

## CUSTOMER' S APPROVAL SPECIFICATIONS

**MODEL: CH070OLDL-004**

**(Complied with RoHS)**

**ISSUE:MAR.12.2014**

**Spec Condition: preliminary**

No.	ITEM	PAGE
1	COVER	--
2	RECORD OF REVISION	0-1
3	MECHANICAL SPECIFICATIONS	1
4	OUTLINE DIMENSIONS	2
5	INTERFACE PIN CONNECTION	3
6	BLOCK DIAGRAM	4
7	ABSOLUTE MAXIMUM RATINGS	4
8	ELECTRICAL CHARACTERISTICS	5~6
9	OPTICAL CHARACTERISTICS	7~9
10	TIMING SPECIFICATIONS	10~13
11	RELIABILITY TEST	14
12	PACKAGE METHOD	15

CUSTOMER	CHEFREE		
APPROVAL	APPROVAL	CHECKER	PREPARE
	Mark	Genius	cloud



### 3.MECHANICAL SPECIFICATIONS

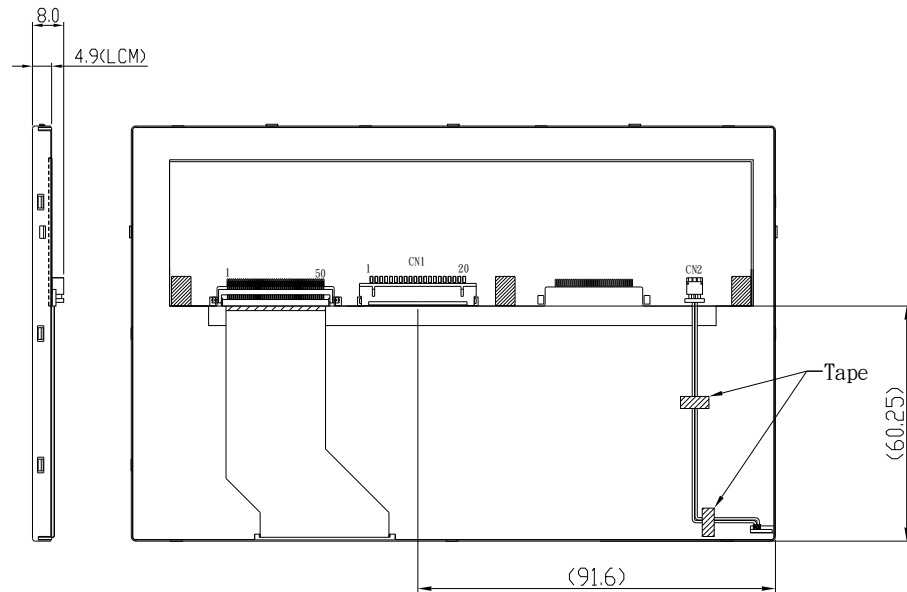
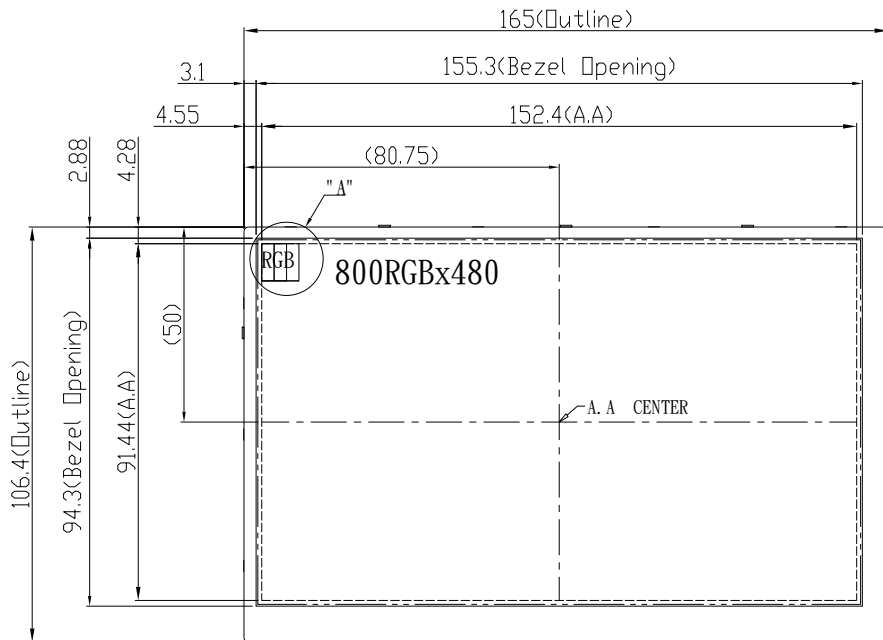
(1)	Number Of Dots (Dots)	800(R.G.B) X 480
(2)	Module Size(mm)	165.0(W) X 106.4(H) X 8.0(D)
(3)	Active Area(mm)	152.4(H) X 91.44(V)
(4)	Pixel Pitch(mm)	0.1905(H) X 0.1905(V)
(5)	LCD Model	TFT , Transmissive, Normally/White
(6)	Polarizer Model	Anti-glare
(7)	LED Backlight Color	White
(8)	Viewing Direction	Wide Viewing Angle
(9)	Gray Scale Inversion Direction	No GSI
(10)	Color Configuration	R.G.B Stripe
(11)	Module Weight(g)	140 ± 5%

\*\*Viewing direction for best image quality is different from TFT definition, there is the 180 degrees shift.

4. OUTLINE DIMENSIONS

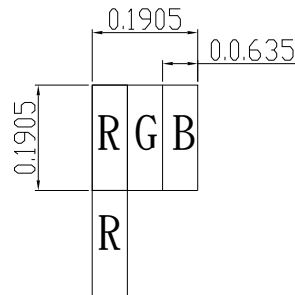
1	2	3	4
文件題目	圖號	頁	次頁
發行日	舊版日	登入號碼	機密等級

7		8 樣式 QT2-RD02-008	
No.	修訂區域	修訂內容	作成
		新版	Cloud
			修訂日期
			2013.02.21



NOTE:

1. Unit: mm
2. Tolerance is  $\pm 0.3$ mm unless noted.
3. CN1: MS240420G or Equivalent



Detail "A"

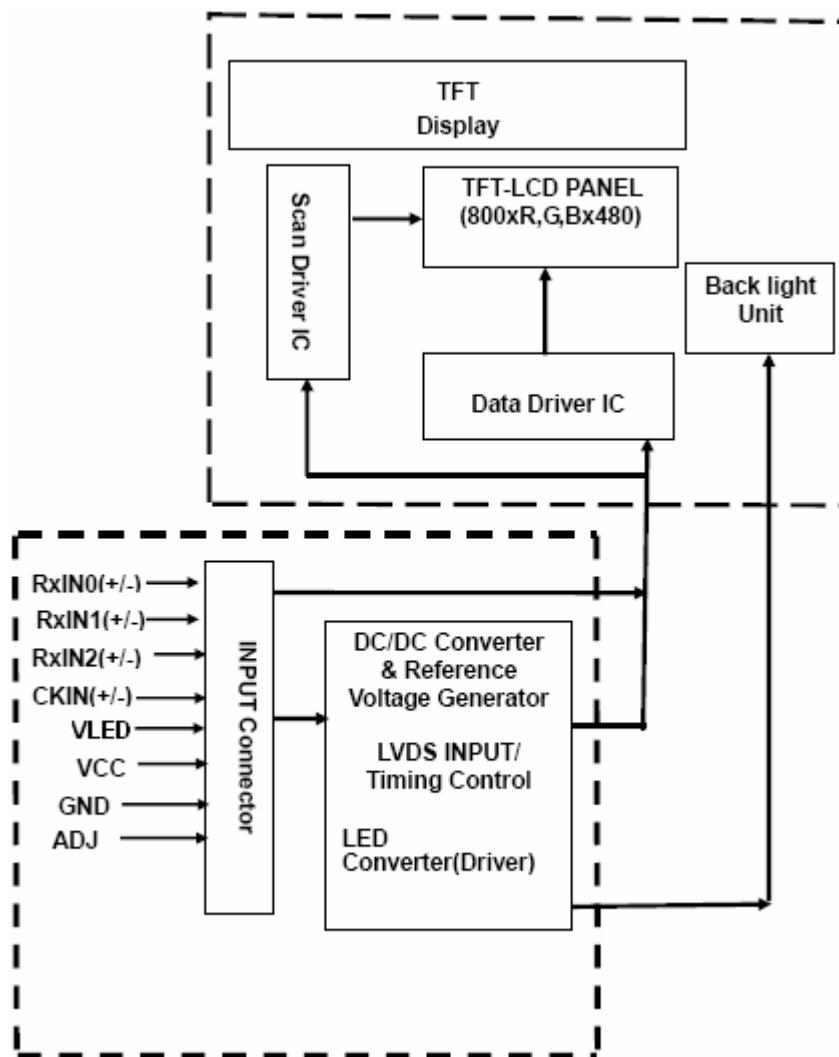
備考	單位: mm		投影法:	比例尺:
入庫	製圖	Cloud 130221	名稱:	圖號
	審查		7" LCM	CH0700LDL-004
	承認			

## 5. INTERFACE PIN CONNECTION

### 5.1 LCM PANEL DRIVING SECTION (CN1 Connector: MS240420 G or Equivalent)

PIN No.	SIGNAL	FUNCTION
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(G0,R5~R0)
6	RxIN0+	Differential Data Input, CH0(G0,R5~R0)
7	GND	Ground
8	RxIN1-	Differential Data Input, CH1(B1,B0,G5~G1)
9	RxIN1+	Differential Data Input, CH1(B1,B0,G5~G1)
10	GND	Ground
11	RxIN2-	Differential Data Input, CH2(DE,B5~B2)
12	RxIN2+	Differential Data Input, CH2(DE,B5~B2)
13	GND	Ground
14	CKIN-	Differential Clock Input
15	CKIN+	Differential Clock Input
16	GND	Ground
17	VLED	Power Supply For LED Driver Circuit
18	VLED	Power Supply For LED Driver Circuit
19	GND	Ground
20	ADJ	Brightness Control For LED B/L

## 6. BLOCK DIAGRAM



## 7. ABSOLUTE MAXIMUM RATINGS

### 7.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	COMMENT
Power Supply Voltage	VCC	-0.3	+7.0	V	
Logic Output Voltage	V <sub>I</sub>	-0.3	VCC+0.3	V	

### 7.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		COMMENT
	MIN	MAX	MIN	MAX	
Ambient Temperature(°C)	-20	70	-30	80	Note 1,2,3
Humidity(% RH)	-	90	-	90	Note 4

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

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

Note 3 : Operation Ta=70°C & -20°C ≤ 240Hrs.

Note 4 : Storage Ta=60°C & H=90% ≤ 240Hrs.

## 8. ELECTRICAL CHARACTERISTICS

### 8.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Power Voltage for LCD	VCC	3.0	3.3	3.6	V
	ICC	-	(175)	(262)	mA
Input High Voltage	V <sub>IH</sub>	0.7*VCC	-	VCC	V
Input Low Voltage	V <sub>IL</sub>	GND	-	0.3*VCC	V
Output High Voltage	V <sub>OH</sub>	0.8VCC	-	VCC	V
Output Low Voltage	V <sub>OL</sub>	GND	-	0.2VCC	V

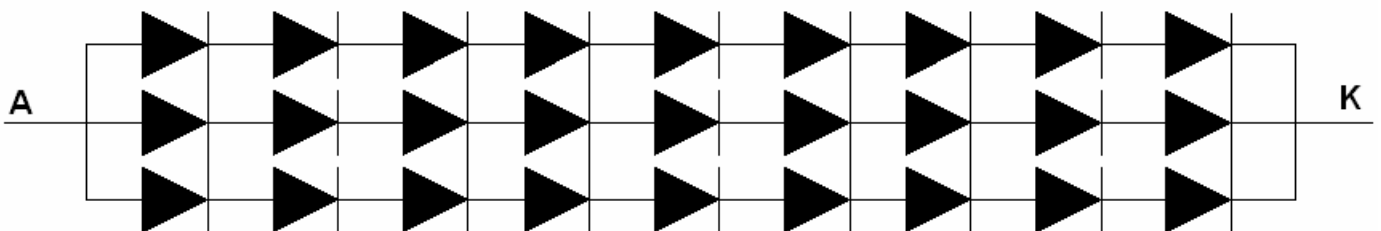
### 8.2 BACKLIGHT UNITS

Ta=25°C

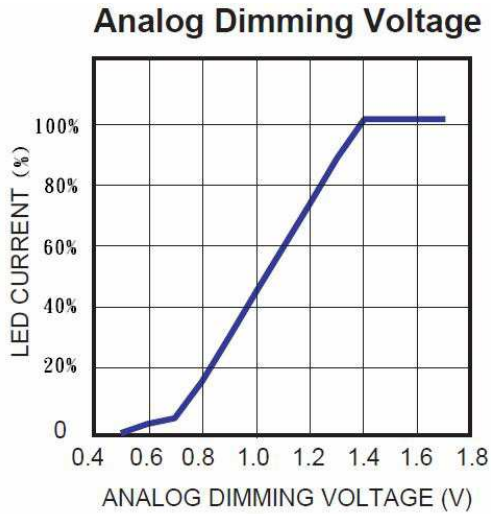
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK	
LED Driving Voltage	VLED	11.7	12	12.3	V		
LED Driving Current	I <sub>LED</sub>	-	300	320	mA	(VLED=12V)	
Brightness control	Analog dimming	ADJ	0.7	-	1.4	V <sub>DC</sub>	Note 3
	PWM dimming		1.4	-	5.0	V <sub>P-P</sub>	Note 4
ADJ Frequency	-	100	-	1000	Hz		
LED Life Time	-	50,000	-	-	Hr		

Note 1: If the module is driven at high ambient temperature & humidity condition. The operating life will be reduced.

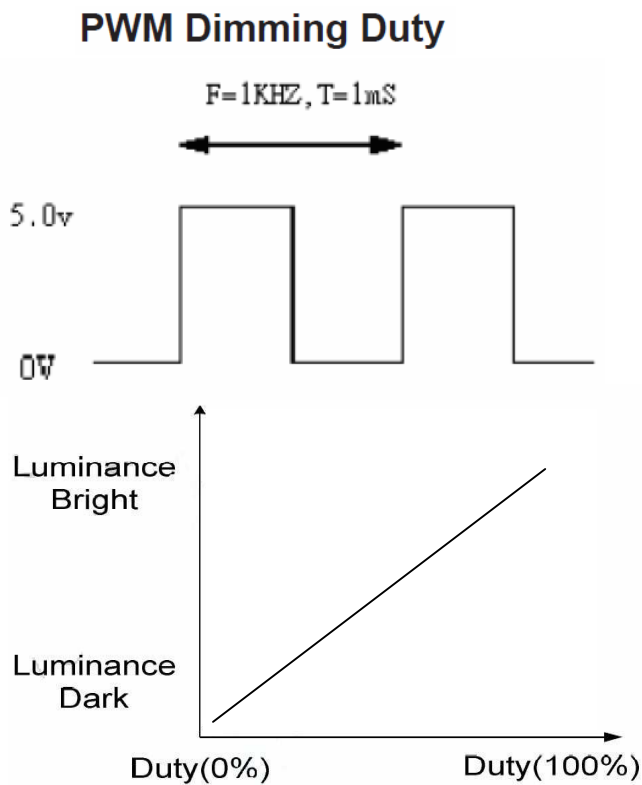
Note 2: Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.



Note3: When the ADJ pin voltage rises from 0.7VDC to 1.4VDC, the LED current will change from 0% to 100% of the maximum LED current.



Note4: ADJ signal  $V_{p-p} = 1.4 \sim 5.0V$ , operation frequency: 100Hz ~ 1 kHz





## 9. OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK	
Contrast Ratio	CR	Viewing	180	240	-	-	Note (1)	
Response Time	TR	Normal	-	5	10	ms	Note (2)	
	TF	Angle	-	15	20	ms		
Chromaticity	White	$\Theta_x = \Theta_y = 0^\circ$	x	(0.26)	(0.31)	(0.36)	-	Note (4)
			y	(0.28)	(0.33)	(0.38)	-	
Viewing Angle	Hor.	$\Theta_x = \Theta_y = 0^\circ$ CR $\geq 10$	$\Theta_{x+}$	80	-	-	Deg.	Note (3)
			$\Theta_{x-}$	80	-	-		
	Ver.		$\Theta_{y+}$	80	-	-		
			$\Theta_{y-}$	80	-	-		
Luminance	L	PWM=100%	800	1000	-	cd/m <sup>2</sup>		
Luminance uniformity	YU		70	75	-	%	Note (5)	

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

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

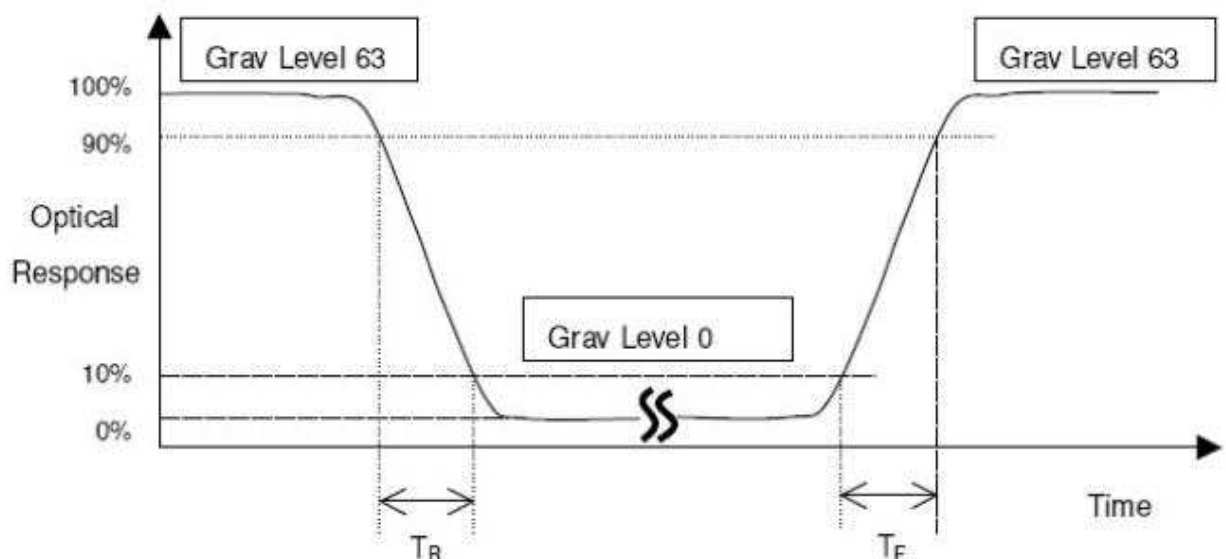
L63: Luminance of gray level 63

L0: Luminance of gray level 0

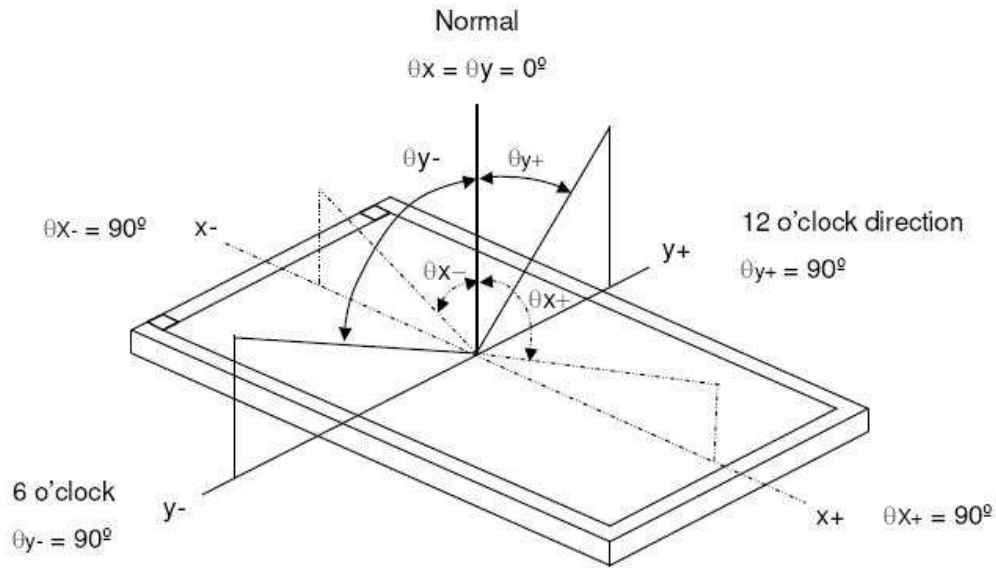
$$CR = CR (5)$$

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

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

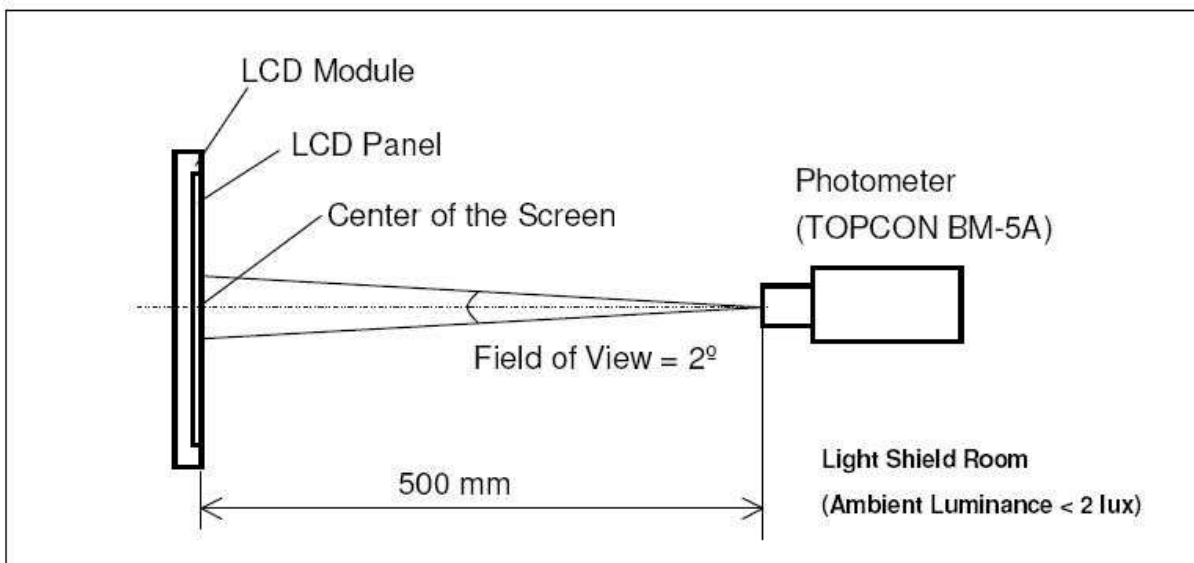


\*Note(3) Definition of Viewing Angle

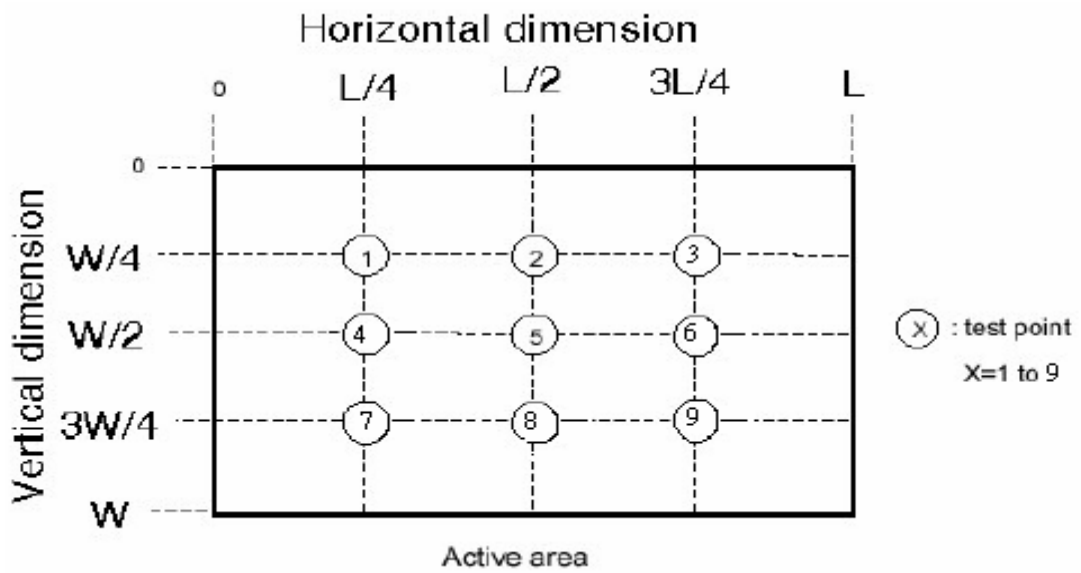


\*Note (4) Measurement Set-Up:

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)



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

## 10. TIMING SPECIFICATIONS

### 10.1.1 AC Electrical Characteristics

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
HS setup time	$T_{hst}$	6	-	-	ns
HS hold time	$T_{hhd}$	6	-	-	ns
VS setup time	$T_{vst}$	6	-	-	ns
VS hold time	$T_{vhd}$	6	-	-	ns
Data setup time	$T_{dsu}$	6	-	-	ns
Data hold time	$T_{dhd}$	6	-	-	ns
DE setup time	$T_{esu}$	6	-	-	ns
Source output settling time	$T_{ST}$	-	-	15	$\mu$ s
Source output loading R	$R_{SL}$	-	2	-	K ohm
Source output loading C	$C_{SL}$	-	60	-	pF

### 10.1.2 Resolution : 800x480

- sync mode

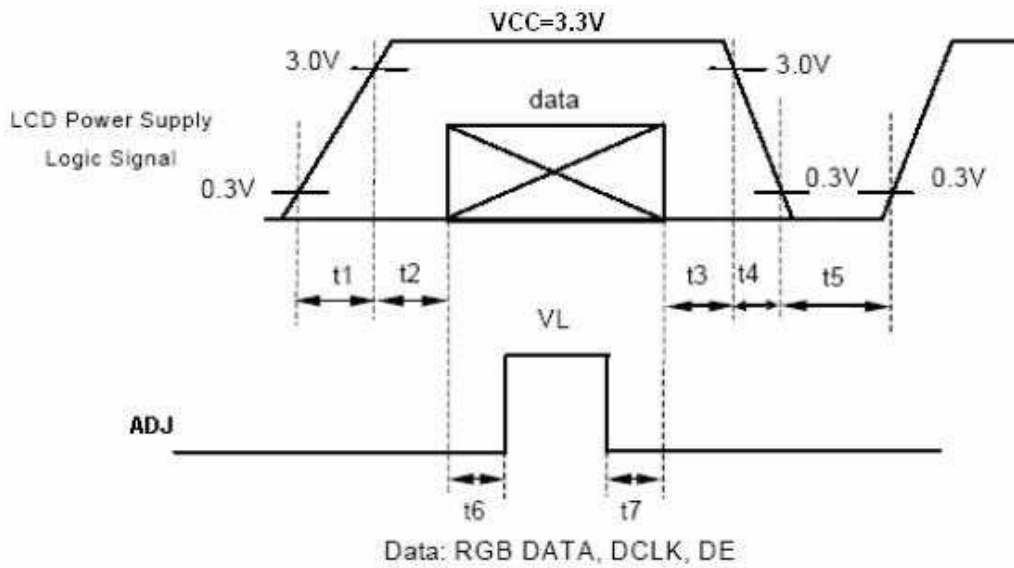
PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLK frequency	$F_{CPH}$	-	33.26	-	MHz
CLK period	$T_{CPH}$	-	30.06	-	ns
CLK pulse duty	$T_{CWH}$	40	50	60	%
HS period	$T_H$	930	1056	1057	$T_{CPH}$
HS pulse width	$T_{WH}$	1	128	-	$T_{CPH}$
HS-first horizontal data time	$T_{HS}$	STHD[7:0]+88 <sup>(1)</sup>			$T_{CPH}$
HS Active Time	$T_{HA}$	-	800	-	$T_{CPH}$
VS period	$T_V$	-	525	-	$T_H$
VS pulse width	$T_{WV}$	1	2	-	$T_H$
VS-DE time	$T_{VS}$	STVD[6:0]+8			$T_H$
VS Active Time	$T_{VA}$	-	480	-	$T_H$

- DE mode

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLK frequency	$F_{CPH}$	25	33.26	50	MHz
CLK period	$T_{CPH}$	-	30.06	-	ns
CLK pulse duty	$T_{CWH}$	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	1000	1056	1200	$T_{CPH}$
DE pulse width	$T_{DEH}$	-	800	-	$T_{CPH}$
DE frame blanking	$T_{DEB}$	10	45	110	$T_{DEH}+T_{DEL}$
DE frame width	$T_{DE}$	-	480	-	$T_{DEH}+T_{DEL}$

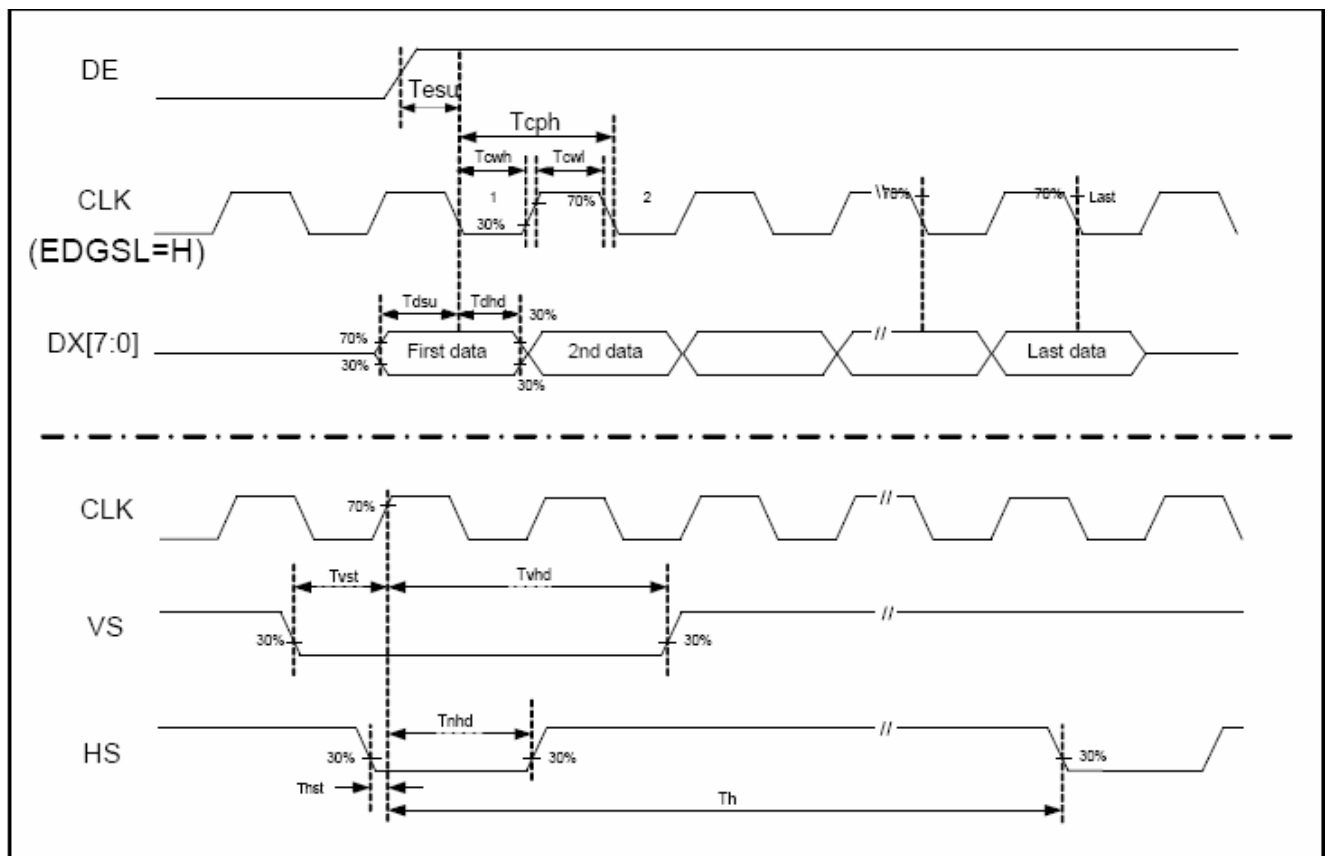
PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DE Horizontal Period	$T_{HP}$	1000	1056	1200	$T_{CLK}$
DE Horizontal Valid	$T_{HV}$	800	800	800	
DE Horizontal Blank	$T_{HBK}$	200	256	400	
DE Vertical Period	$T_{VP}$	490	525	590	$T_{HP}$
DE Vertical Valid	$T_{VV}$	480	480	480	
DE Vertical Blank	$T_{VBK}$	10	45	110	
DE Vertical Frequency	$FV$	51	60	70	Hz

## 10.2 POWER SIGNAL SEQUENCE

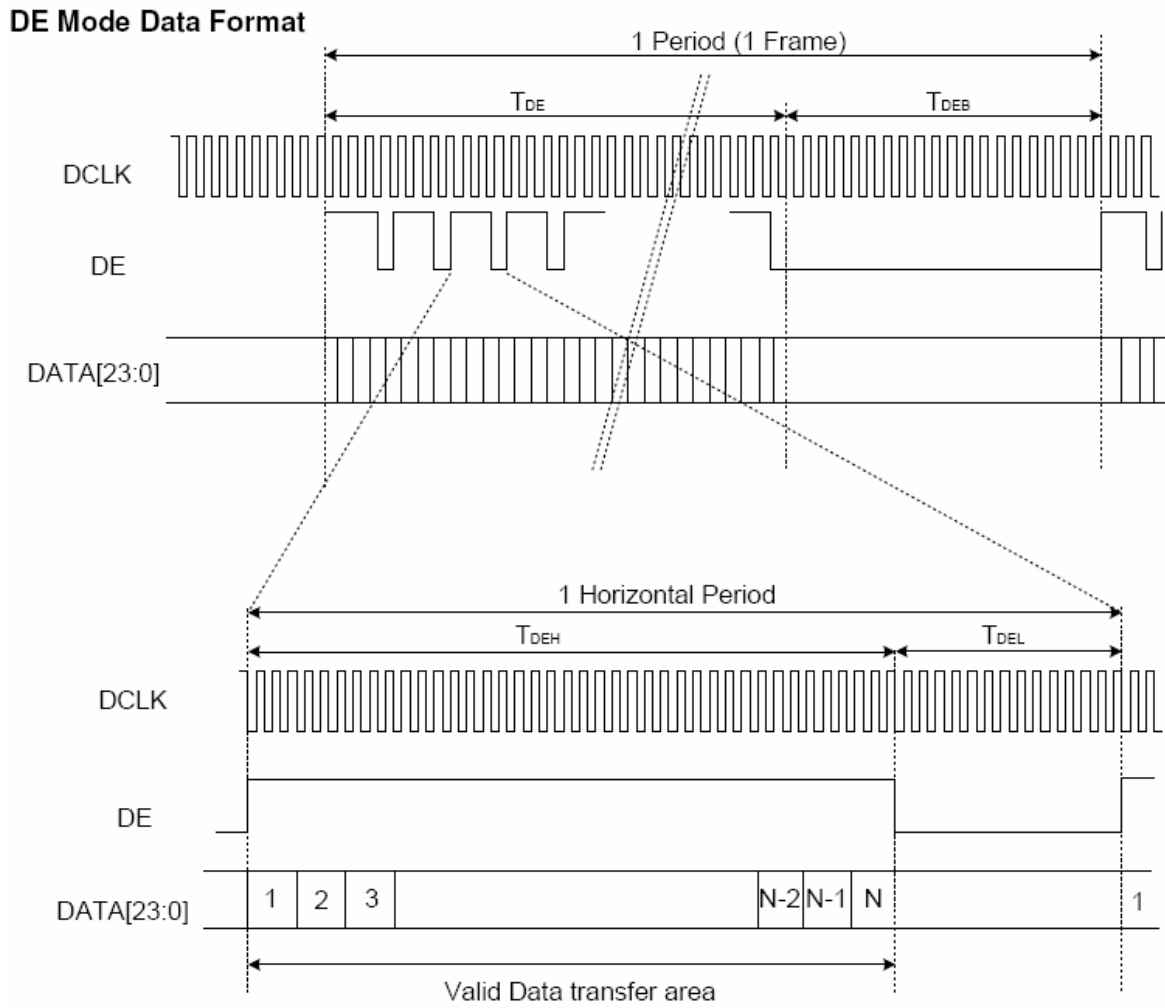


PARAMETER	MIN.	TYP.	MAX.	UNIT
T1	-	-	10	ms
T2	50	-	-	ms
T3	0	-	50	ms
T4	0	-	10	ms
T5	60	-	-	ms
T6	200	-	-	ms
T7	200	-	-	ms

## 10.3 CLOCK AND DATA WAVEFORMS

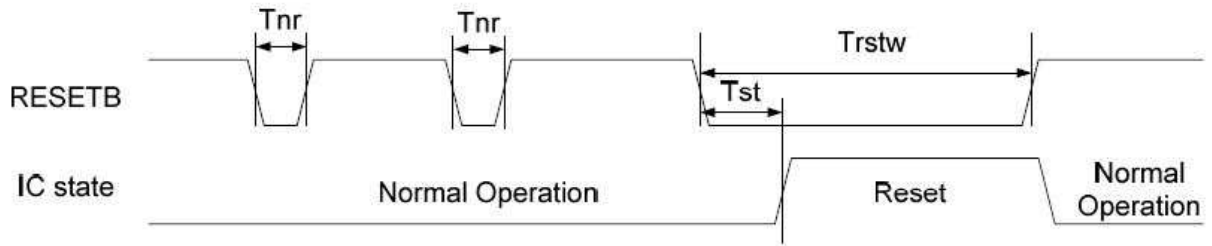


## 10.4 DATA INPUT FORMAT



## 10.5 HARDWARE RESET TIMING

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
RESETB low pulse width	$T_{rstw}$	10	-	-	$\mu\text{s}$
Negative noise pulse width	$T_{nr}$		-	4	$\mu\text{s}$
Reset start time	$T_{st}$	4	-		$\mu\text{s}$



## 11. RELIABILITY TEST

Ta = 25°C

Environmental Test				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	80°C	240HRS	
2	Low Temperature Storage	-30±3°C	240HRS	
3	High Temperature Humidity Storage	60°C 90%RH	240HRS	NOTE(2)
4	High Temperature Operation	70°C	240HRS	NOTE(2)
5	Low Temperature Operation	-20°C	240HRS	NOTE(2)
6	Temperature Cycle	-30°C ← -25°C → 80°C (30min) (5min) (30min)	10CYCLE	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 MODULE WON'T BE DEFORMATIVE, COLOR CHANGEABLE OR BROKEN.

c. THE MODULES CAN'T BE APART.

NOTE (3): BEFORE COSMETIC AND FUNCTION TEST, THE PRODUCT MUST HAVE ENOUGH RECOVERY TIME, AT LEAST 2 HOURS AT ROOM TEMPERATURE.



## 12. PACKAGE METHOD

TBD

## The Netherlands



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