100	%	
			5	-	100	%	(2)
PWM Control Permissive Ripple Voltage		V_{PWM_pp}	-	-	100	mV	
PWM Control Frequency		f_{PWM}	190	-	2K	Hz	(3)
LED Power Current	LED_VCCS =Typ.	ILED	253	301	357	mA	(4)

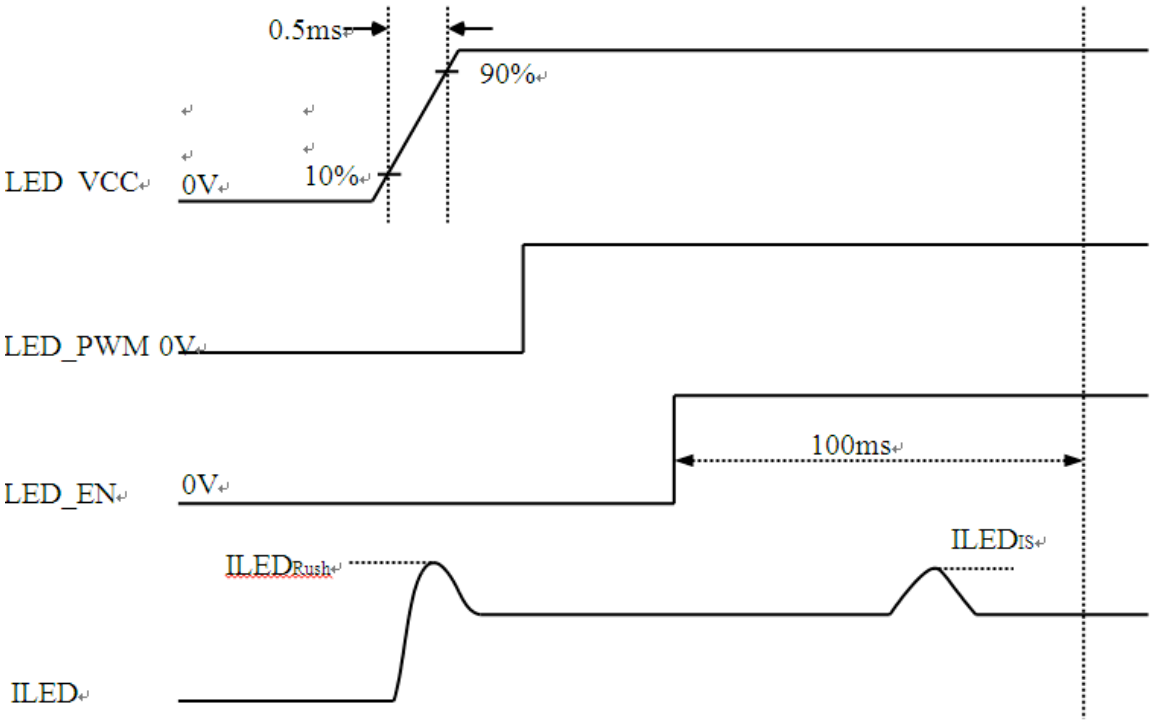
Note (1) $I_{LED_{RUSH}}$: the maximum current when LED_VCCS is rising,

$I_{LED_{IS}}$: the maximum current of the first 100ms after power-on,

Measurement Conditions: Shown as the following figure. LED_VCCS = Typ, Ta = 25 ± 2 ºC, f_{PWM} = 200 Hz, Duty=100%.



VLED rising time is 0.5ms



Note (2) If the PWM control duty ratio is less than 10%, there is some possibility that acoustic noise or backlight flash can be found. And it is also difficult to control the brightness linearity.

Note (3) If PWM control frequency is applied in the range less than 1 KHz, the “waterfall” phenomenon on

the screen may be found. To avoid the issue, it's a suggestion that PWM control frequency should follow the criterion as below.

PWM control frequency f_{PWM} should be in the range

$$(N + 0.33) * f'' f_{PWM} '' (N + 0.66) * f$$

N : Integer ($N \geq 3$)

f : Frame rate

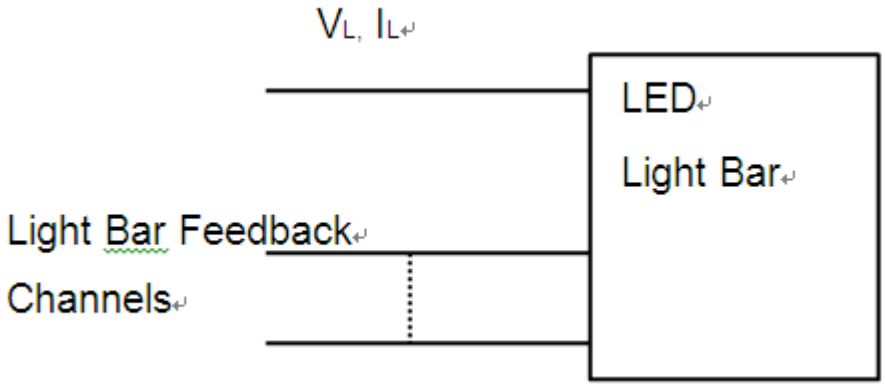
Note (4) The specified LED power supply current is under the conditions at "LED_VCCS = Typ.", Ta = 25± 2 ºC, f_{PWM} = 200 Hz, Duty=100%.

4.3.3 BACKLIGHT UNIT

Ta = 25 ± 2 ºC

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Light Bar Power Supply Voltage	V_L	22.4	25.6	27.2	V	(1)(2)(Duty100%)
LED Light Bar Power Supply Current	I_L	114	120	126	mA	
Power Consumption	P_L	2.55	3.07	3.43	W	(3)
LED Life Time	L_{BL}	15000	-	-	Hrs	(4)

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



Note (2) For better LED light bar driving quality, it is recommended to utilize the adaptive boost converter with current balancing function to drive LED light-bar.

Note (3) $P_L = I_L \times V_L$ (Without LED converter transfer efficiency)

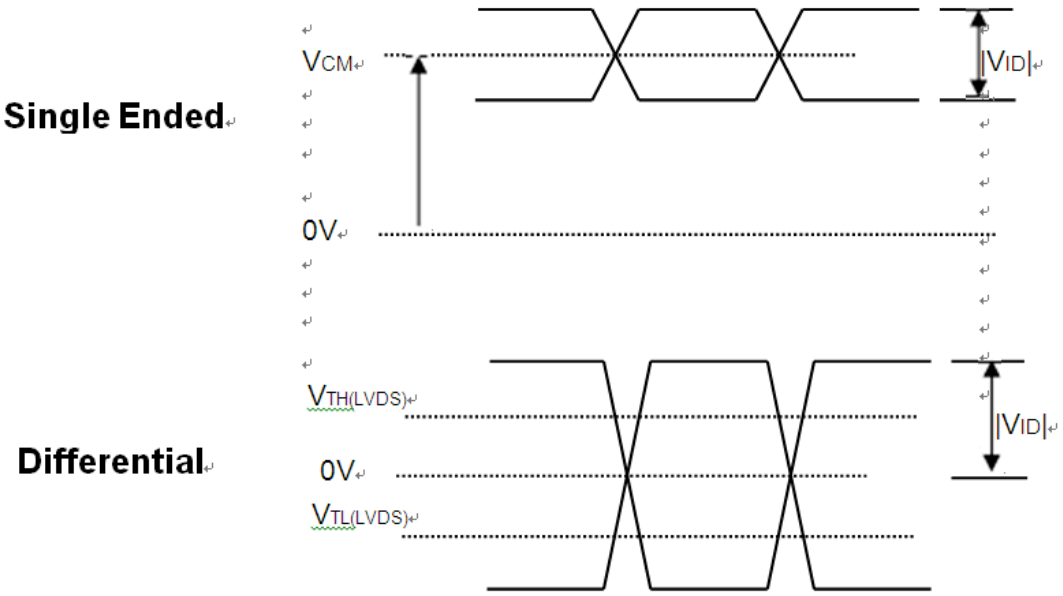
Note (4) The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta =25 ±2 ºC and I_L = 24 mA(Per EA) until the brightness becomes ≦ 50% of its original value.

4.4 LVDS INPUT SIGNAL TIMING SPECIFICATIONS

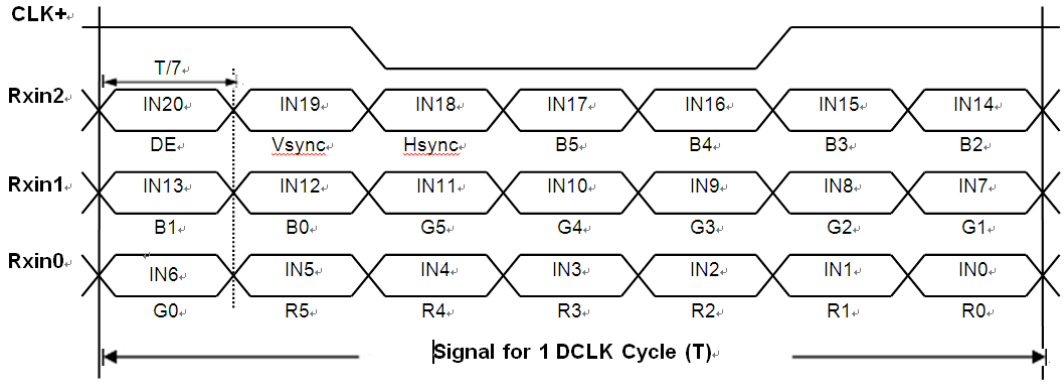
4.4.1 LVDS DC SPECIFICATIONS

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LVDS Differential Input High Threshold	$V_{TH(LVDS)}$	-	-	+100	mV	(1), V_{CM}=1.2V
LVDS Differential Input Low Threshold	$V_{TL(LVDS)}$	-100	-	-	mV	(1) V_{CM}=1.2V
LVDS Common Mode Voltage	V_{CM}	1.125	-	1.375	V	(1)
LVDS Differential Input Voltage	$\|V_{ID}\|$	100	-	600	mV	(1)
LVDS Terminating Resistor	R_T	-	100	-	Ohm	-

Note (1) The parameters of LVDS signals are defined as the following figures.



4.4.2 LVDS DATA FORMAT



4.4.3 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 below 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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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

4.5 DISPLAY TIMING SPECIFICATIONS

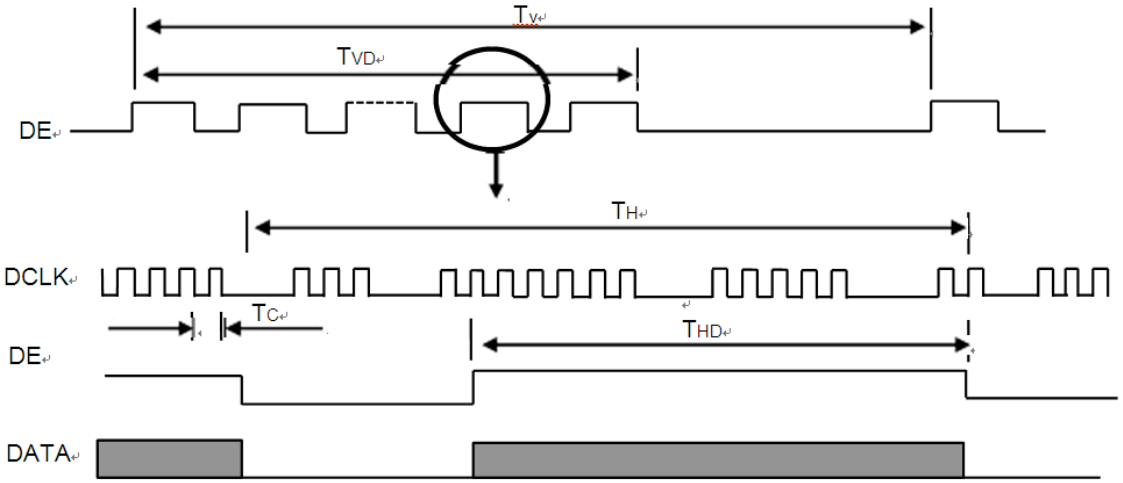
The input signal timing specifications are shown as the following table and timing diagram.

Refresh rate 60Hz

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	1/Tc	62.4	69.3	85	MHz	-
DE	Vertical Total Time	TV	772	788	793	TH	-
	Vertical Active Display Period	TVD	768	768	768	TH	-
	Vertical Active Blanking Period	TVB	TV-TVD	20	TV-TVD	TH	-
	Horizontal Total Time	TH	1430	1466	1492	Tc	-
	Horizontal Active Display Period	THD	1366	1366	1366	Tc	-
	Horizontal Active Blanking Period	THB	TH-THD	100	TH-THD	Tc	-

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

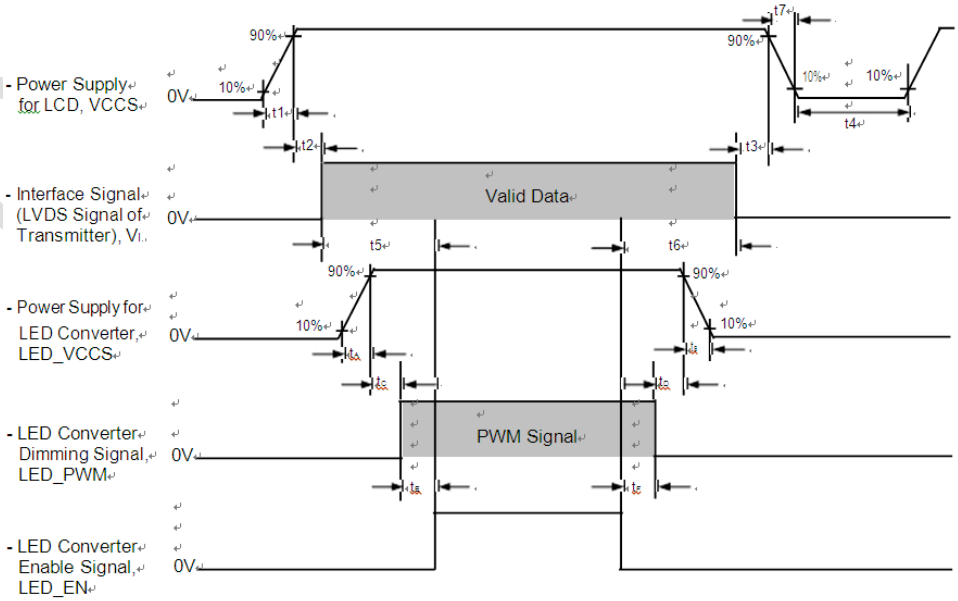
INPUT SIGNAL TIMING DIAGRAM



4.6 POWER ON/OFF SEQUENCE

The power sequence specifications are shown as the following table and diagram.

Symbol	Value			Unit	Note
	Min.	Typ.	Max.		
t1	0.5	-	10	ms	
t2	0	-	50	ms	
t3	0	-	50	ms	
t4	500	-	-	ms	
t5	200	-	-	ms	
t6	200	-	-	ms	
t7	0.5	-	100	ms	
t_A	0.5	-	10	ms	
t_C	10	-	-	ms	
t_D	10	-	-	ms	
t_E	10	-	-	ms	
t_F	10	-	-	ms	



Note (1) Please don't plug or unplug the interface cable when system is turned on.

Note (2) Please avoid floating state of the interface signal during signal invalid period.

Note (3) It is recommended that the backlight power must be turned on after the power supply for LCD and the interface signal is valid.

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}	3.3	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Light Bar Input Current	I_L	120	mA

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

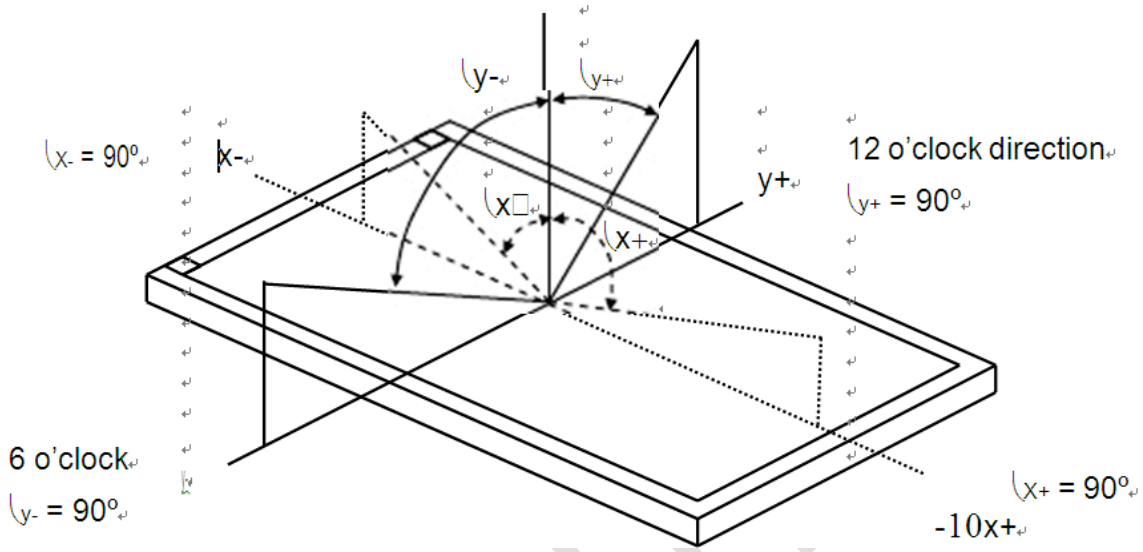
5.2 OPTICAL SPECIFICATIONS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing Normal Angle	400	500	-	-	(2),(5),(8)
Response Time		T_R		-	3	8	ms	(3),(8)
		T_F		-	8	13	ms	
Luminance of White (5P)		L_{AVE}		185	220	-	cd/m^2	(4),(5),(8)
White Variation (5P)		™W		80	--		%	(5),(6),(8)
White Variation (13P)		™W		65	--		%	(5),(6),(8)
Color gamut		C.G		55	60		%	(5),(7),(8)
Color Chromaticity	Red	Rx		Typ.- 0.03	0.617	Typ.+ 0.03	-	(1), (5) (8)
		Ry			0.340		-	
	Green	Gx			0.320		-	
		Gy			0.598		-	
	Blue	Bx			0.160		-	
		By			0.084		-	
	White	Wx			0.313		-	
		Wy			0.329		-	
Viewing Angle	Horizontal	θ_x+	CR≥10	40	45	-	Deg.	(1),(5),(8)
		θ_x-		40	45	-		
	Vertical	θ_Y+		15	20	-		
		θ_Y-		40	45	-		

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

Normal

$\theta_x = \theta_y = 0°$



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

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

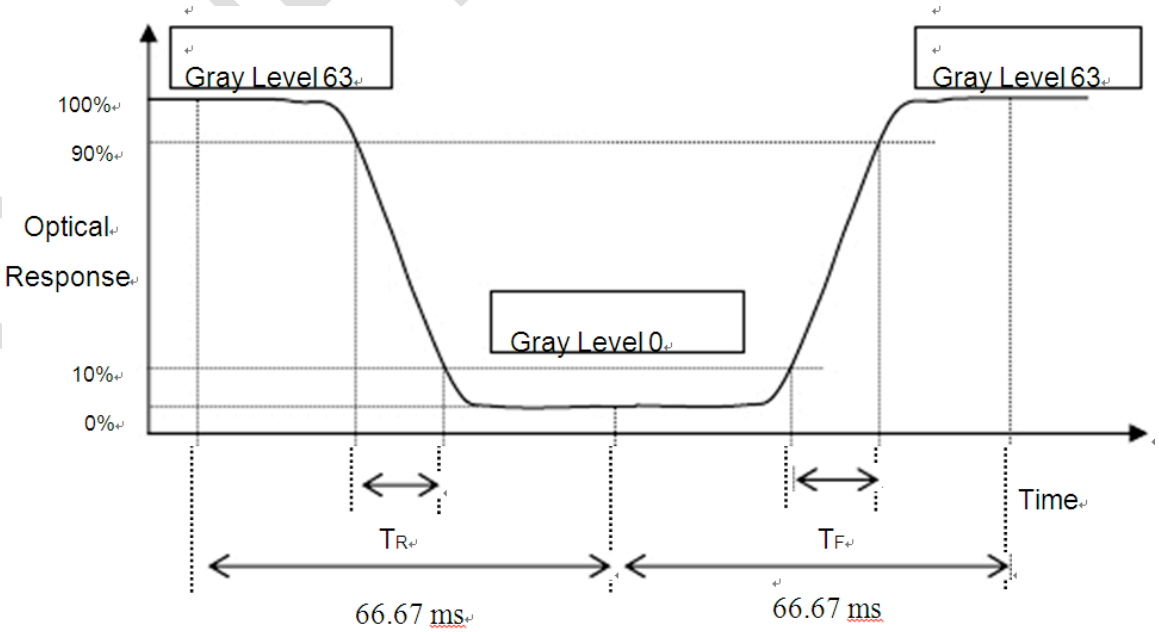
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

CR = CR (1)

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 Average Luminance of White (L_{AVE}):

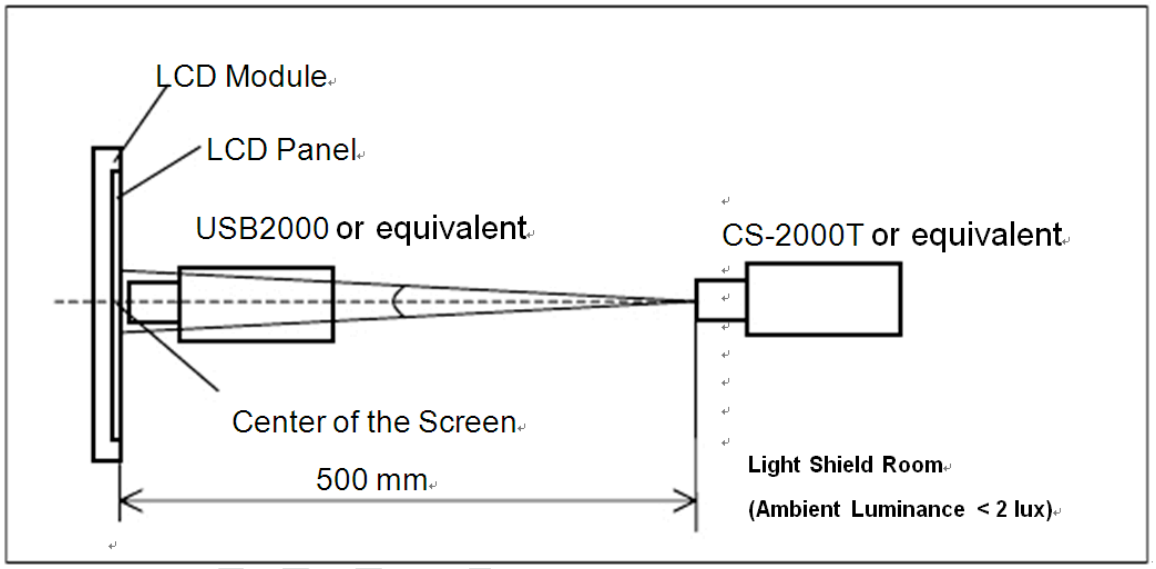
Measure the luminance of gray level 63 at 5 points

L_{AVE} = [L (1)+ L (2)+ L (3)+ L (4)+ L (5)] / 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 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

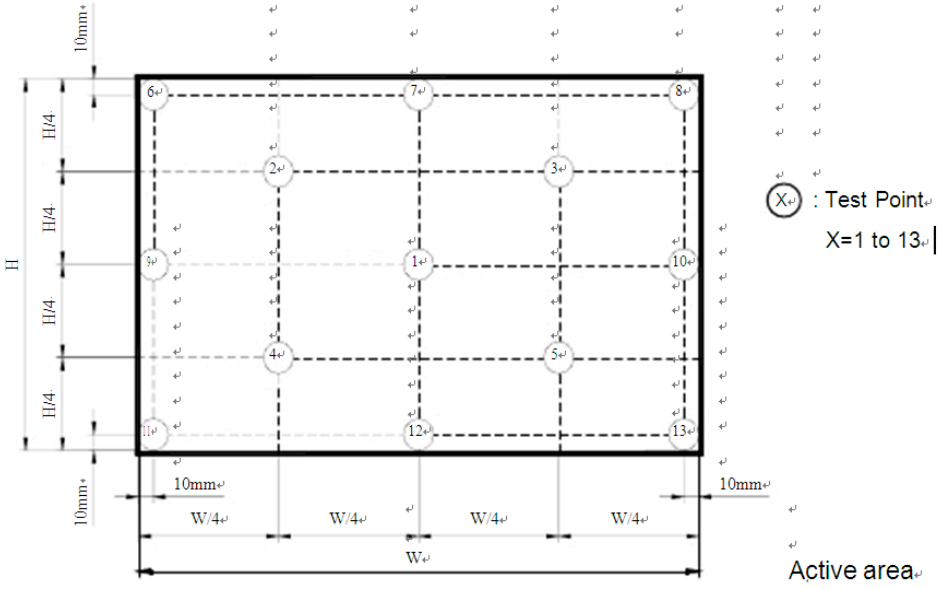


Note (6) Definition of White Variation (™W):

Measure the luminance of gray level 63 at 5 points

™W_{5p} = {Minimum [L (1)~ L (5)] / Maximum [L (1)~ L (5)]}*100%

™W_{13p} = {Minimum [L (1)~ L (13)] / Maximum [L (1)~ L (13)]}*100%



Note (7) Definition of color gamut (C.G%):

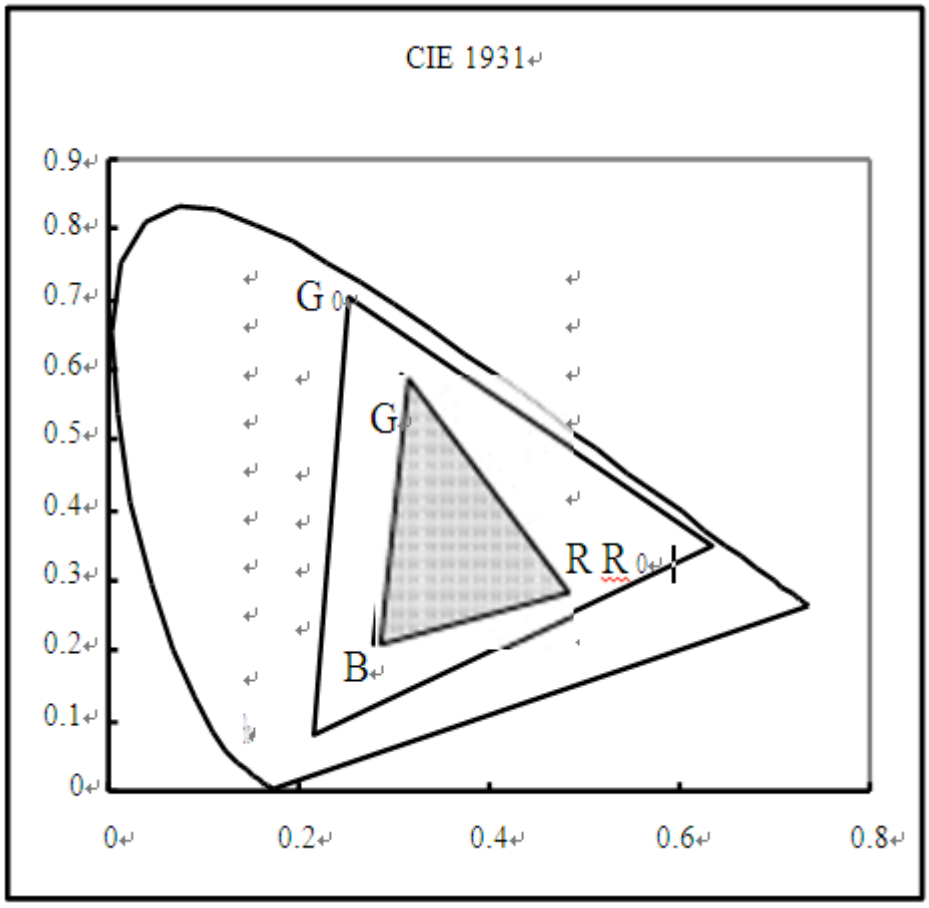
C.G%= R G B / R_0 G_0 B_0,*100%

R_0, G_0, B_0 : color coordinates of red, green, and blue defined by NTSC, respectively.

R, G, B : color coordinates of module on 63 gray levels of red, green, and blue, respectively.

R_0 G_0 B_0 : area of triangle defined by R_0, G_0, B_0

R G B: area of triangle defined by R, G, B



Note (8) The listed optical specifications refer to the initial value of manufacture, but the condition of the specifications after long-term operation will not be warranted.

6. EM Asynchronous Serial Communication Protocol

19.2kbps, 1-bit start, 8bits data, 1-bit stop, parity none.
Data Format: 7bytes for a data packet (Data), as follows:

	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Byte0:	1	D6	D5	D4	D3	D2	D1	D0
Byte1:	0	X_{15}	X_{14}	X_{13}	X_{12}	X_{11}	X_{10}	X_9
Byte2:	0	X_8	X_7	X_6	X_5	X_4	X_3	X_2
Byte3:	0	Y_{15}	Y_{14}	Y_{13}	Y_{12}	Y_{11}	Y_{10}	Y_9
Byte4:	0	Y_8	Y_7	Y_6	Y_5	Y_4	Y_3	Y_2
Byte5:	0	P_6	P_5	P_4	P_3	P_2	P_1	P_0
Byte6:	0	X_1	X_0	Y_1	Y_0	P_9	P_8	P_7

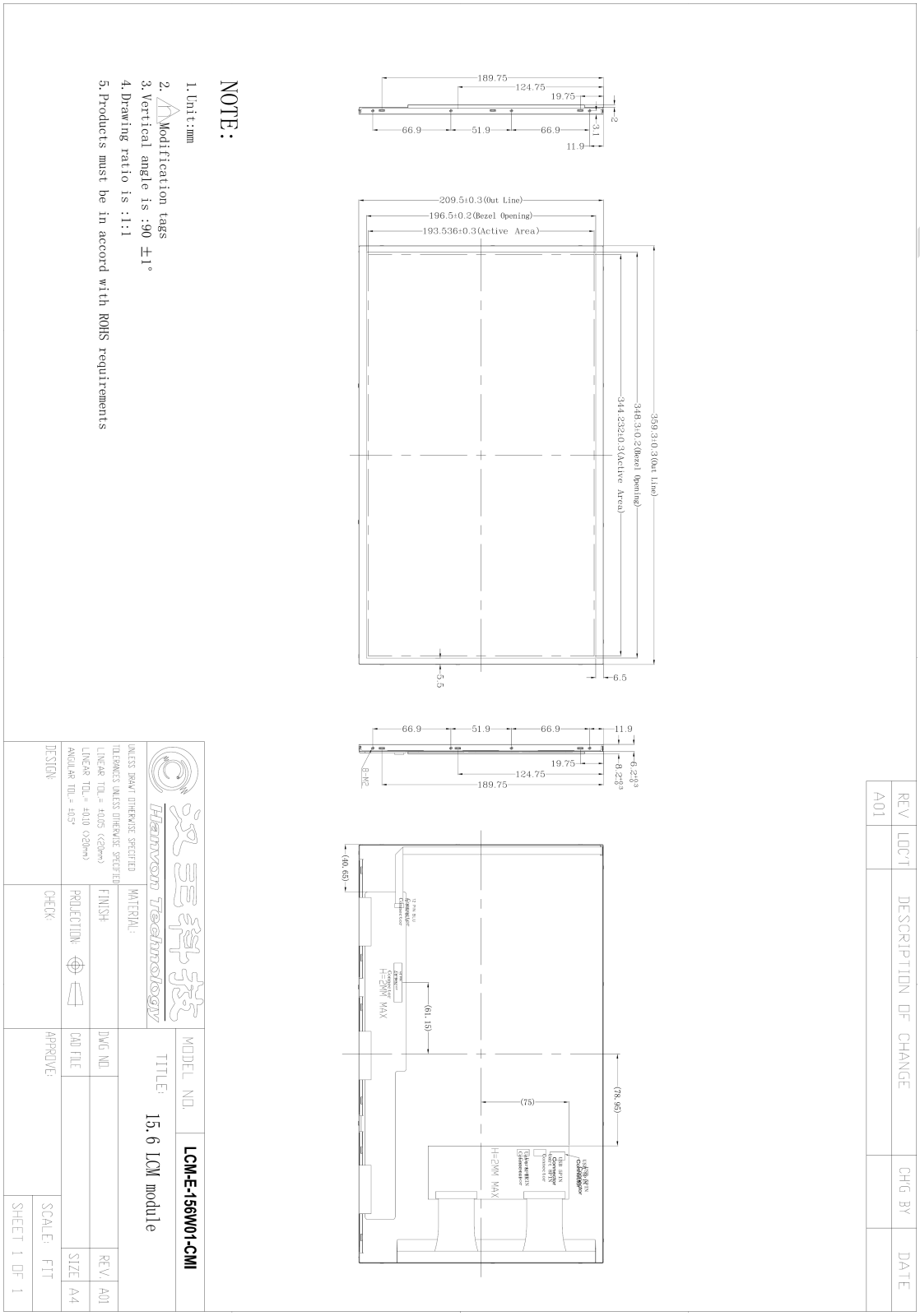
Note:

1. *The MSB (most significant bit) of each Byte0 is always 1, indicating the start of a packet.*
2. *D0 = 1 indicates the pen has put pressure on the screen.*
3. *D1 = 1 indicates the programmable key has been pressed down.*
4. *D2、D3、D4 default 0.*
5. *D5 defaults 1.*
6. *D6 = 1 indicates the pen has left the effective handwriting area. Under this situation, D0 =0, Xn and Yn indicate the last known coordinates of the pen, Pn=0.*
7. *When D6=0, D4=0，D0=0，Data packets are not sent.*
8. *$X_{0\sim15}$ indicates the nth bit of the X coordinate. The most left side of the screen corresponds to X=0, and the most right side of the screen corresponds to X= 0x27DE*
9. *$Y_{0\sim15}$ indicates the nth bit of the Y coordinate. The most above side of the screen corresponds to Y=0, and the most below side of the screen corresponds to Y= 0x1CFE..*
10. *$P_{0\sim9}$ indicates the nth bit of the pressure, which ranging from 0 to 0x3FF.*

7. Appearance

8. Mechanical Drawing

.



9. Handling Precautions

9.1 Mounting method

The LCD panel of Daxian LCD module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

9.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns.

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Sulfur (S)

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (CI), Sulfur (S) from customer, Responsibility is on customer.

9.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

9.4 packing

- Module employ LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

9.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

9.6 Storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.

[It is recommended to store them as they have been contained in the inner container at the time of delivery from us

9.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into

pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later

- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

10. Reliability Test Conditions and Methods

11. Precaution for use

11.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

11.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

12. RoHS Report

13. Labels

13.1 Green Label

Label Material: White color Label Ink: Green
Label Location: Paste on the middle of the board backside

13.2 Bar Code Label

Serial number: YY: Year produced
MM: Month produced
#: Serial number in the month
Label Material: White color Label Ink: Black
Label Location: Paste on the bottom of the board backside

13.3 Inner Box Label

CP No. **********

Q'ty/Box (pcs):

P No. LCM-E-156W01-CMI

Hanwang Technology CO., LTD.

MADE IN CHINA

Label Material: White color Label Ink: Black
Label Location: Paste on the upside of the inner carton

13.4 Shipping Mark Label

PRODUCT NAME: 10.1Inch EM Touch Display
CP NO.:
P NO.: LCM-E-156W01-CMI
QTY:
CARTON NO.:
DIMENSION:
GROSS WEIGHT:
NET WEIGHT:
Hanwang Technology Co., Ltd.
MADE IN CHINA
Handle with Care Keep Upright

Label Material: White color Label Ink: Black
Label Location: Paste on the side face of the outer carton

14.Packing