DLC Display Co., Limited

德爾西顯示器有限公司

MODEL No: DLC0430E2ZG-T-11

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Record of Revision

Date	Revision No.	Summary
2015-07-14	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC0430E2ZG-T-11 active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC , CTP and a backlight unit. The 4.3″ display area contains 480(RGB) x 272 pixels.

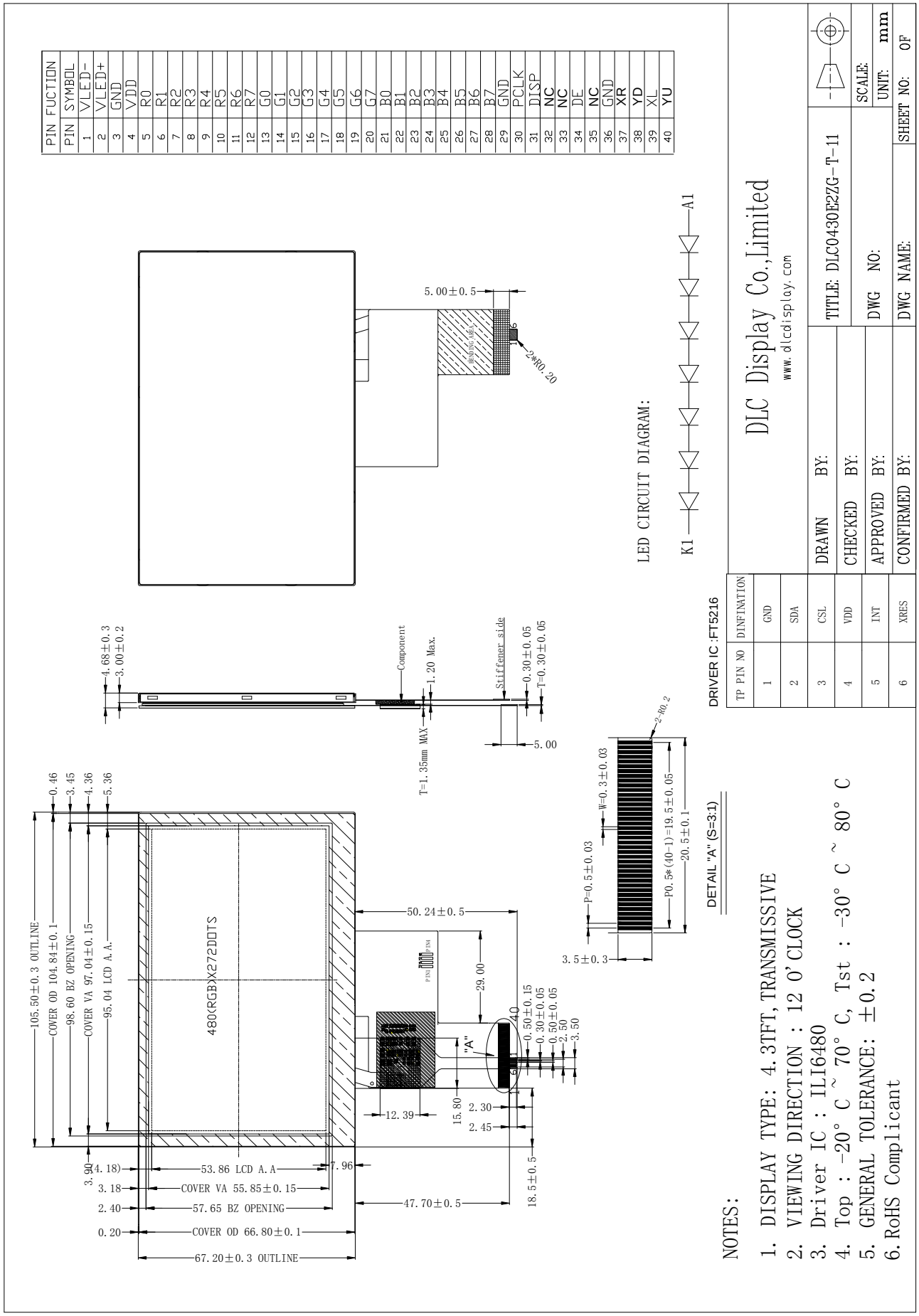
2. Application

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

3. General Information

Item	Contents	Unit
Size	4.3	inch
Resolution	480 (RGB) x 272	/
Interface	RGB	/
Technology type	a-Si TFT	/
Pixel pitch	0.198x0.198	mm
Pixel Configuration	RGB stripes	
Outline Dimension (W x H x D)	105.50x67.20x4.68	mm
Active Area	95.04 x 53.856	mm
Display Mode	Transmissive Normally white	/
Driver IC of CTP	FT5216	/
Backlight Type	LED	/
Weight	TBD	g

4. Outline Drawing



5. Interface signals

Pin No	Symbol	Function
1	VLED-	BACK LIGHT POWER GROUND
2	VLED+	BACK LIGHT POWER SUPPLY
3	GND	POWER GROUND
4	VDD	POWER SUPPLY
5-12	R0-R7	RED DATA
13-20	G0-G7	GREEN DATA
21-28	B0-B7	BLUE DATA
29	GND	POWER GROUND
30	PCLK	In external interface mode, served as a dot clock signal.
31	DISP	standby mode control pin
32	NC	NC
33	NC	NC
34	DE	In external interface mode, polarity of ENABLE signal is synchronized with valid graphic data input.
35	NC	NC
36	GND	POWER GROUND
37	NC	NO CONNECTION
38	NC	
39	NC	
40	NC	

The recommended connector: FH19SC-40S-0.5SH (HIROSE.)

TP signal interface

Pin	Symbol	Description
1	GND	Power ground.
2	SDA	Data input.
3	SCL	Clock for the data input.
4	VDD	Power supply
5	INT	Interrupt output Pin.
6	XRES	Reset pin

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Logic Supply Voltage	VDD	-0.3	5.0	V	
Input Voltage	VIN	-0.3	VDD +0.3	V	

6.2. Environment Conditions

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

6.3. LED Backlight Absolute max. ratings

Item	Symbol	MIN	MAX	Unit	Remark
LED Forward Current	ILED	--	25	mA	each LED

7. Electrical Specifications

7.1 Electrical characteristics

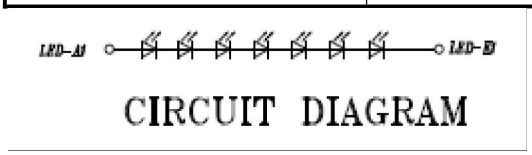
Ta = 25 °C, GND=0V

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage	VDD	3.0	3.3	3.6	V	
Input Signal Voltage	VIL	0	--	0.3*VDD	V	
	VIH	0.7*VDD	--	VDD	V	
Output Signal Voltage	VOL	--	--	0.3* VDD	V	
	VOH	0.7*VDD	--	VDD	V	

7.2 LED Backlight

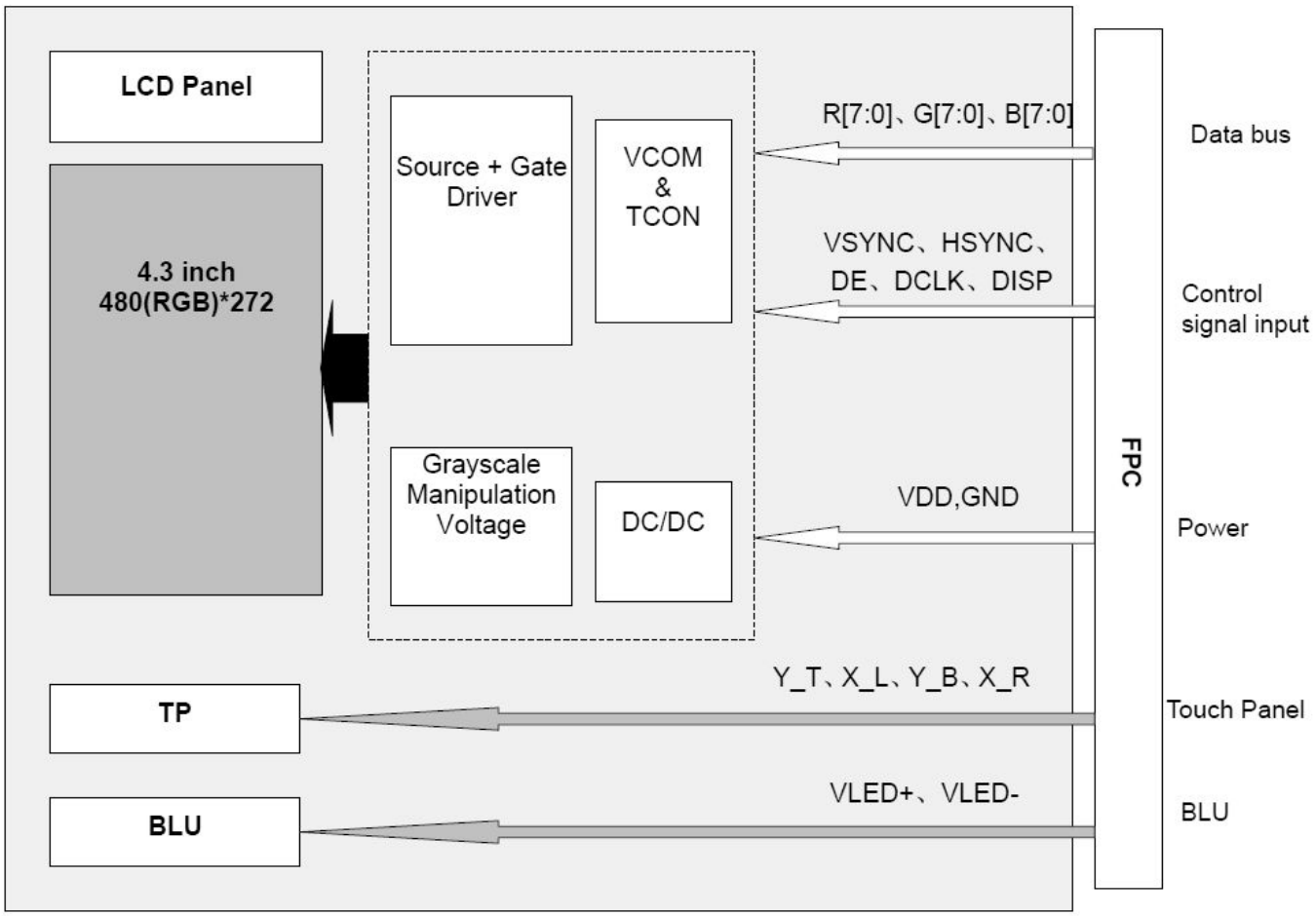
Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF		20		mA	One LED
Forward Voltage	VF		22.4		V	If=20mA
LED lifetime			25,000		Hrs	



CIRCUIT DIAGRAM

7.3 Schematic of LCD module system

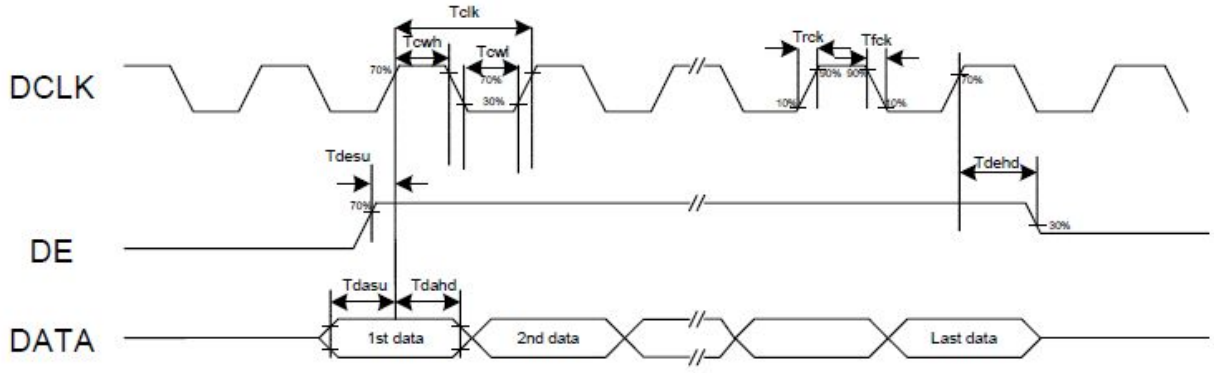


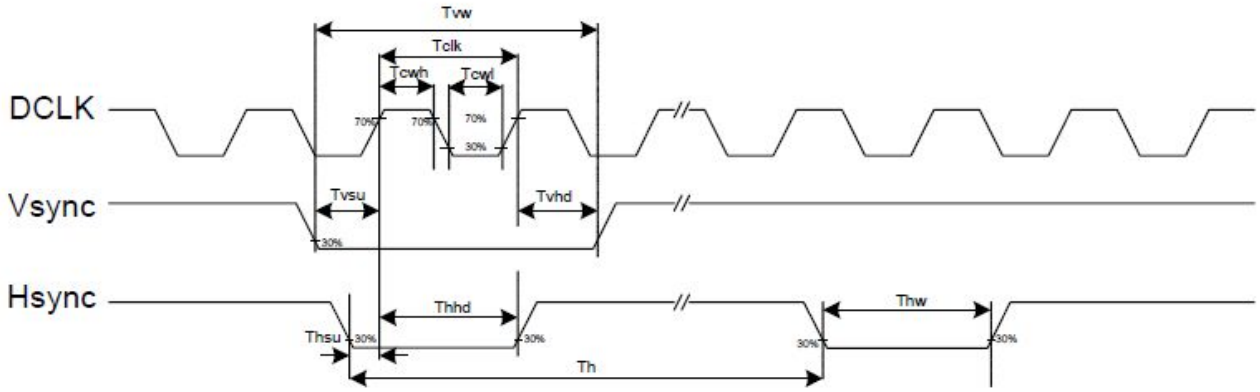
8. Command/AC Timing

8.1 Input signal characteristics

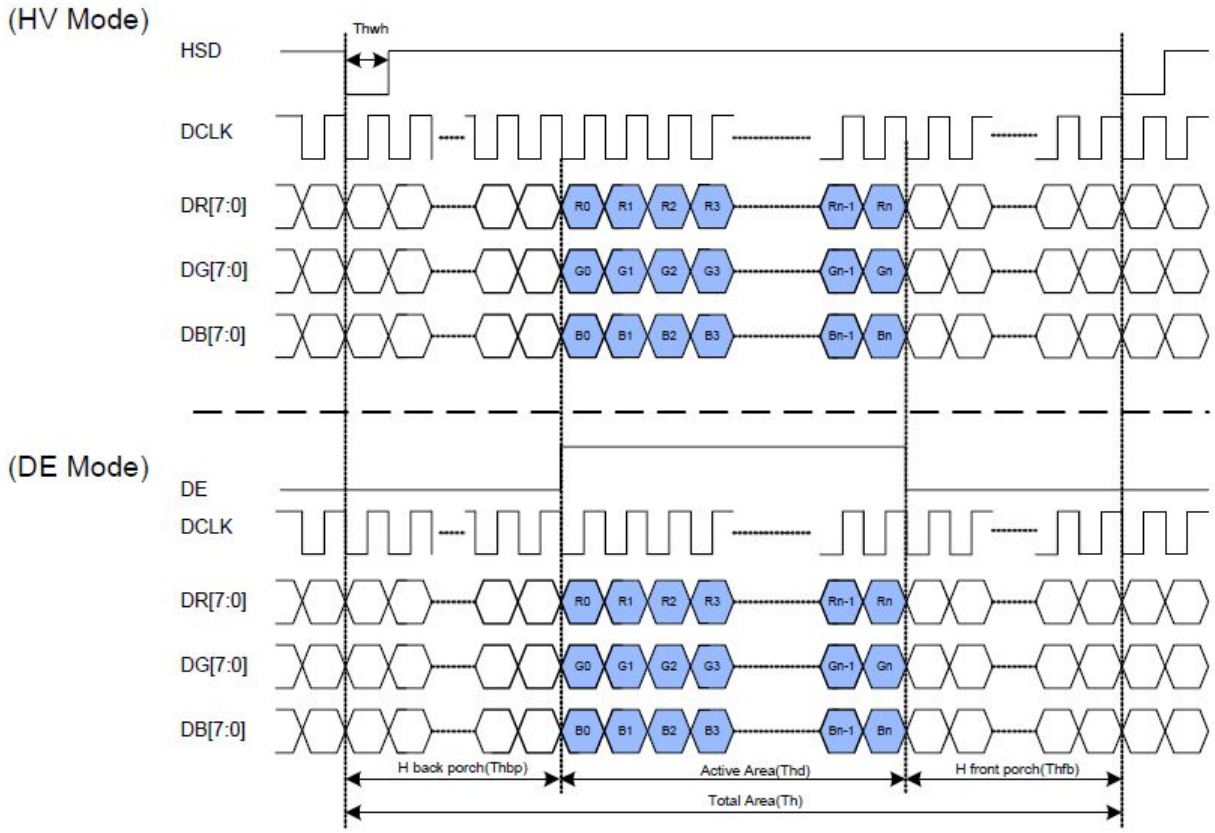
Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
System operation timing						
VDD power source slew time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
Input Output timing						
DCLK clock time	Tclk	33.3	-	-	ns	DCLK=30MHz
Clock rising time	Trck	9	-	-	ns	
Clock falling time	Tfck	9	-	-	ns	
HSD width	Thwh	1	-	-	DCLK	
HSD period time	Th	55	60	65	us	
HSD setup time	Thst	12	-	-	ns	
HSD hold time	Thhd	12	-	-	ns	
VSD width	Tvwh	1	-	-	Th	
VSD setup time	Tvst	12	-	-	ns	
VSD hold time	Tvhd	12	-	-	ns	
Data setup time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	
DE setup time	Tdesu	12	-	-	ns	
DE hold time	Tdehd	12	-	-	ns	
Source output setting time	Tst	-	-	TBD	us	10% to 90% CL=60pF, RL=2Kohm
Gate output setting time	Tgst	-	500	1000	ns	10% to 90%, CL=60pF
VCOM output setting time	Tcst	-	-	TBD	us	10% to 90%, CL=40nF, RL=50ohm
Time from VSD to 1st line data input	Tvs	3	8	31	Th	HV mode By HDL[4:0] setting

8.2 Clock and Data Input Waveforms





8.3 Parallel RGB Mode Data format



Parallel RGB input timign table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	5	9	12	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd		272		H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	93	H
HSD period time	Th	520	525	800	DCLK
HSD display area	Thd		480		DCLK
HSD back porch	Thbp	36	40	255	DCLK
HSD front porch	Thfp	4	5	65	DCLK

9. Optical Specification

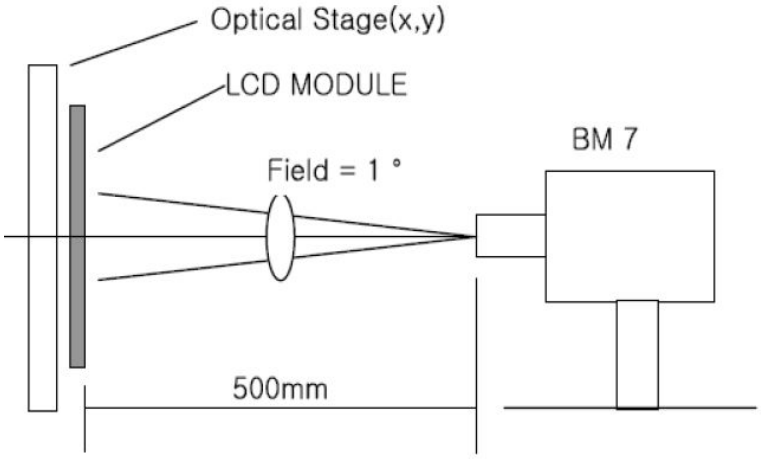
Ta=25℃

Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio		CR	θ=0°	350	500	-		Note1 Note2
Response Time		Ton/ Toff	25℃	-	20	-	ms	Note1 Note3
View Angles		ΘT	CR≧10	40	50	-	Degree	Note 4
		ΘB		60	70	-		
		ΘL		60	70	-		
		θR		60	70	-		
Chromaticity	White	x	Brightness is on	0.265	0.315	0.365		Note5, Note1
		y		0.278	0.328	0.378		
	Red	x		0.540	0.590	0.640		
		y		0.300	0.350	0.400		
	Green	x		0.290	0.340	0.390		
		y		0.500	0.550	0.600		
	Blue	x		0.094	0.144	0.194		
		y		0.050	0.100	0.150.		
NTSC		S		-	51	-	%	Note5
Luminance		L		-	230	-	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

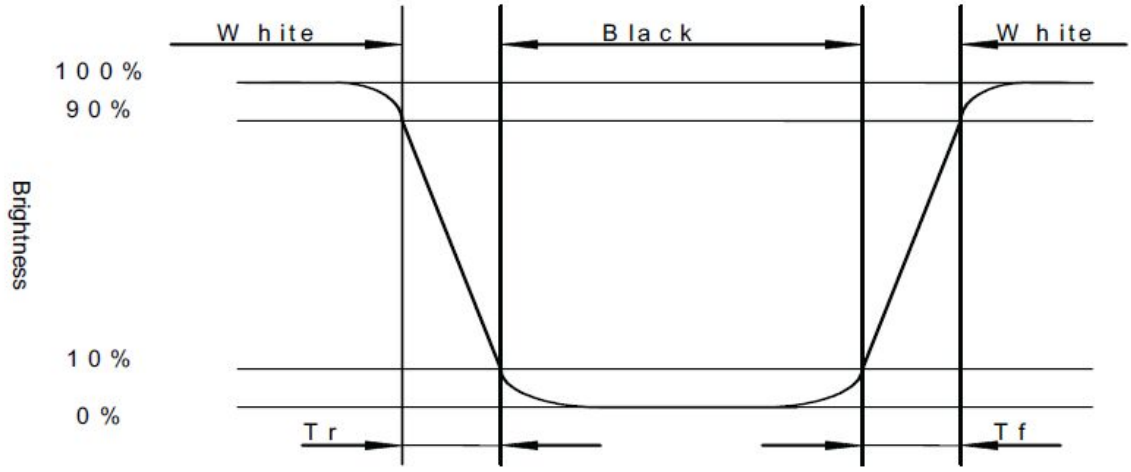


Note 2: Contrast ratio is defined as follow:

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

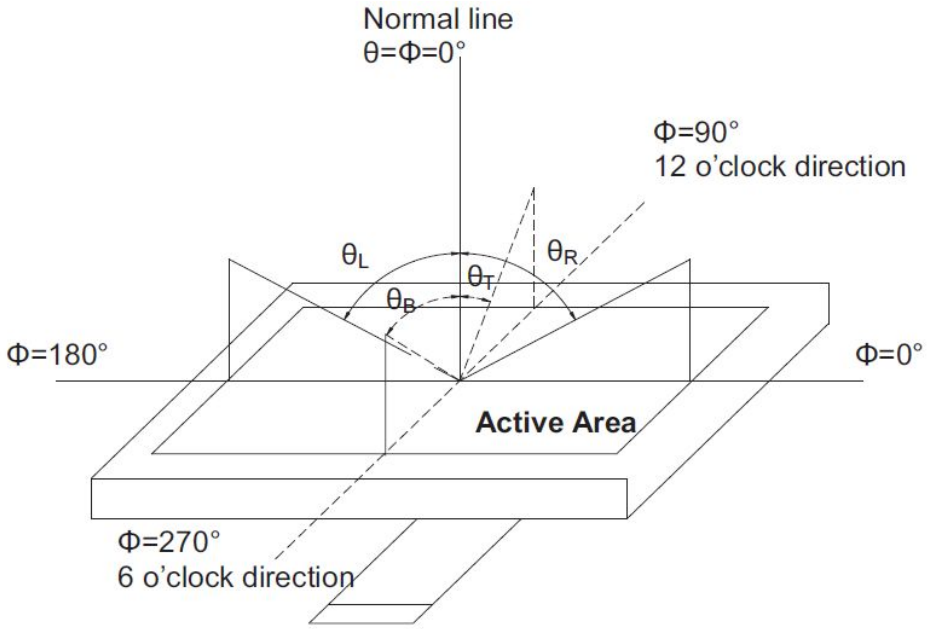
Note 3: Response time is defined as follow:

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).



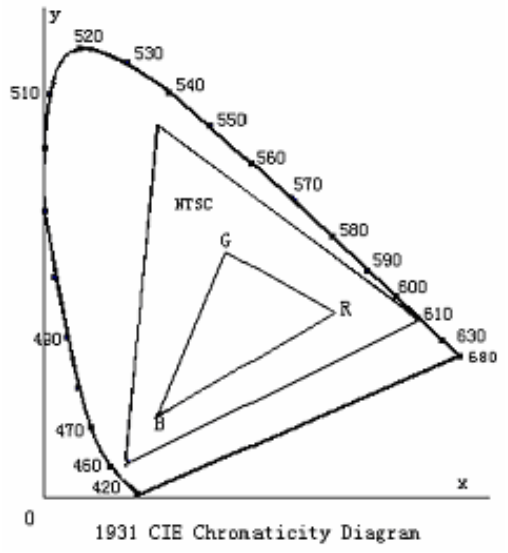
Note 4: Viewing angle range is defined as follow:

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.

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

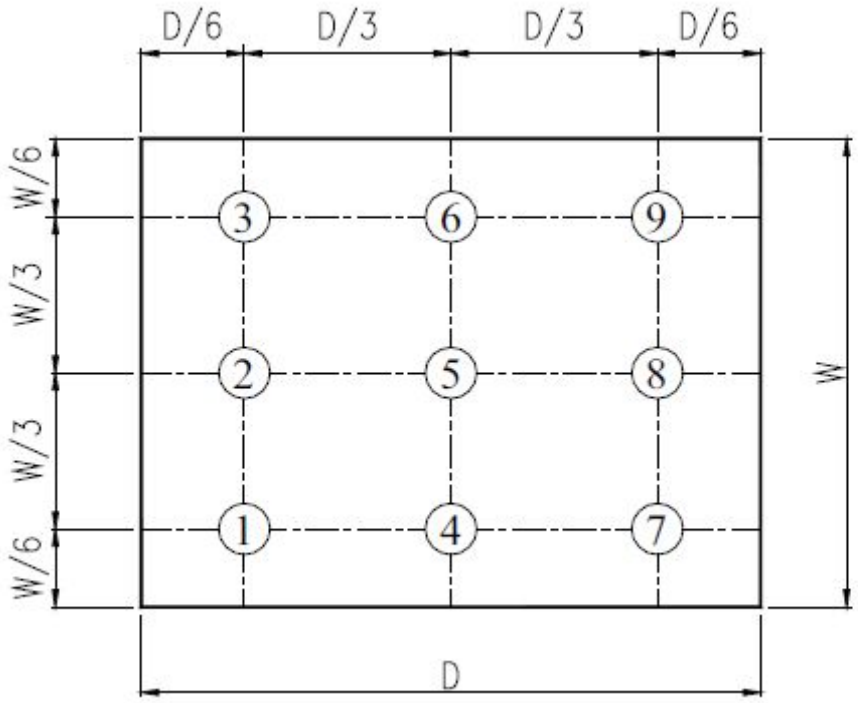


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+70℃, 120hrs	Per table in below
2	Low Temp Operation	Ta=-20℃, 120hrs	Per table in below
3	High Temp Storage	Ta=+80℃, 120hrs	Per table in below
4	Low Temp Storage	Ta=-30℃, 120hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+50℃, 90% RH 120 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 10 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)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z.	Per table in below
9	Shock (Non-operation)	60G 6ms, ±X,±Y,±Z 3times, for each direction	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.

11.4Storage

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.