

# TFT-DISPLAY DATASHEET

ONation  
Model:OT156CBWDLT-00

## BRIEF SPEC.:

Main Feature	LandscapeType Wide Viewing Angle Touchscreen
Active Screen Area	344.23 x 193.53 (mm)
Diagonal   Format	15.6"   16:9
Resolution	1366 X 768
Colors	[ 8 Bit]
Backlight	LED White
Brightness	240 cd/m <sup>2</sup>
LED Life Time	50K (h)
Interface	LVDS
Viewing Angle	80/80 L/R 80/80 up/down
Touchscreen	yes
Power Supply	5 V (Typ.)
Module Outline	363 x 215.92 x 19.15 (mm)
Operation Temperature	-0... +60 °C
Storage Temperature	-20... +60 °C
Surface Treatment	Anti-Glare Hardness 3H



# ONation Corporation

## TFT COLOR LCD MODULE

**MODEL: OT156CBWDLT-00**  
(Complied with RoHS)

**WXGA**  
**LVDS interface**

**Version: P0.1**

<b>Customer :</b> _____
<b>Approved By :</b> _____
<b>Date:</b> _____

ONATION		
APPROVAL	CHECKER	PREPARE
Ian	Ian	Josh

All information is subject to change without notice.  
Please confirm the sales representative before starting to design your system

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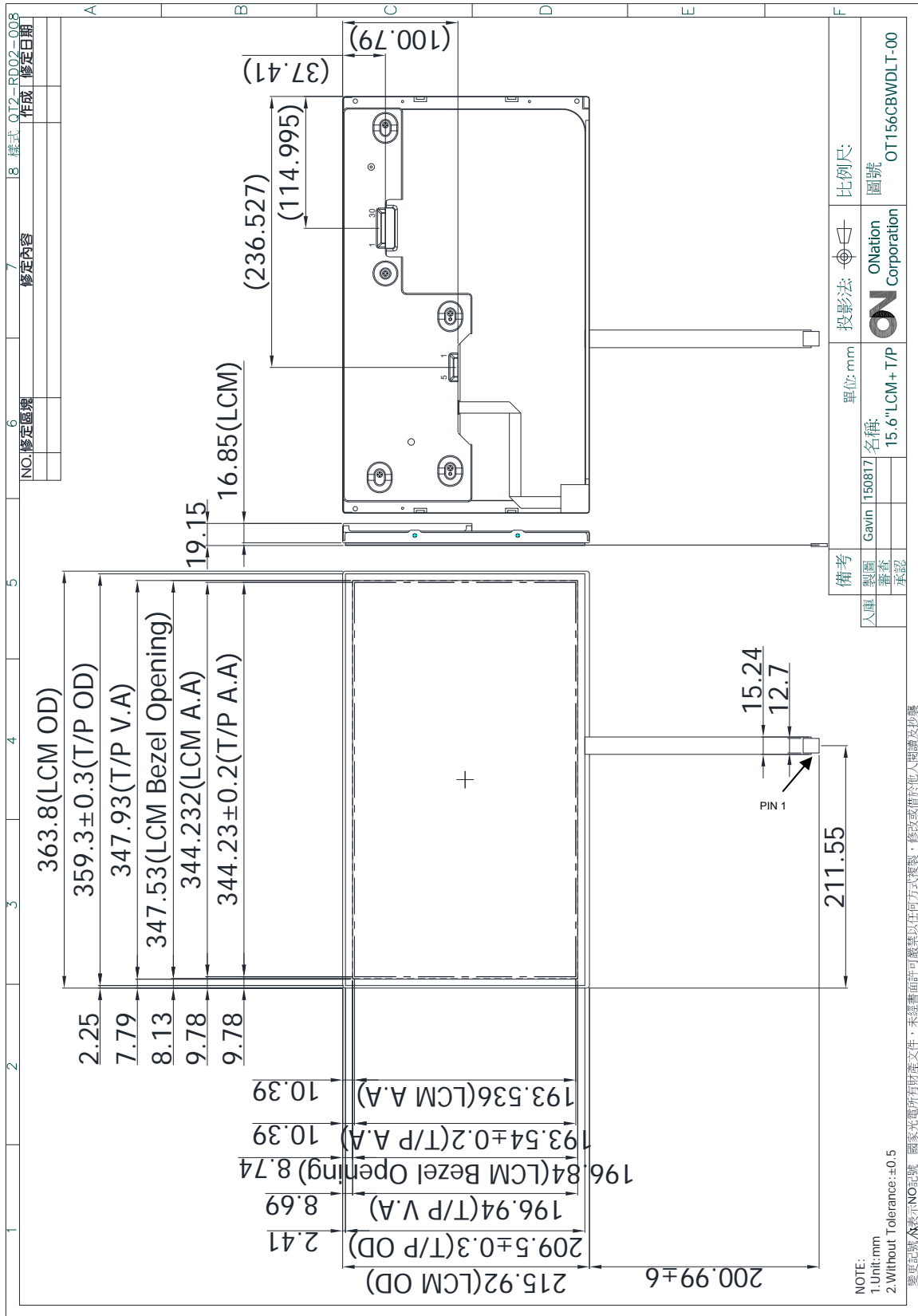
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## 2.MECHANICAL SPECIFICATIONS

(1)	Number Of Dots (Dots)	1366(R.G.B) X 768
(2)	Module Size(mm)	363.8 (W) X 215.92 (H) X 19.15 (D)
(3)	Active Area(mm)	344.232(H) X 193.536(V)
(4)	Dot Pitch(mm)	0.252 (H) X 0.252(V)
(5)	LCD / Polarizer Model	TFT Ctive matrix, Normally/White,AG,3H
(6)	LED Backlight Color	White
(7)	Viewing Direction	Wide Viewing Angle Horizontal : Right +Left side 160°(typ.) Vertical : Up +Down side 160°(typ.)
(8)	Gray Scale Inversion Direction	No GSI
(9)	Color Configuration	R.G.B Vertical Stripe
(10)	Module Weight(g)	TBD

### 3. OUTLINE DIMENSIONS



## 4. INTERFACE PIN CONNECTION

### 4.1 LCM PANEL DRIVING SECTION

Type Part Number : 187114-30091,P2

Mating Housing Part Number : FI-X30H(JAE) or FI-X30HL(JAE) or equivalent

PIN NO.	SYMBOL	FUNCTION	REMARKS
1	GND	Ground	
2	NC	No connection	
3	NC	No connection	
4	GND	Ground	
5	RxIN0-	Differential Clock Input,CH0(Negative)	
6	RxIN0+	Differential Clock Input,CH0(Positive)	
7	GND	Ground	
8	RxIN1-	Differential Clock Input,CH1(Negative)	
9	RxIN1+	Differential Clock Input,CH1(Positive)	
10	GND	Ground	
11	RxIN2-	Differential Clock Input,CH2(Negative)	
12	RxIN2+	Differential Clock Input,CH2(Positive)	
13	GND	Ground	
14	RxCLKIN-	Differential Clock Input (Negative)	
15	RxCLKIN+	Differential Clock Input (Positive)	
16	GND	Ground	
17	RxIN3-	Differential Clock Input,CH3(Negative)	
18	RxIN3+	Differential Clock Input,CH3(Positive)	
19	GND	Ground	
20	NC	No connection	
21	NC	No connection	
22	NC	No connection	
23	GND	Ground	
24	GND	Ground	
25	GND	Ground	
26	VCC	+5V Power Supply	
27	VCC	+5V Power Supply	
28	VCC	+5V Power Supply	
29	VCC	+5V Power Supply	
30	VCC	+5V Power Supply	

#### 4.2 BACKLIGHT UNIT

Connector : CI1405M2HRF-NH (CviLux)

Mating Housing Part Number : CI1405SL000-NH (CviLux) or Equivalen

PIN NO.	SYMBOL	FUNCTION	REMARKS
1	VLED	Power Supply	
2	GNG	Ground	
3	EN	Enable pin	
4	ADJ	Backlight Adjust	
5	NC	Not connection	

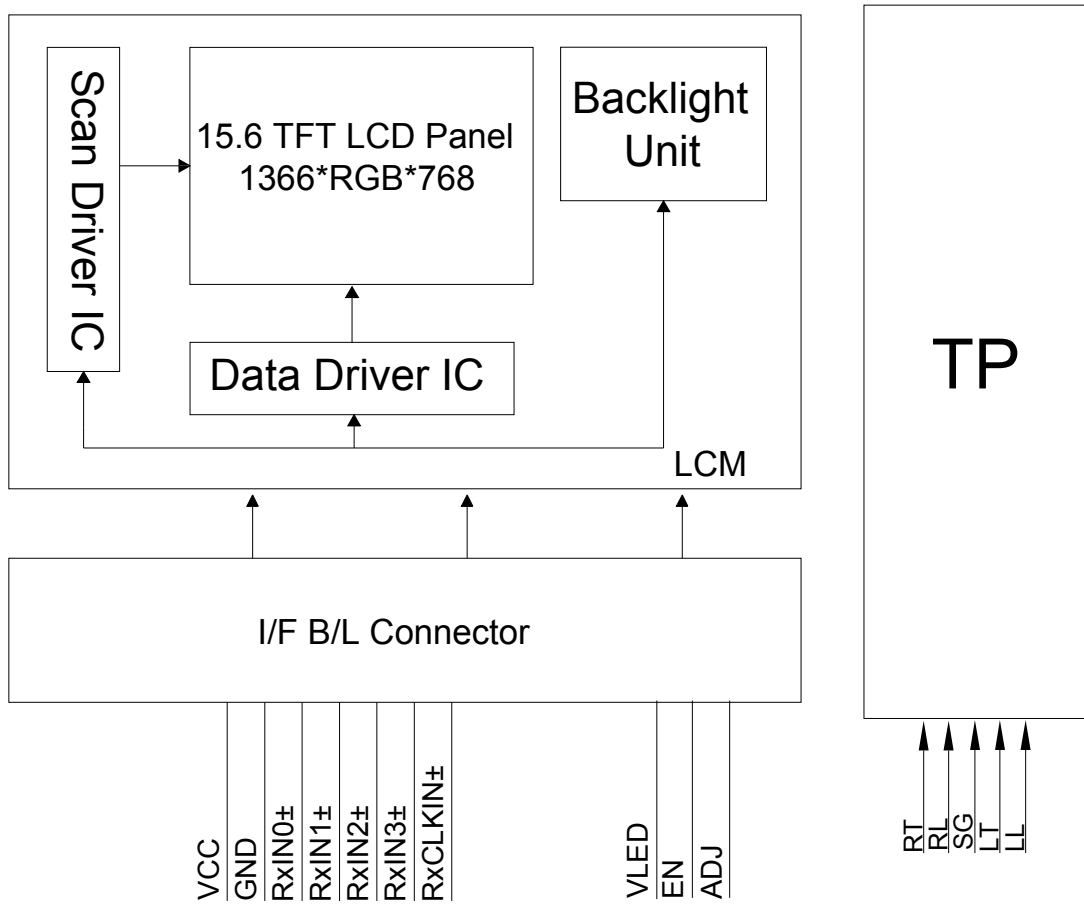
#### 4.3 TP PIN ASSIGNMENT

T/P Connector ; P/N 65801-005 or Equivalen

PIN NO.	SIGNAL	FUNCTION
1	RL	-
2	LL	-
3	SG	-
4	RT	-
5	LT	-



### 5. BLOCK DIAGRAM



## 6.ABSOLUTE MAXIMUM RATINGS

### 6.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Power Supply voltage	VCC	-0.3	6	V	
Logic Input Voltage	V <sub>IN</sub>	-0.3	6	V	

Note: The absolute maximum rating values of this product not allowed to be exceeded at any times. Should be module be used with any of absolute maximum ratings exceeded. The characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

### 6.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN	MAX	MIN	MAX	
Ambient Temperature(°C)	0	60	-20	60	
Humidity(% RH)	Note 3		Note 3		

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 : Storage Ta=50°C & RH=80% ≤ 240Hrs.

## 7.ELECTRICAL CHARACTERISTICS

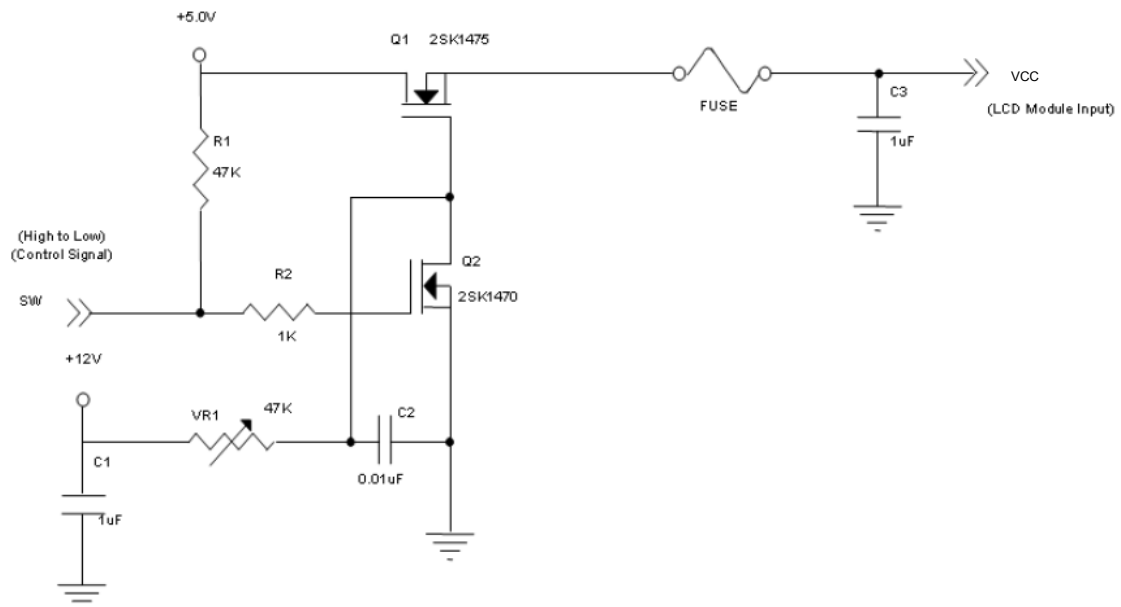
### 7.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25°C

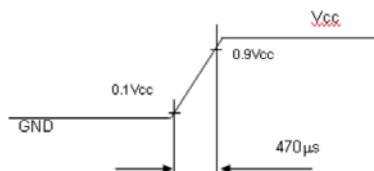
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Logic/ LCD Drive Voltage	VCC	4.5	5	5.5	V	
Power Supply Current	ICC	-	(160)	(210)	mA	White ,NOTE 3
	ICC	-	(220)	(270)	mA	Black ,NOTE 3
Ripple Voltage	V <sub>RP</sub>	-	-	150	mV	
Rush Current	I <sub>RUSH</sub>	-	-	3	A	NOTE 2
Power Consumption	PLCD		1.35	1.6	Watt	NOTE 4
LVDS differential input voltage	V <sub>id</sub>	200	-	600	mV	
LVDS common input voltage	V <sub>ic</sub>	-	1.2	-	V	
Logic High Input voltage	V <sub>IH</sub>	2.7	-	3.3	V	
Logic Low Input voltage	V <sub>IL</sub>	0	-	0.7	V	

Note 1 : The ambient temperature is Ta = 25±2°C

Note 2 : Measurement Conditions:



V<sub>d</sub> rising time is 470μs



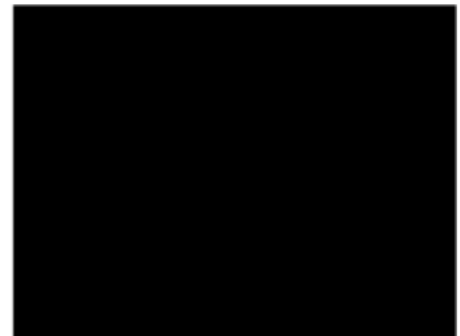
Note 3 : The specified power supply current is under the conditions at  $V_{CC}=5.0V, T_a=25\pm 2^{\circ}C$ ,  $F_r=60Hz$ , whereas a power dissipation check pattern below is displayed.

a : White Pattern

b : Black Pattern



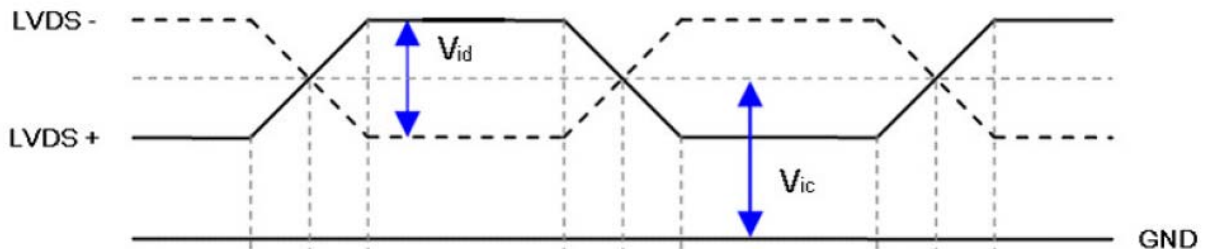
Active Area



Active Area

Note 4 : The power consumption is specified at the black pattern with the maximum current.

Note 5 : VID waveform condition



### 7.3 BACKLIGHT UNIT

$T_a=25^{\circ}C$

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
LED voltage	V <sub>LED</sub>	10.8	12	13.2	V	
LED Light Bar Current	I <sub>LED</sub>	600	800	1000	mA	V <sub>LED</sub> =12V Duty=100%
LED Life Time	L <sub>L</sub>	50000			Hour	Note 2
Power Consumption	P <sub>LED</sub>		9.6		W	V <sub>LED</sub> =12V Duty=100%

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

Note 2 : The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at  $T_a=25\pm 2^{\circ}C$  and  $I=(60)mA$  (per chip) until the brightness becomes  $\leq 50\%$  of its original value.

## 8.OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK	
Contrast Ratio	CR	Viewing Normal Angle	(300)	(400)	-	-	Note (1)	
Response Time	TR		-	3	8	ms	Note (2)	
	TF		-	7	13	ms		
Chromaticity	White	$\Theta_x = \Theta_y$ $= 0^\circ$	Wx	(0.268)	(0.313)	(0.358)	-	Note (4)
	Wy		(0.284)	(0.329)	(0.374)	-		
Viewing Angle	Hor.	$\Theta_{x-+}$ $\Theta_{x+}$	Horizontal CR=10	140	160	-	Deg.	Note (3)
	Ver.	$\Theta_{y-+}$ $\Theta_{y+}$						
Luminance	L	PWM =100%	(190)	(240)	-	cd/m <sup>2</sup>	-	
Luminance uniformity	YU		65	-	-	%	Note (5)	

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

The contrast ratio can be calculated by the following expression.

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

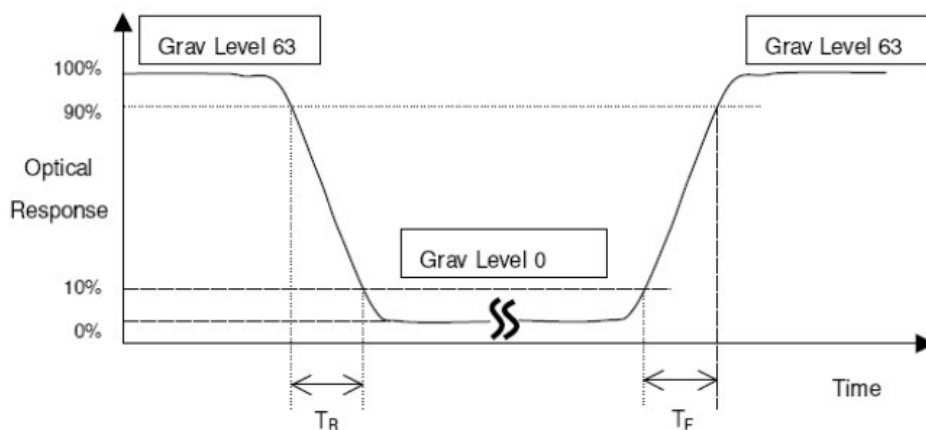
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

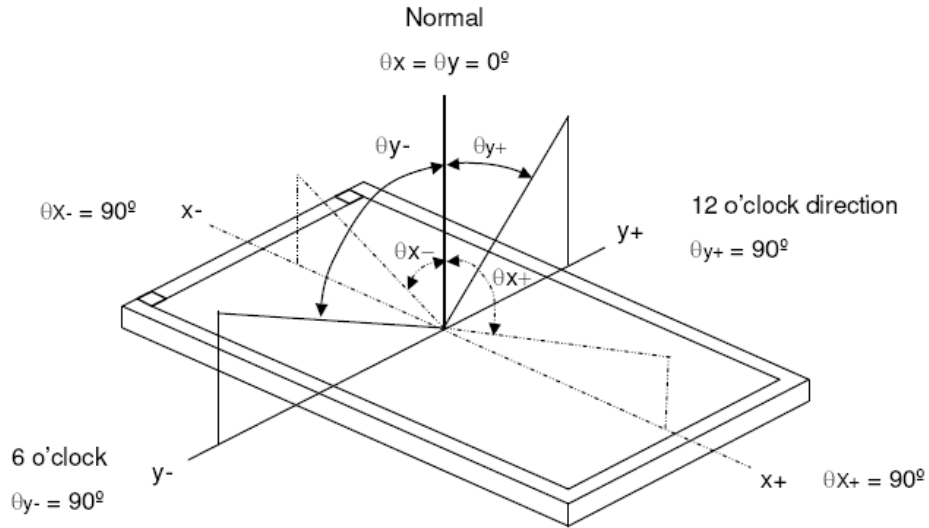
$$CR = CR (5)$$

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

\*Note (2) Definition of Response Time (TR, TF):

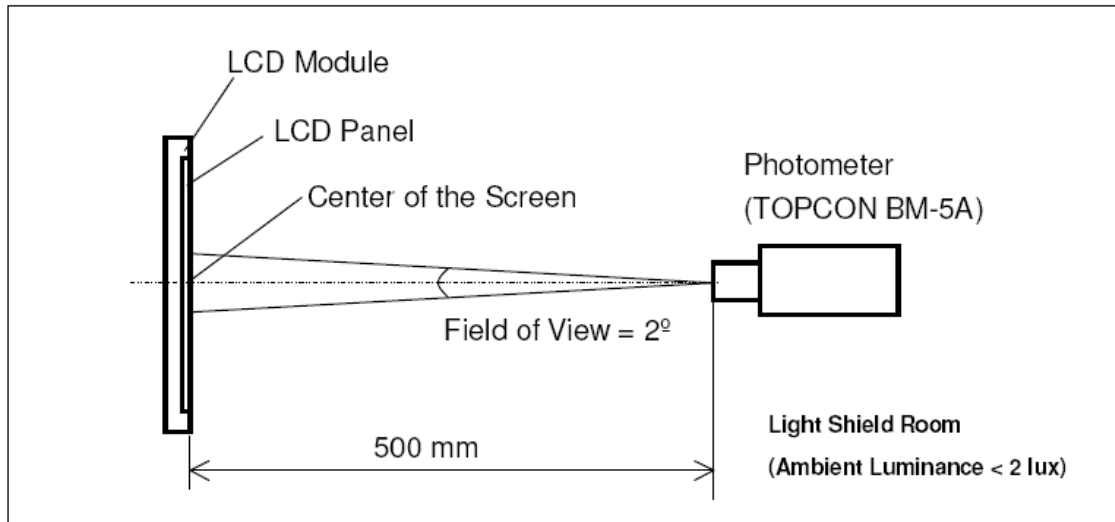


\*Note(3) Definition of Viewing Angle

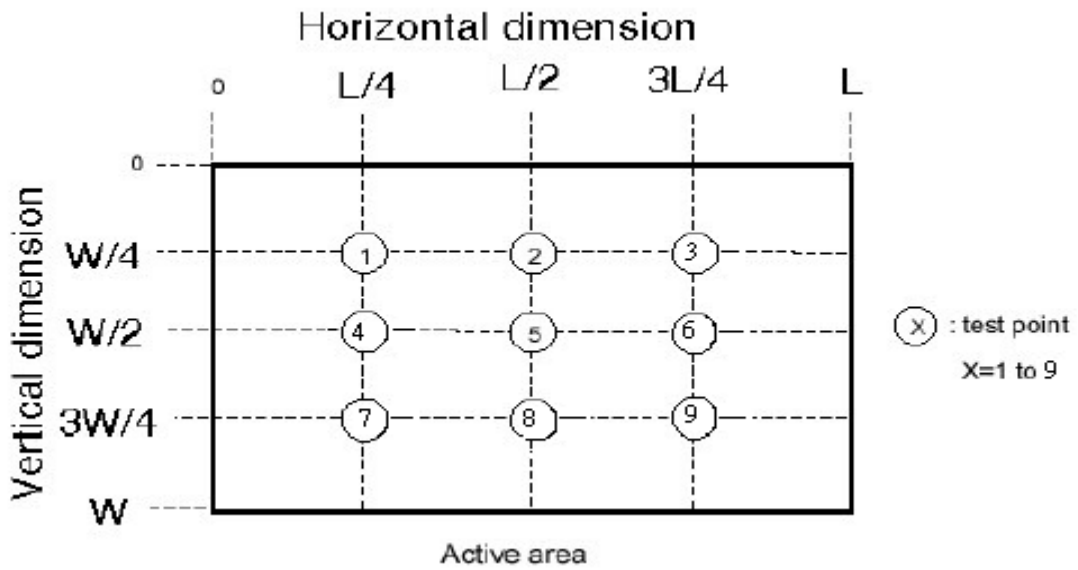


\*|

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)



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

## 9. TOUCH PANEL SPECIFICATIONS

### 9.1 FEATURES

ITEM	SPECIFICATIONS
Type	Five-Wire Analog Resistive
Input Mode	Stylus or Finger
Cable	FFC

### 9.2 OPTICAL CHARACTERISTICS

ITEM	SPECIFICATIONS
Transparency	80%±3% (Measured by BYK-Gardner)
Haze	8%±3% (Measured by BYK-Gardner)

### 9.3 ELECTRICAL CHARACTERISTICS

ITEM	SPECIFICATIONS
Loop Resistance	X : 20~500Ω, Y : 20~500Ω (see Figure 6-1)
Linearity	$X \leq 1.5\%$ , $Y \leq 1.5\%$ (see Figure 6-2)
Chattering	$\leq 15\text{ms}$
Insulation	$\geq 20\text{M}\Omega/25\text{V}(\text{DC})$
Endurance	No acting damage at DC50V/60sec

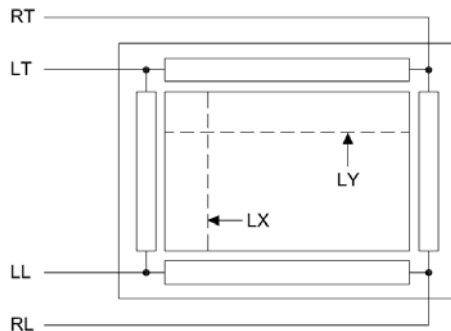


Figure 6-1

Loop Resistance X= short RT and RL, short LT and LL, measure the resistance between RT and LT

Loop Resistance Y= short RT and LT, short RL and LL, measure the resistance between RT and RL

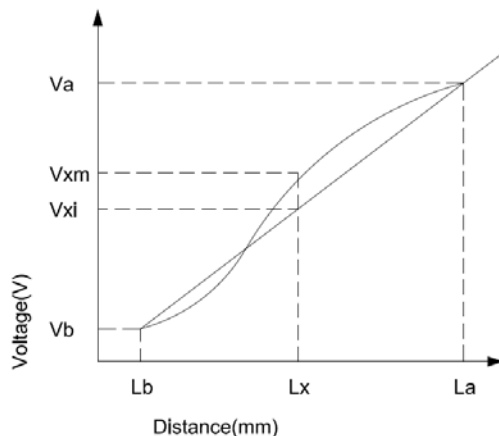
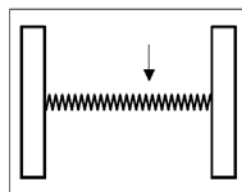


Figure6-2



## 10.TIMING SPECIFICATIONS

### 10.1 LVDS DATA MAPPING TABLE

LVDS Channel 0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	G0	R5	R4	R3	R2	R1	R0
LVDS Channel 1	LVDS output	D18	D15	D14	D13	D14	D9	D8
	Data order	B1	B0	G5	G4	G3	G2	G1
LVDS Channel 2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	B5	B4	B3	B2
LVDS Channel 3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	B7	B6	G7	G6	R7	R6

### 10.2 COLOR DATA INPUT ASSIGNMENT

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

Color		Data Signal																							
		Red								Green				Blue											
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	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	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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
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	
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red(255)	1	1	1	1	1	1	1	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
Green(1)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
Green(2)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
⋮		⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
Green(253)		0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	
Green(254)		0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	
Green(255)		0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	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
	Blue(1)	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	1	
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	

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

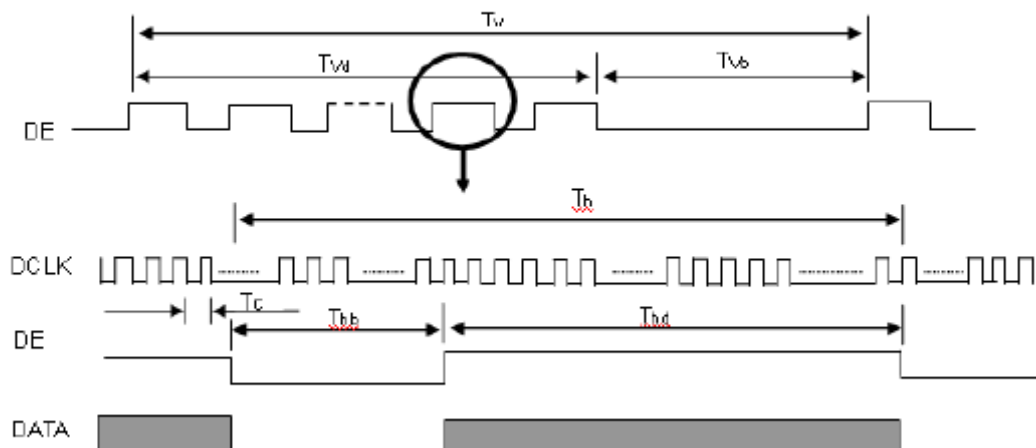
### 10.3 DISPLAY TIMING SPECIFICATIONS

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

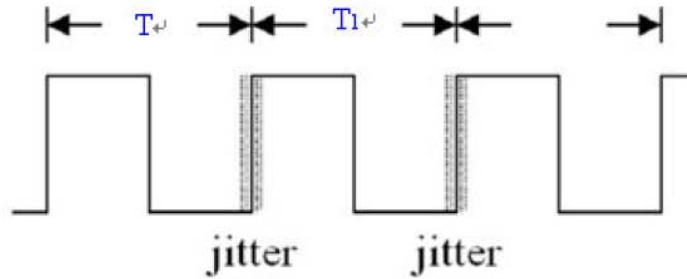
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	F <sub>c</sub>	63	76	96	MHz	-
	Period	T <sub>c</sub>		13		ns	
	Input cycle to cycle jitter	T <sub>rd</sub>	TC -200		TC +200	ns	(1)
	Input Clock to data skew	TLVCCS			400	ps	(2)
	Spread spectrum modulation range	F <sub>clkin_mod</sub>	FC*97%		FC*103%	MHz	(3)
	Spread spectrum modulation frequency	F <sub>SSM</sub>			200	KHz	
Vertical Display Term	Frame Rate	Fr	50	60	76	Hz	T <sub>v</sub> =T <sub>vd</sub> +T <sub>vb</sub>
	Total	T <sub>v</sub>	800	806	15	Th	-
	Active Display	T <sub>vd</sub>	768	768	768	Th	-
	Blank	T <sub>vb</sub>	32	38	47	Th	-
Horizontal Display Term	Total	T <sub>h</sub>	1500	1560	1570	T <sub>c</sub>	T <sub>h</sub> =T <sub>hd</sub> +T <sub>hb</sub>
	Active Display	T <sub>hd</sub>	1366	1366	1366	T <sub>c</sub>	-
	Blank	T <sub>hb</sub>	134	194	204	T <sub>c</sub>	-

Note : Because this module is operated by DE only mode, Hsync and Vsync input signals are ignored

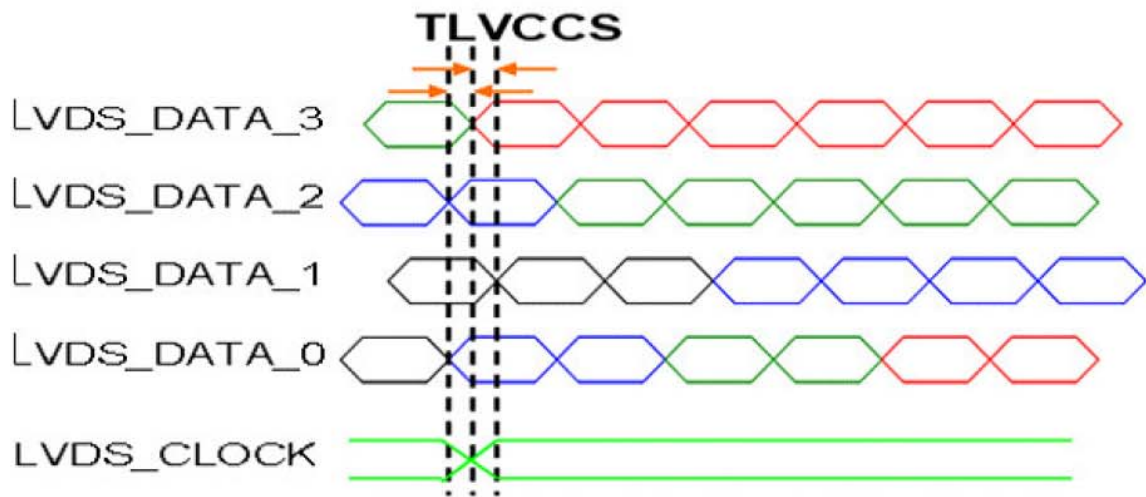
INPUT SIGNAL TIMING DIAGRAM



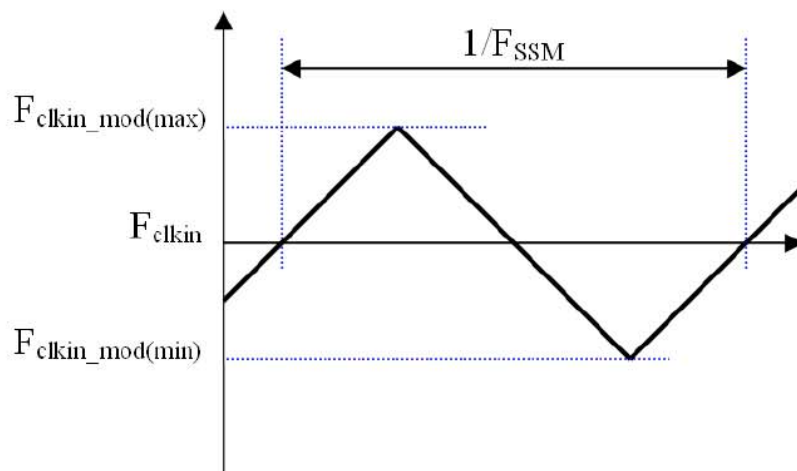
Note (1) The input clock cycle-to-cycle jitter is defined as below figures.  $Trcd = |T_1 - T_2|$



Note (2) Input Clock to data skew is defined as below figures.



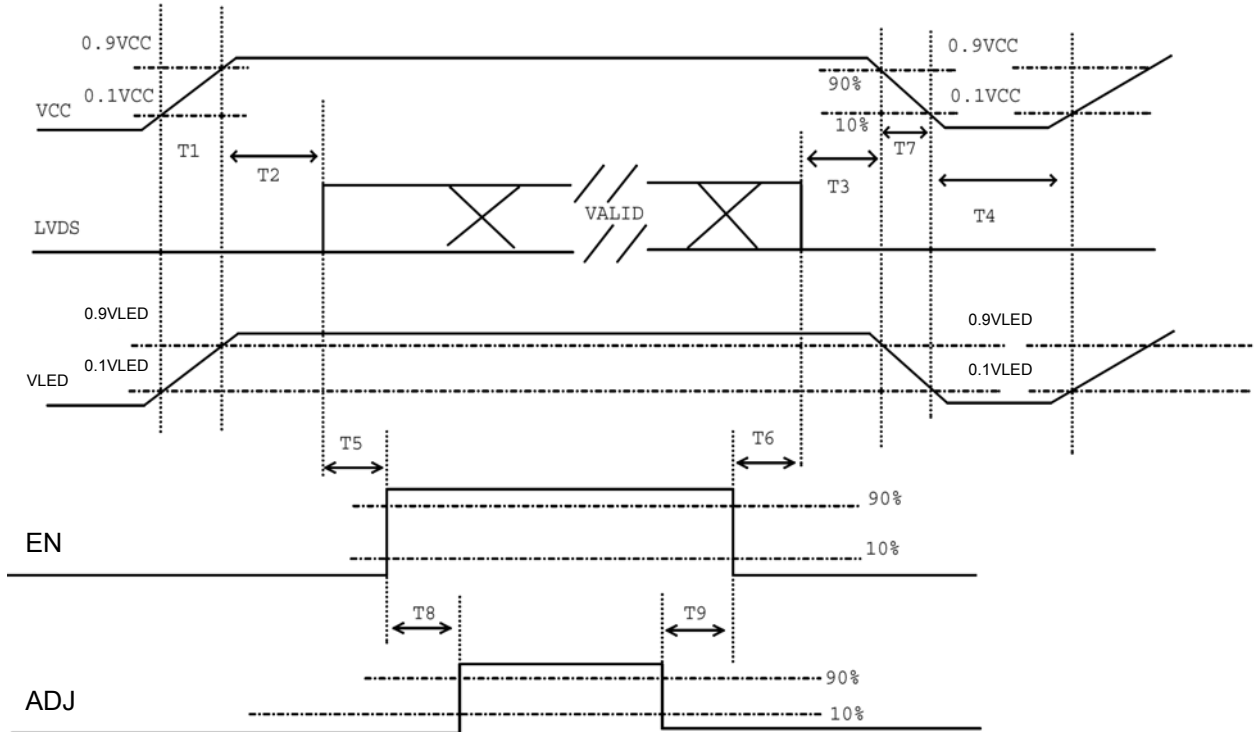
Note (3) The SSCG (Spread spectrum clock generator) is defined as below figures.



Note (4) The DCLK range at last line of V-blanking should be set in 0 to  $H_{display}/2$

### 10.4 POWER ON/OFF SEQUENCE

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



Timing Specification:

ITEM	VALUE			UNIT
	MIN	TYP	MAX	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	0	-	50	ms
T4	500	-	-	ms
T5	200	-	-	ms
T6	20	-	-	ms
T7	5	-	300	ms
T8	10	-	-	ms
T9	10	-	-	ms

Note (1) Please avoid floating state of interface signal at invalid period.

Note (2) When the interface signal is invalid , be sure to pull down the power supply of LCD VCC to 0V .

Note (3) The Backlight converter power must be turned on after power supply for the logic and the interface signal is valid . The Backlight converter power must be turned off before the power supply for the logic and the interface signal is invalid.

## 11. RELIABILITY TEST

ENVIRONMENTAL TEST				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	60°C	240HRS	Note1,4
2	Low Temperature Storage	-20°C	240HRS	Note1,4
3	High Temperature Humidity Storage	50°C,80%RH	240HRS	Note4
4	High Temperature Operation	60°C	240HRS	Note2,4
5	Low Temperature Operation	0°C	240HRS	Note1,4
6	Temperature Cycle	-20°C→60°C (30min) (30min)	100CYCLE	Note4

Note1 : Ta is the ambient temperature of samples.

Note2 : Ts is the temperature of panel's surface.

Note3 : In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note4 : Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

## 12. LCM INSPECTION STANDARD

Inspection specifications refer ONation Corporation LCM INSPECTION STANDARD Document.  
Document Number : TBD

## 13. PACKAGE INFORMATION

LCM Model	LCM Qty. in the box	Inner Box Size (mm)	Weight	REMARK
OT156CBWDLT-00	TBD	TBD	TBD	

## 14. PRECAUTIONS FOR USE

### 14.1 SAFETY

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

### 14.2 STORAGE CONDITIONS

- (1) Store the panel or module in a dark place where the temperature is  $23\pm 5^{\circ}\text{C}$  and the humidity is below  $50\pm 20\% \text{RH}$ .
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.

### 14.3 HANDLING PRECAUTIONS

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
- (6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
- (10) Wipe off water droplets or oil immediately . If you leave the droplets for a long time, staining and discoloration may occur.
- (11) 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, legs or clothes, it must be washed away thoroughly with soap.

### 14.4 WARRANTY

- (1) Acceptance inspection period  
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- (2) Applicable warrant period  
The period is within 12 months since the date of shipping out under normal using and storage conditions.