CUSTOMER' S APPROVAL SPECIFICATIONS

MODEL: CH104DLEL-001

(Complied with RoHS)

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Spec Condition: Preliminary

CUSTOMER	CHEFREE		
APPROVAL	APPROVAL	CHECKER	PREPARE
	ch lee	ch lee	kevin

2. RECORD OF REVISION

Rev	DATE	PAGE	SUMMARY
0.1	2012.08.03	ALL	Preliminary specification was first issued.
0.1	2012.08.03	ALL	Preliminary specification was first issued.

3.MECHANICAL SPECIFICATIONS

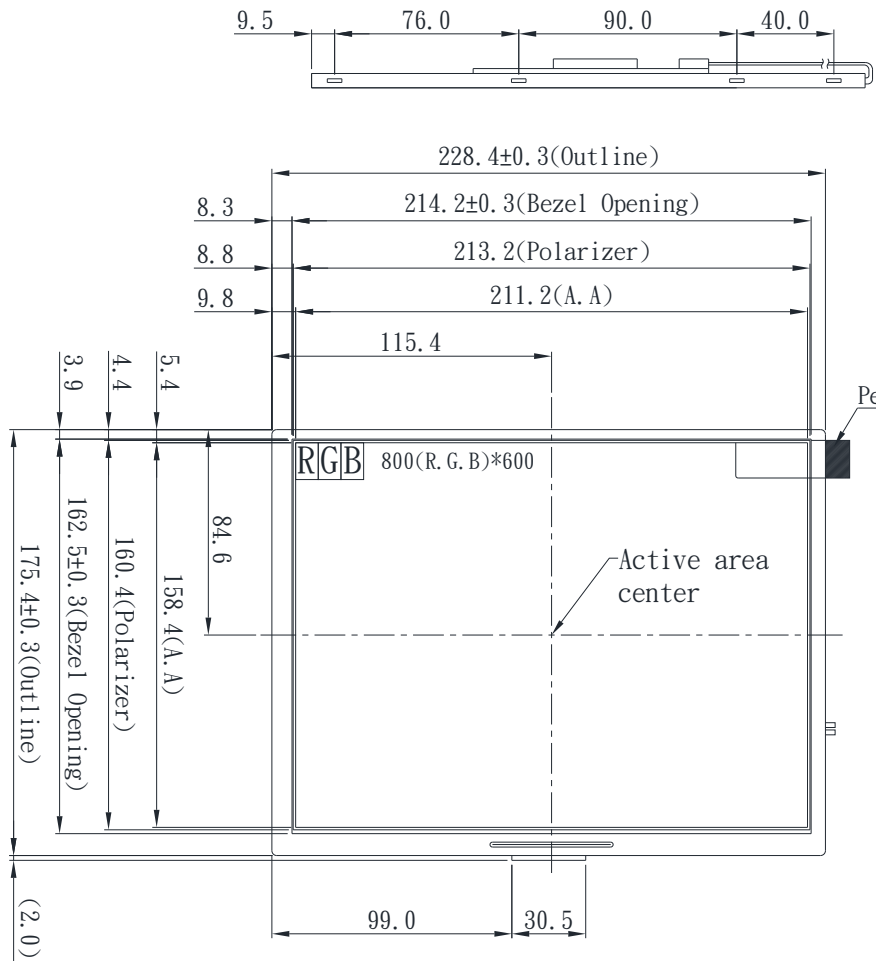| (1)	Number Of Dots (Dots)	800(R.G.B) X 600
(2)	Module Size(mm)	228.4(W) X 175.4(H) X 10.5(D)
(3)	Active Area(mm)	211.2(W) X 158.4(H)
(4)	Pixel Pitch(mm)	0.264(W) X 0.264(H)
(5)	LCD Model	a-Si TFT , Transmissive, Normally/White
(6)	LED Backlight Color	White
(7)	Viewing Direction	12 O'clock
(8)	Gray Scale Inversion Direction	6 O'clock
(9)	Color Configuration	R.G.B Vertical Stripe
(10)	Module Weight(g)	TBD

**Viewing direction for best image quality is different from TFT definition, there is the 180 degrees shift.
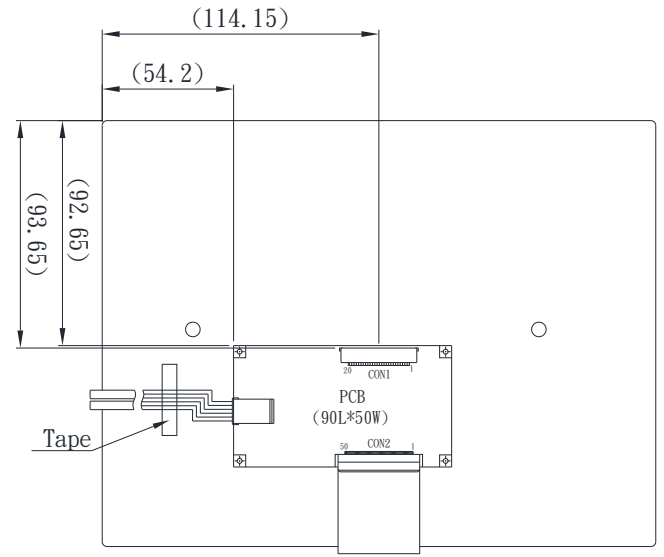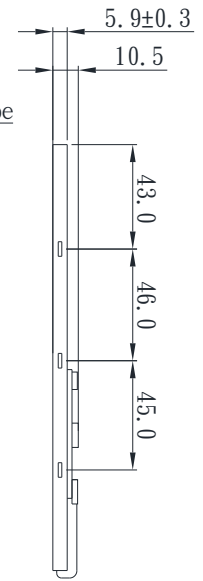
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No.	修定區塊	修 訂 內 容	作 成	修訂日期
		新版	Tim	2012.07.30

8 樣式 QT3-RD-E-0004-003

文件題目	圖號		頁	次頁
發行日	舊版日	登入號碼	機密等級	

228.4±0.3(Outline)

214.2±0.3(Bezel Opening)

213.2(Polarizer)

211.2(A.A)

115.4

9.5 76.0 90.0 40.0

8.3
8.8
9.8

5.9±0.3
10.5

(114.15)

(54.2)

3.9
4.4
5.4

84.6

Peeling Tape

RGB 800(R.G.B)*600

Active area center

162.5±0.3(Bezel Opening)
160.4(Polarizer)
158.4(A.A)
175.4±0.3(Outline)

(2.0)

99.0 30.5

43.0
46.0
45.0

(92.65)
(93.65)

PCB
(90L*50W)

20 CON1

50 CON2

Tape

NOTE:
1.Unit:mm
2.Without Tolerance ±0.5
3.CON1 connector : Hirose DF14A-20P-1.25H or equivalent
   Matching connector : Hirose DF14-20S-1.25C or equivalent.

備考				單位:mm	投影法:	比例尺:	1:1
入庫	製圖	Tim	120730	名稱:		圖號	
	審查			10.4吋LCM		CH104DLEL-001	
	承認						

2

5. INTERFACE PIN CONNECTION

5.1 LCM PANEL DRIVING SECTION

CON1: Hirose DF14A-20P-1.25H or equivalent.

Matching connector: Hirose DF14-20S-1.25C or equivalent.

PIN NO	SYMBOL	FUNCTION	REMARK
1	VCC	Power supply for Digital Circuit	
2	VCC	Power supply for Digital Circuit	
3	GND	Ground	
4	GND	Ground	
5	RxIN0-	Differential Data Input, CH0(Negative)	
6	RxIN0+	Differential Data Input, CH0(Positive)	
7	GND	Ground	
8	RxIN1-	Differential Data Input, CH1(Negative)	
9	RxIN1+	Differential Data Input, CH1(Positive)	
10	GND	Ground	
11	RxIN2-	Differential Data Input, CH2(Negative)	
12	RxIN2+	Differential Data Input, CH2(Positive)	
13	GND	Ground	
14	CKIN-	Differential Clock Input(Negative)	
15	CKIN+	Differential Clock Input (Positive)	
16	GND	Ground	
17	VDD	Power supply for LED Driver Circuit	
18	VDD	Power supply for LED Driver Circuit	
19	GND	Ground	
20	ADJ	Brightness control for LED B/L	

Remarks:

1) ADJ is brightness control Pin. The larger of the pulse duty is, the higher of the brightness.

2) ADJ signal is 0~3.3V. Operation frequency is 20 KHz.

3) GND PIN must be grounding, can not be floating.

6. BLOCK DIAGRAM
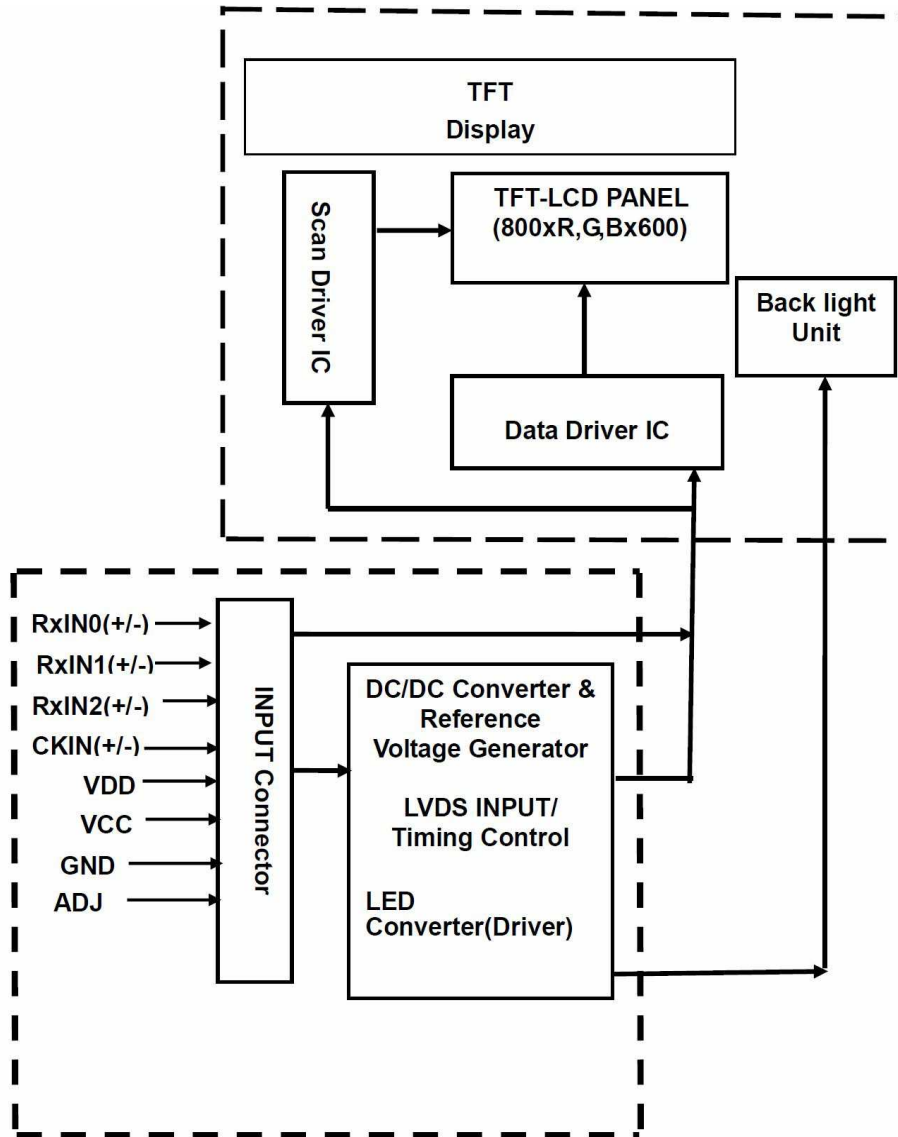
7. ABSOLUTE MAXIMUM RATINGS

7.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Power Supply Voltage	VCC	-0.3	+5.0	V	
Logic Input Voltage	VI	-0.3	VCC+0.3	V	

7.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature(℃)	-10	50	-20	60	Note 1,2

Note 1 : The response time will become lower when operated at low temperature.

Note 2 : Background color changes slightly depending on ambient temperature.

8.ELECTRICAL CHARACTERISTICS

8.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power Voltage for LCD	VCC	3.0	3.3	3.6	V	
	ICC	-	185	250	mA	Note1
Ripple Voltage	VDDrp	-	-	100	mVp-p	
"H" level logical input voltage	V_{IH}	0.7*VCC	-	VCC	V	
"L" level logical input voltage	V_{IL}	0	-	0.3*VCC	V	
LVDS differential input High Threshold	Vth	-	-	100	mV	Vcm=1.2V
LVDS differential input Low Threshold	Vtl	-100	-	-	mV	Vcm=1.2V
LVDS Input Differential Voltage	|VID|	100	400	600	mV	
LVDS Common Mode Voltage	Vcm	1.1	1.2	1.45	V	

Note 1: test pattern: all black, VCC=3.3V, at f_{CLK}=40MHz.

8.2 BACKLIGHT UNITS

Ta=25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
LED Driving Voltage	VDD	4.5	5.0	5.5	V	Note 1
LED Driving Current	IDD	-	530	700	mA	VDD=5.0V
ADJ input voltage	VIH	3.0	-	3.3	V	
	VIL	0	-	0.3	V	
ADJ frequency	-	19	20	21	KHz	
LED Life Time	-	10000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and each LED current=20mA.

Note 2: The "LED Life Time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and each LED current=20mA. The LED Life Time could be decreased if operating each LED current is larger than 20mA.

9.OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK
Contrast Ratio		CR		300	500	-	-	Note (1)
Response Time		TR		-	5	10	ms	Note (2)
		TF		-	15	20	ms	
Color Chromaticity	Red	Rx	Viewing Normal Angle Θx=Θy =0°	(0.523)	(0.573)	(0.623)	-	Note (4)
		Ry		(0.300)	(0.350)	(0.400)	-	
	Green	Gx		(0.286)	(0.336)	(0.386)	-	
		Gy		(0.547)	(0.597)	(0.647)	-	
	Blue	Bx		(0.102)	(0.152)	(0.202)	-	
		By		(0.062)	(0.112)	(0.162)	-	
	White	Wx		(0.26)	(0.31)	(0.36)	-	
		Wy		(0.28)	(0.33)	(0.38)	-	
Brightness		L		200	250	-	cd/m^2	IDD=530mA
Uniformity		YU		70	80	-	%	Note(5)
Viewing Angle		Θx+	Viewing Angle Θx=Θy =0° CR≧10	60	70	-	Deg.	Note (3)
		Θx-		60	70	-		
		ΘY+		40	50	-		
		ΘY-		50	60	-		

*Note (1)   Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.
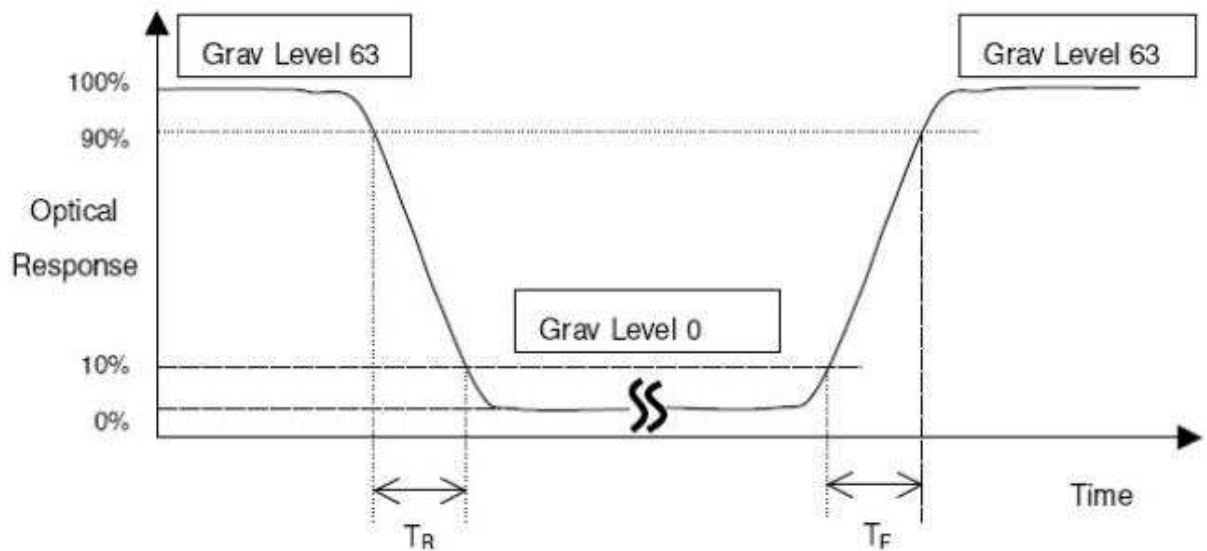
Contrast Ratio (CR) = L63 / L0

L63: Luminance of gray level 63
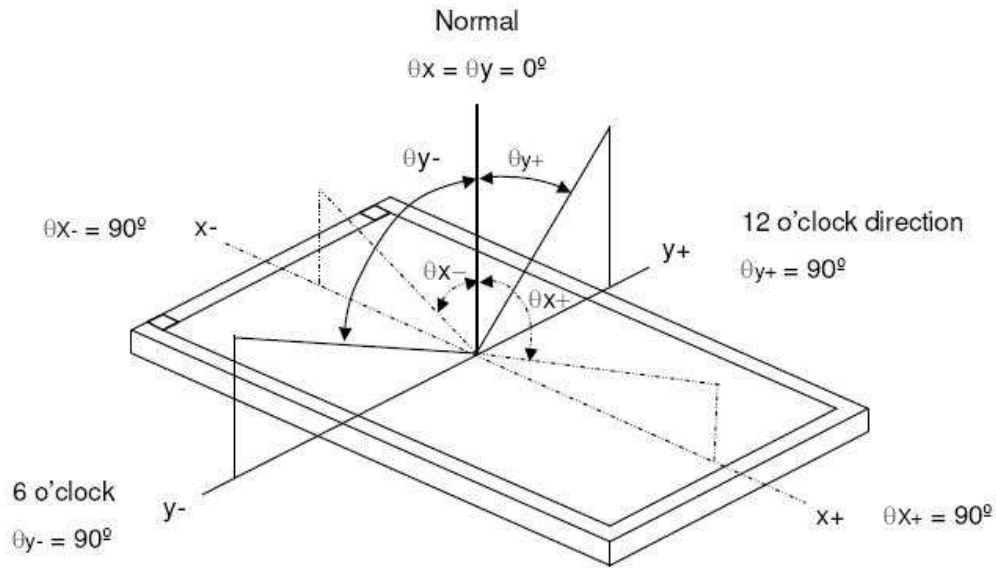
L 0: Luminance of gray level 0

$CR = CR (5)$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

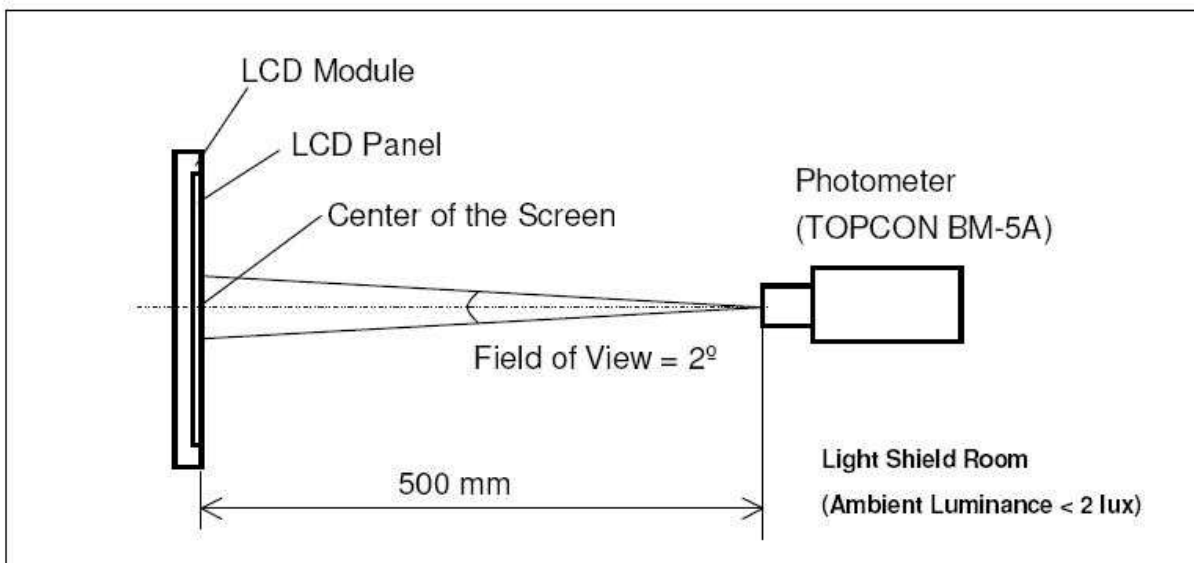*Note (2)   Definition of Response Time (T_R, T_F):

7

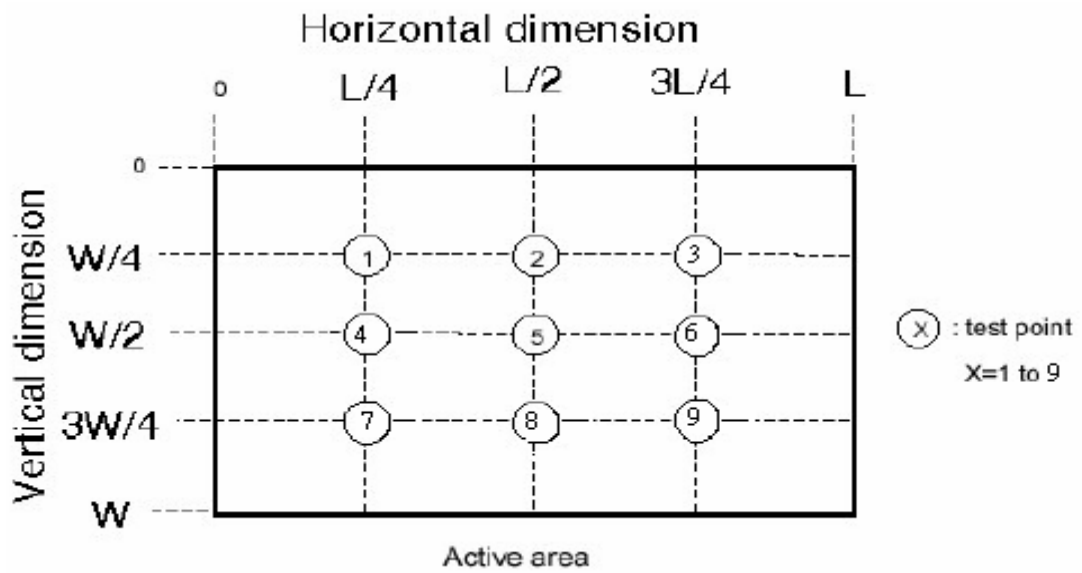*Note(3)   Definition of Viewing Angle

*Note (4)   Measurement Set-Up:

The LCD module should be stabilized at a 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.
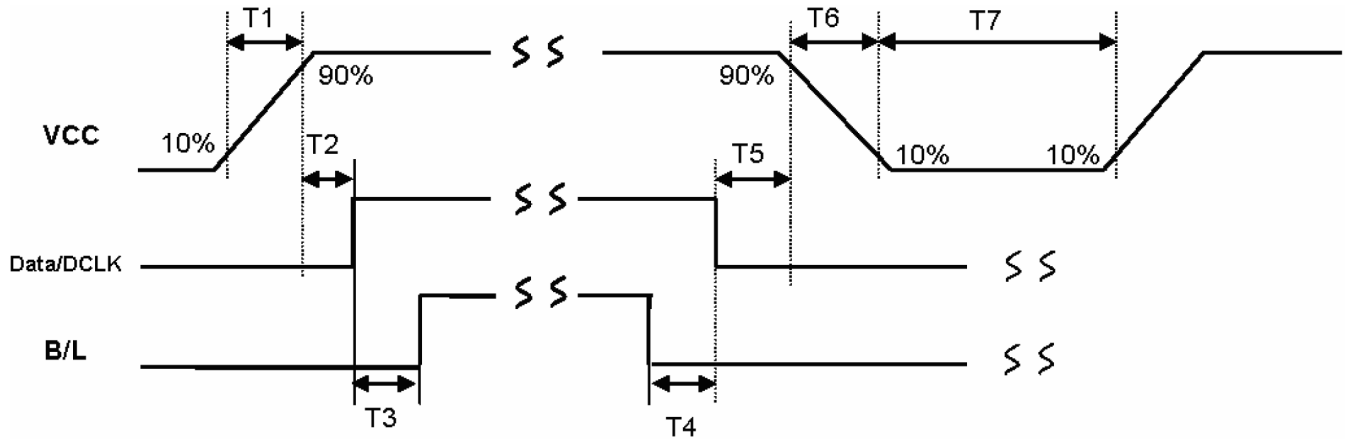
*Note (5)

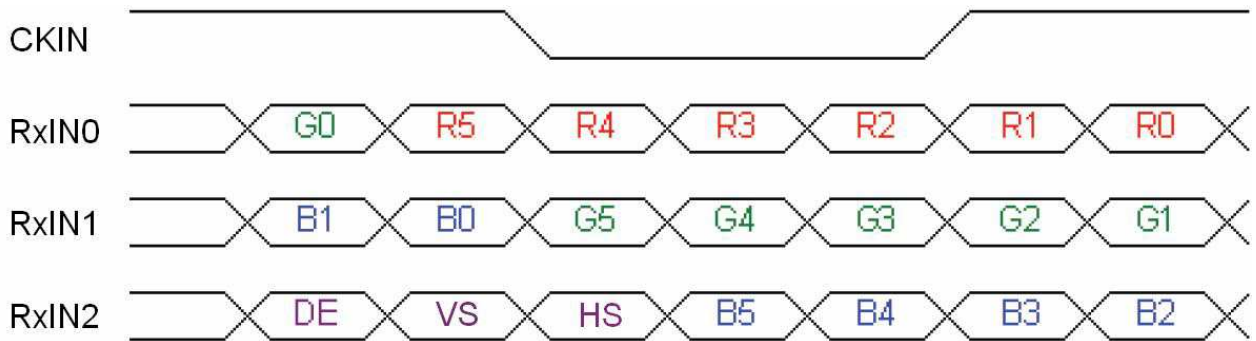$$\left(1 - \frac{\text{MAX Luminance - Average Luminance}}{\text{Average Luminance}}\right) \times 100\% > 70\%$$

10. TIMING SPECIFICATIONS

10.1 POWER SIGNAL SEQUENCE

	MIN.	TYP.	MAX.	UNIT
T1	-	-	20	ms
T2	50	-	200	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	16	-	50	ms
T6	-	-	20	ms
T7	1000	-	-	ms

10.2 THE INPUT DATA FORMAT

10.3 AC TIMING CHARATERISTICS

10.3.1 Timing Conditions

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Data Setup Time	Tdsu	8	-	-	ns
Data Hold Time	Tdhd	8	-	-	ns
DE Setup Time	Tesu	8	-	-	ns
DE Hold Time	Tehd	8	-	-	ns
DCLK frequency	F_{CPH}	35	40	45	MHz
DCLK period	T_{CPH}	23	25	28.5	ns
DCLK pulse duty	T_{CWH}	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	862	1056	1200	T_{CPH}
DE pulse width	T_{DH}	800	800	800	T_{CPH}
DE frame blanking	T_{DEB}	24	35	100	$T_{DEH}+T_{DEL}$
DE frame width	T_{DE}	600	600	600	$T_{DEH}+T_{DEL}$

10.3.2 Timing Diagram

11
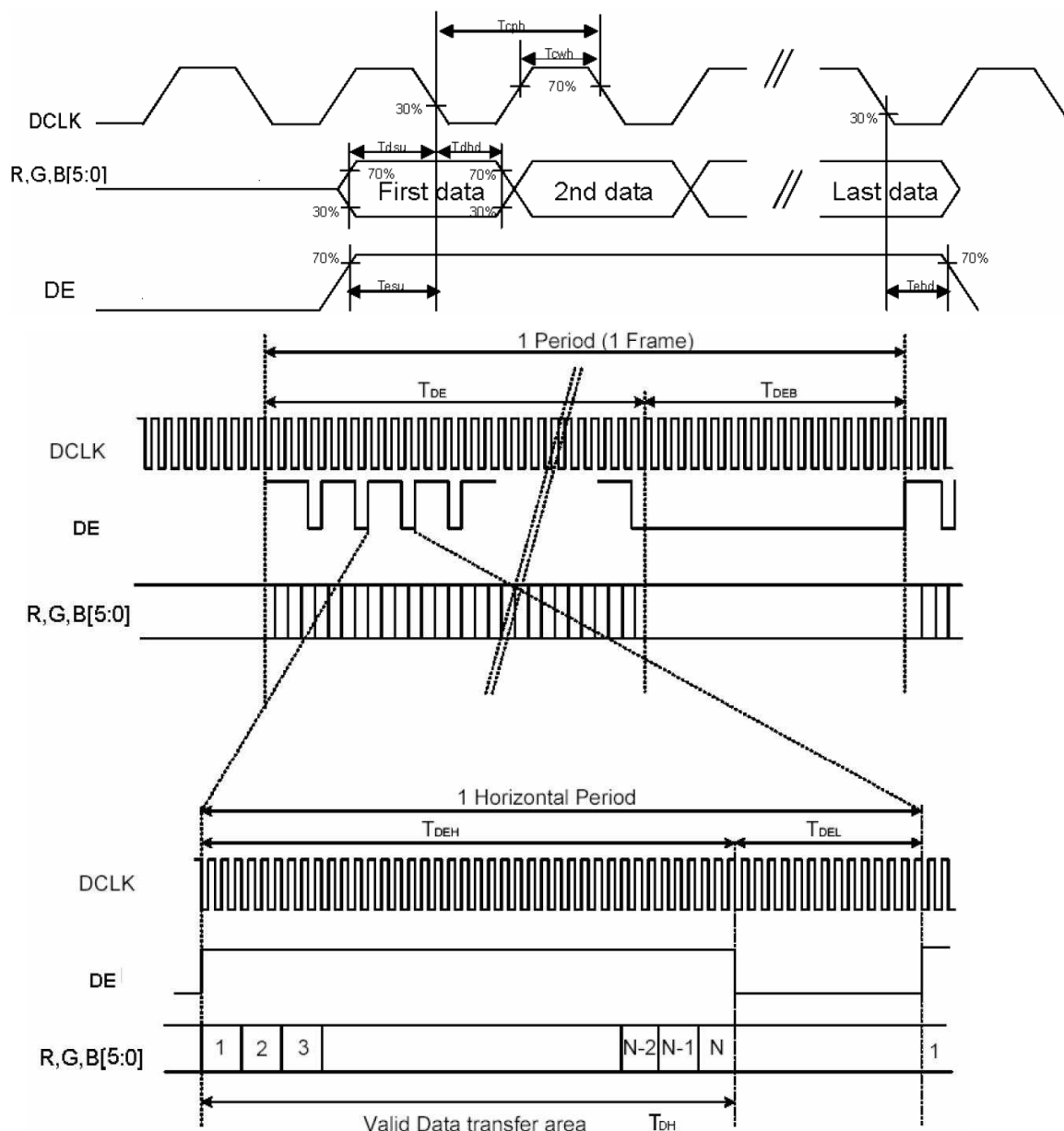
11. RELIABILITY TEST

NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
		Environmental Test		
1	High Temperature Storage	60℃	240HRS	
2	Low Temperature Storage	-20℃	240HRS	
3	High Temperature Humidity Operation	50℃ 80%RH	240HRS	NOTE(2)
4	High Temperature Operation	50℃	240HRS	NOTE(2)
5	Low Temperature Operation	-10℃	240HRS	NOTE(2)
6	Temperature Cycle	-10℃ ← →60℃ (30min)　(30min)	100Cycle	NOTE(2)

NOTE (1): a. THE MODULE SHOULD WORK PROPERLY.

b. BEFORE AND AFTER FUNCTION TEST, THE DIFFERENCE OF CONSUMPTIVE
CURRENT.SHOULD BE WITHIN 10%

NOTE (2) : a. THE MODULE SHOULD WORK PROPERLY.

b. THE MODLUE WON'T BE DEFORMATIVE, COLOR CHANGEABLE OR BROKEN.

c. THE MODULES CAN'T BE APART.

NOTE (3) : ENVIRONMENTAL TEST ITEN 1.~6. MEASURE AFTER 12 HOURS LEFT AT
NORMAL TEMPERATURE AND HUMIDITY

12. PRECAUTIONS IN USE LCM

12.1 ASSEMBLY PRECAUTIONS
(1)You must mount a module using holes arranged in four corners or four sides.
(2)You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
(3)Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
(4)Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(5)Do not open the case because inside circuits do not have sufficient strength.
(6)Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.
(7)Please do not touch metal frames with bare hands and soiled gloves. A color change of the metal frames can happen during a long preservation of soiled LCD modules.
(8)Please pay attention to handling lead wire of backlight so that it is not tugged in connecting with inverter.

12.2 OPERATING PRECAUTIONS
(1)Please be sure to turn off the power supply before connecting and disconnecting signal input cable.
(2)Please do not change variable resistance settings in LCD module. They are adjusted to the most suitable value. If they are changed, it might happen LCD does not satisfy the characteristics specification
(3)Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
(4)When fixed patterns are displayed for a long time, remnant image is likely to occur.
(5)Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
(6)Please consider that LCD backlight takes longer time to become stable of radiation characteristics in low temperature than in room temperature.

12.3 ELECTROSTATIC DISCHARGE CONTROL
(1)The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such the copper leads on the PCB and the interface terminals with any parts of the human body.
(2)The modules should be kept in antistatic bags or other containers resistant to static for storage.
(3)Only properly grounded soldering irons should be used.
(4)If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.
(5)The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended.
(6)Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

12.4 STORAGE PRECAUTIONS
(1)When you store LCDs for a long time, it is recommended to keep the temperature between 0°C-40°C without the exposure of sunlight and to keep the humidity less than 90%RH.
(2)Please do not leave the LCDs in the environment of high humidity and high temperature such as 60°C 90%RH.
(3)Please do not leave the LCDs in the environment of low temperature; below -20°C.

12.5 OTHERS.

(1) A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight Land strong UV rays

(2) Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.

(3) For the packaging box, please pay attention to the followings:

    a. Please do not pile them up more than 5 boxes.
    (They are not designed so.) And please do not turn over.

    b. Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.

    c. Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)

12.6 LIMITED WARRANTY

Unless otherwise agreed between Chefree and customer, Chefree will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with Chefree acceptance standards, for a period on one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of Chefree is limited to repair and/or replacement on the terms set forth above. Chefree will not responsible for any subsequent or consequential events.