OSD DISPLAYS

Customer:	
Model Number:	OSD009T3311-39
Specification Number:	
Date:	4/28/2017
Version:	A.1.0

For Customer's Acceptance

Approved by	Comments

Approved by	Reviewed by	Prepared by

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Record of Revision

Date	Revision No.	Summary
2017-04-28	1.0	Rev 1.0 was issued

Record of Revision

1. Scope

This data sheet is to introduce the specification of OSD009T3311-39 active matrix TFT module. It is composed of a color TFT-LCD panel, driver IC, FPC and a backlight unit. The 0.9'' display area contains 80(RGB) x 160 pixels.
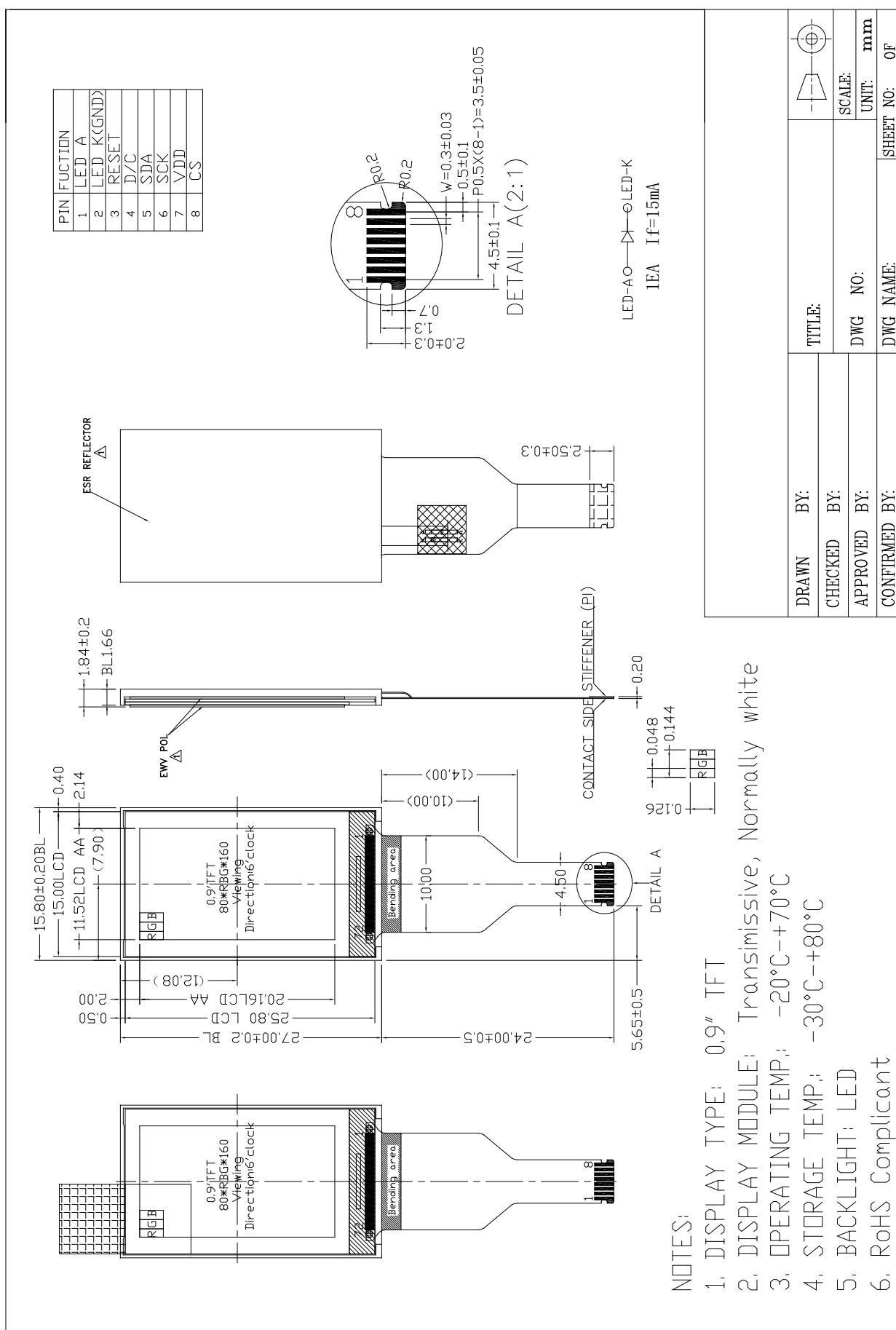
2. Application

Digital equipments which need color display, mobile navigator/video systems.

3. General Information

Item	Contents	Unit
Size	0.9	inch
Resolution	80 (RGB) x 160	/
Interface	SPI	/
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	15.80 x 27.00 x 1.84	mm
Active Area	11.52 x 20.16	mm
Backlight Type	LED	/
Controller	ST7735S	
Display Mode	Transmissive, Normally White	/
Weight	TBD	g

PIN FUCTION
PIN	FUCTION
1	LED A
2	LED K(GND)
3	RESET
4	D/C
5	SDA
6	SCK
7	VDD
8	CS

DETAIL A(2:1)

R0.2
R0.2
W=0.3±0.03
0.5±0.1
P0.5X(8-1)=3.5±0.05
4.5±0.1
0.7
1.3
2.0±0.3

LED-A○─▷├─○LED-K
1EA If=15mA

ESR REFLECTOR

2.50±0.3

1.84±0.2
BL1.66

EWV POL

CONTACT SIDE STIFFENER (PI)

0.20
0.048
0.144
RGB
0.126

15.80±0.20BL
15.00LCD
11.52LCD AA
0.40
2.14
(7.90)

0.9"TFT
80*RBG*160
Viewing
Direction6'clock

RGB

(14.00)
(10.00)
Bending area
10.00
4.50
8
1
DETAIL A

(12.08)
2.00
0.50
20.16LCD AA
25.80 LCD
27.00±0.2 BL
24.00±0.5
5.65±0.5

0.9"TFT
80*RBG*160
Viewing
Direction6'clock
RGB
Bending area
8
1

NOTES:
1. DISPLAY TYPE: 0.9" TFT
2. DISPLAY MODULE: Transimissive, Normally white
3. OPERATING TEMP.: -20°C-+70°C
4. STORAGE TEMP.: -30°C-+80°C
5. BACKLIGHT: LED
6. RoHS Complicant

SCALE:
UNIT: mm
SHEET NO: OF

TITLE:
DWG NO:
DWG NAME:

DRAWN BY:
CHECKED BY:
APPROVED BY:
CONFIRMED BY:

5. Interface signals

Pin No.	Symbol	I/O	Function
1	LEDA	P	LED backlight (Anode)
2	LEDK	P	LED backlight (Cathode)
3	RESET	I	Reset the display
4	D/C	I	Command/Data select
5	SDA	I/O	Serial Input /output data bus
6	SCK	I	Serial clock
7	VDD	P	Power supply
8	CS	I	Chip select pin

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	VDD	-0.3	3.3	V	
Logic Signal Input /Output Voltage	IOVDD	-0.3	VDD+0.5	V	

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.

2. $V_{DD} > V_{SS}$ must be maintained.

6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-20	70	℃	
Storage Temperature	TSTG	-30	80	℃	

Note:

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

2. Background color changes slightly depending on ambient temperature. The phenomenon is reversible.

3. Ta<=40℃:85%RH MAX.

Ta>=40℃:Absolute humidity must be lower than the humidity of 85%RH at 40℃.

7. Electrical Specifications

7.1 Electrical characteristics

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VDD	Ta=25℃	2.6	2.8	3.0	V	
Input voltage	'H'	V_{IH}	VDD=2.8V	0.8xVDD	-	VDD	V	
	'L'	V_{IL}	VDD=2.8V	0	-	0.2xVDD	V	
Current Consumption		I_{CC1}	Normal mode	-	1.8	2.5	mA	1
		I_{CC2}	Sleep mode	-	0.03	0.1	mA	1

Note: Tested in 1x1 chessboard pattern.

7.2 LED Backlight

| Item	Symbol	Min	Typ	Max	Unit	Note
Supply voltage	Vf	-	3.0	-	V	
Supply current	If	-	15		mA	
Life for the LED	life	-	30000	-	hours	

Note: The" LED Life time" is defined as the module brightnees decrease to 50% original brightness at T=25℃ and I_{LED} =15 mA. The LED Life time could be decreased if operating I_{LED} is larger than 15 mA

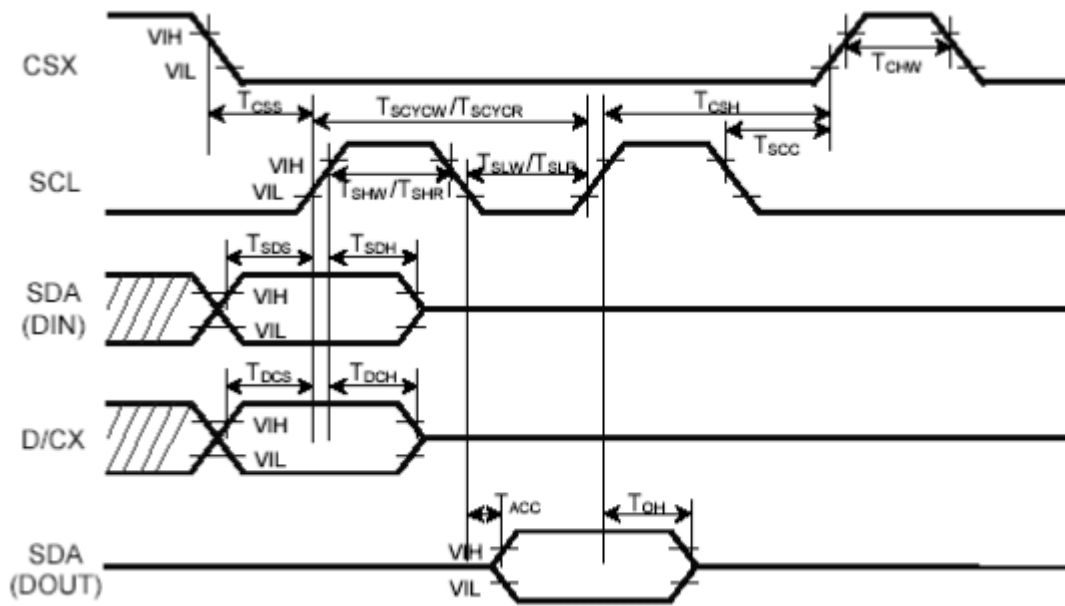# 8. Command/AC Timing

8.1 SPI write/read to register or GRAM
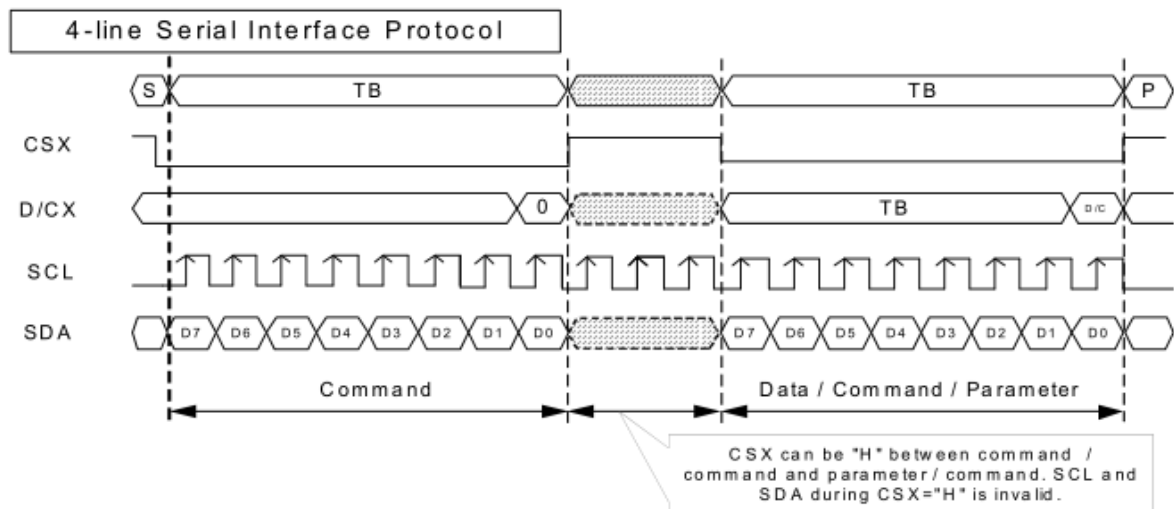
4-pins Serial Protocol for writing register or GRAM
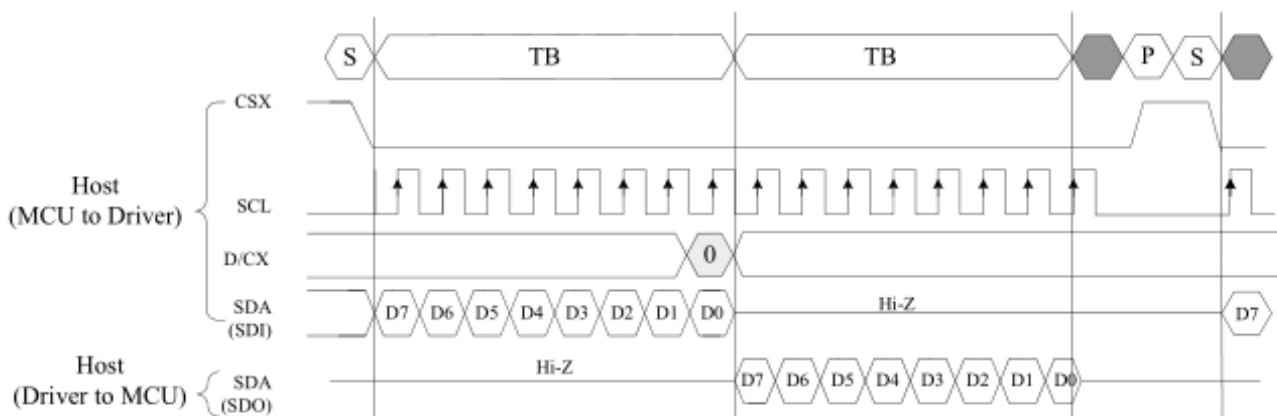
Figure6: 4-pins Serial Protocol (for DAH/DBH/DCH/0AH/0BH/0CH/0DH/0EH/0FH command: 8-bit read)

8.2 i80-System Interface Timing Characteristics

| Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	TCSS	Chip select setup time	10		ns	
	TCSH	Chip select hold time	30		ns	
	TCHW	Chip select "H" pulse width	30		ns	
SCL	TSCYCW	Serial clock cycle(Write)	66		ns	
	TSHW	S"L""L" pulse width(Write)	15		ns	
	TSLW	S"L""L" pulse width(Write)	15		ns	
	TSCYCR	Serial clock cycle(Read)	150		ns	
	TSHR	S"L""H" pulse width(Read)	60		ns	
	TSLR	S"L""L" pulse width(Read)	60		ns	
DCX	TDCS	D/CX setup time	5		ns	
	TDCH	D/CX hold time	5		ns	
SDA(DIN) (DOUT)	TSDS	Data setup time	5		ns	
	TSDH	Data hold time	5		ns	
	TACC	Access time	5	50	ns	For maximum CL=30pF
	TOH	Output disable time	10		ns	For minimum CL=8pF

i80-System Bus Timing

9. Optical Specification

Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio		CR	θ=0°	300	500	-		Note1 Note2
Response Time		Tr	25℃	-	10	-	ms	Note1 Note3
		Tf		-	10	-	ms	
View Angles		ΘT	CR≧10	-	60	-	Degree	Note 4
		ΘB		-	45	-		
		ΘL		-	60	-		
		ΘR		-	60	-		
Chromaticity	Red	x	Brightness is on	-	0.51	-		Note5, Note1
		y		-	0.34	-		
	Green	x		-	0.31	-		
		y		-	0.56	-		
	Blue	x		-	0.15	-		
		y		-	0.14	-		
	White	x		-	0.28	-		
		y		-	0.33	-		
NTSC		S		50	60	-	%	Note5
Luminance		L		-	100	-	cd/m^2	Note1 Note6
Uniformity		U		75	80	-	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25℃(±3℃);   LED back-light: ON, Environment brightness < 150 lx
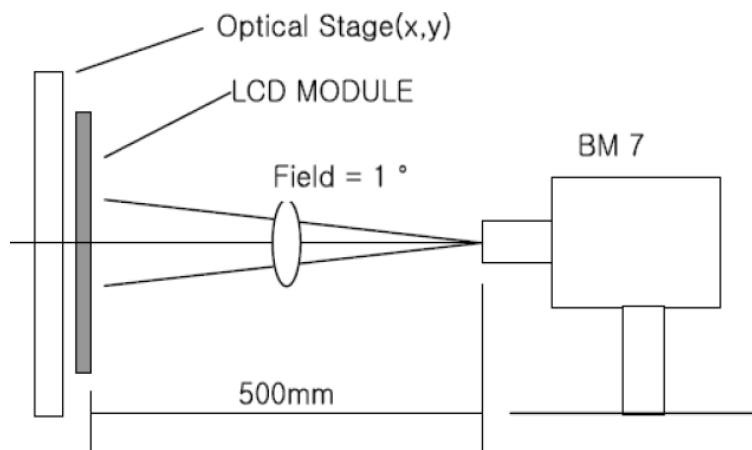
Note 2: Contrast ratio is defined as follow:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

Note 3: Response time is defined as follow:

Response time is the time required for the display to transition from black to white (Rise Time, Tr) and from white to black(Decay Time, Tf).
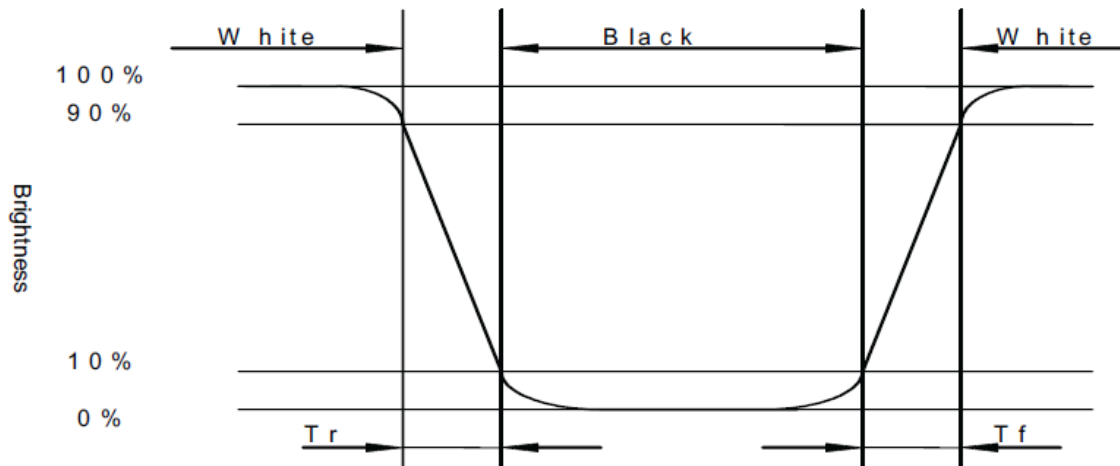
Note 4: Viewing angle range is defined as follow:

Viewing angle is measured at the center point of the LCD.

Note 5: Color chromaticity is defined as follow: (CIE1931)

Color coordinates measured at center point of LCD.
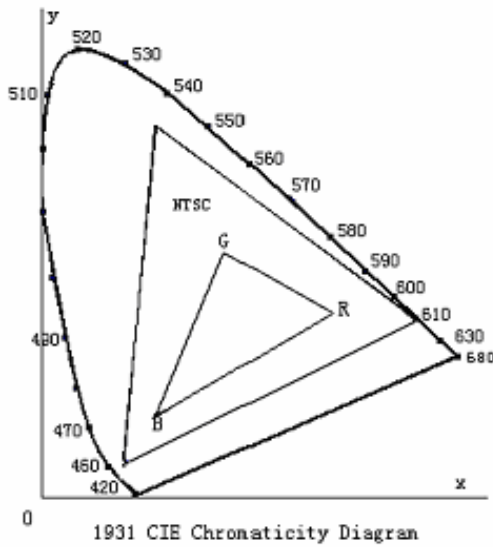
$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 6: Luminance is defined as follow:

Luminance is defined as the brightness of all pixels "White" at the center of display area on optimum contrast.
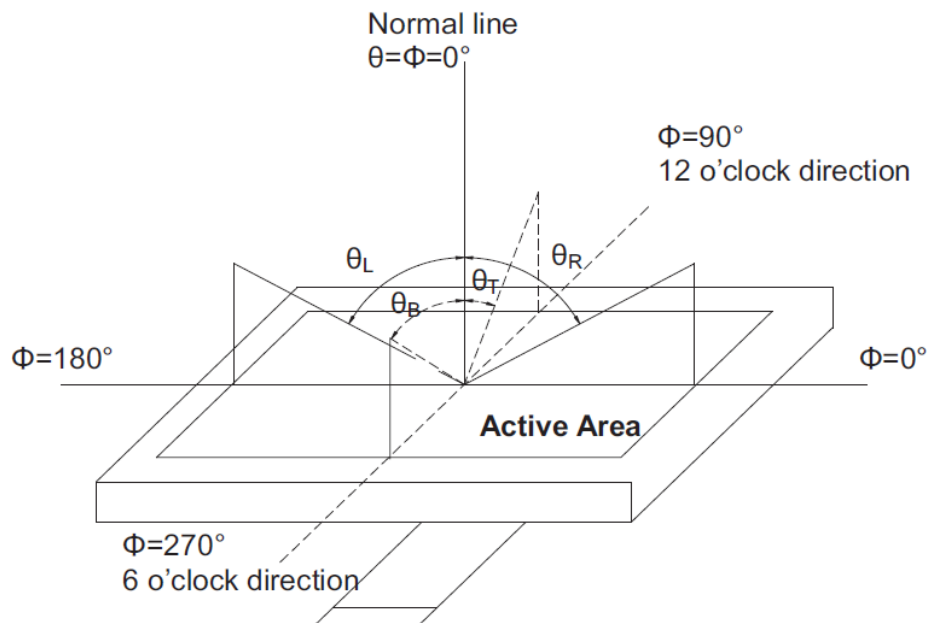
Note 7: Luminance Uniformity is defined as follow:

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Uniformity(U)} = \frac{\text{Minimum Luminance(brightness) in 9 points}}{\text{Maximum Luminance(brightness) in 9 points}}$$

Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

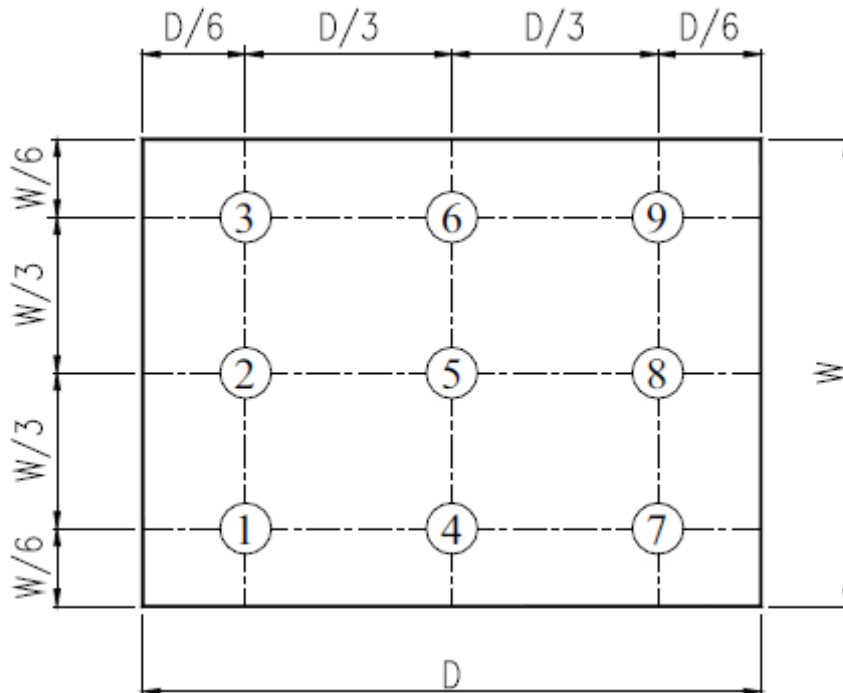| No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+70℃, 96hrs	Per table in below
2	Low Temp Operation	Ta=-20℃, 96hrs	Per table in below
3	High Temp Storage	Ta=+80℃, 96hrs	Per table in below
4	Low Temp Storage	Ta=-30℃, 96hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+60℃, 90% RH 96 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 5 Cycles	Per table in below
7	ESD (Operation)	C=150pF, R=330Ω，5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times;	Per table in below
8	Vibration (Non-operation)	10Hz~150Hz, 100m/s2, 120min	Per table in below
9	Shock (Non-operation)	Half- sine wave,300m/s2,11ms	Per table in below
10	Package Drop Test	Height:80 cm, 1 corner, 3 edges, 6 surfaces	Per table in below

INSPECTION	CRITERION(after test)
Appearance	No Crack on the FPC, on the LCD Panel
Alignment of LCD Panel	No Bubbles in the LCD Panel No other Defects of Alignment in Active area
Electrical current	Within device specifications
Function / Display	No Broken Circuit, No Short Circuit or No Black line No Other Defects of Display

11. Precautions for Use of LCD Modules

11.1 Safety

The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

11.2 Handling

A. The LCD and touch panel is made of plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.

B. Do not handle the product by holding the flexible pattern portion in order to assure the reliability

C. Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.

D. Provide a space so that the panel does not come into contact with other components.

E. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.

F. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.

G. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.

H. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

11.3 Static Electricity

A. Ground soldering iron tips, tools and testers when they are in operation.

B. Ground your body when handling the products.

C. Power on the LCD module before applying the voltage to the input terminals.

D. Do not apply voltage which exceeds the absolute maximum rating.

E. Store the products in an anti-electrostatic bag or container.

F. Peel off the LCM protective film slowly since static electricity may be generated.

11.4 Storage

A. Store the products in a dark place at $+25℃±10℃$ with low humidity (40% RH to 60% RH). Don't expose to sunlight or fluorescent light.

B. Storage in a clean environment, free from dust, active gas, and solvent.

11.5 Cleaning

A. Do not wipe the touch panel with dry cloth, as it may cause scratch.

B. Wipe off the stain on the product by using soft cloth moistened with ethanol. Do not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.

11.6 Cautions for installing and assembling

Bezel edge must be positioned in the area between the Active area and View area. The bezel may press the touch screen and cause activation if the edge touches the active area. A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected activation if the gap is too narrow. There is a tolerance of 0.2 to 0.3mm for the outside dimensions of the touch panel and tail. A gap must be made to absorb the tolerance in the case and connector.