



ASI-T-200EA6SRN/D

Item	Contents	Unit
Size	2.0	inch
Resolution	320(RGB) x 240	/
Interface	SPI & RGB	/
Technology type	IPS	/
Pixel pitch	0.1275 x 0.1275	mm
Pixel Configuration	R.G.B. Vertical Stripe	/
Outline Dimension (W x H x D)	46.10 x 40.96 x 2.54	mm
Active Area	40.80 x 30.60	mm
Viewing Direction	ALL	/
Backlight Type	LED	/
Driver IC	ILI9342C	/



Record of Revision

Date	Revision No.	Summary
2019-05-11	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of ASI-T-200EA6SRN/D active matrix TFT module. It is composed of a color TFT-LCD panel, driver IC, FPC and a backlight unit. The 2.0" display area contains 320 (RGB) x 240 pixels.

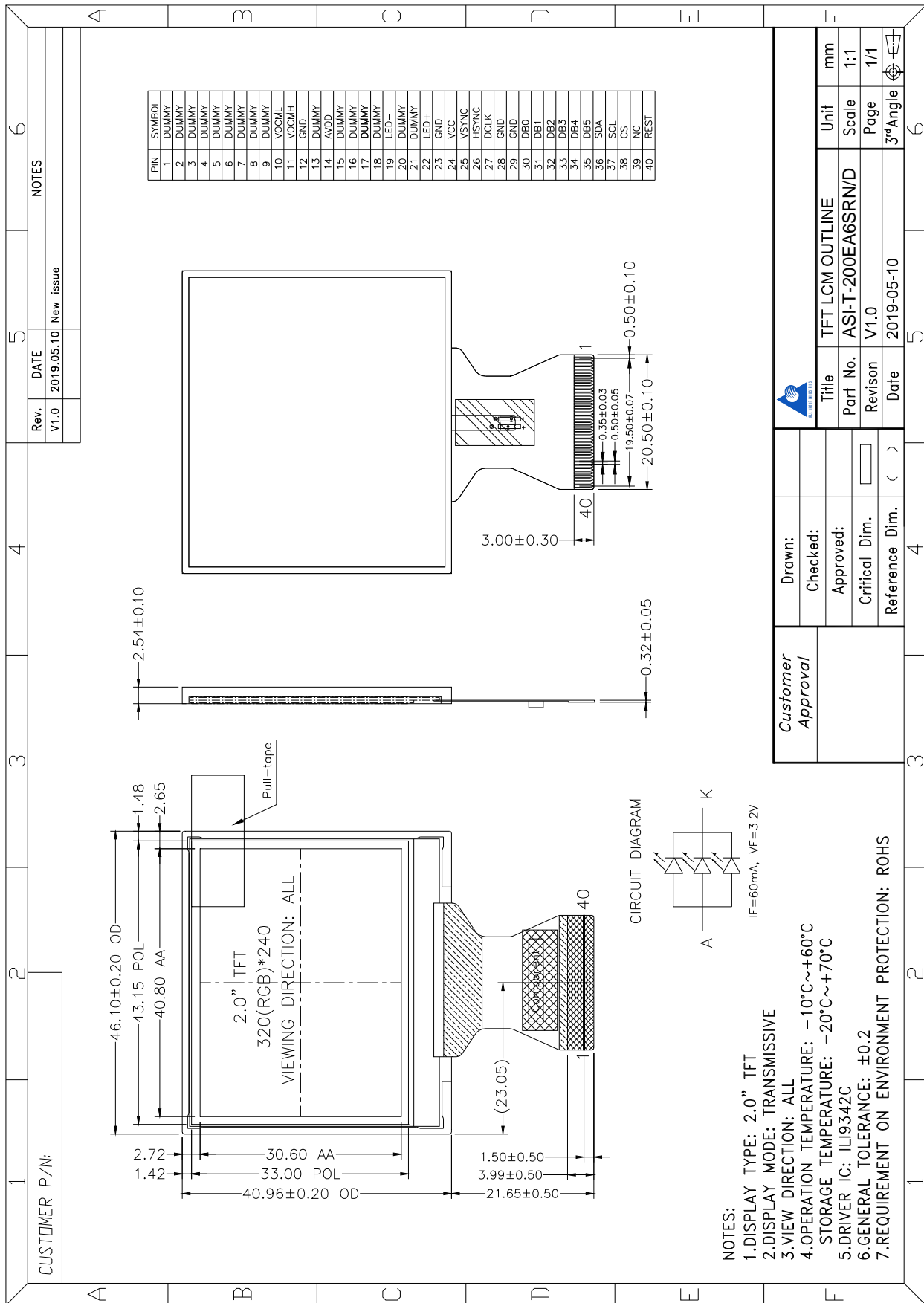
2. Application

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

3. General Information

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4. Outline Drawing



5. Interface signals

No	Symbol	Description	Remarks
1~9	DUMMY	Dummy	
10	VCOML	Capacitor for VCOM low	
11	VCOMH	Capacitor for VCOM high	
12	GND	Ground	
13	DUMMY	Dummy	
14	VCC	Power supply for interface logic circuit	
15~18	DUMMY	Dummy	
19	LED-	BL negative pin	
20~21	DUMMY	Dummy	
22	LED+	BL positive pin	
23	GND	Ground	
24	VCC	Power supply for interface logic circuit	
25	VSYNC	Frame synchronizing signal for RGB interface operation	
26	HSYNC	Line synchronizing signal for RGB interface operation	
27	DCLK	Dot clock signal for RGB interface operation	
28~29	DUMMY	Dummy	
30~35	B0-DB5	6 bits data bus input	
36	SDA	Serial command data input	
37	SCL	Serial command clock input	
38	CS	Serial communication chip select	
39	DUMMY	Dummy	
40	RESET	System reset pin	

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.3	3.3	V	

6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-10	60	°C	
Storage Temperature	TSTG	-20	70	°C	

7. Electrical Specifications

7.1 Electrical characteristics

GND=0V, Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power Supply Voltage	VCC	2.5	3.3	3.3	V	
Input signal voltage	Low Level	V _{IL}	GND	--	0.2*VCC	V
	High Level	V _{IH}	0.8*VCC	--	VCC	V

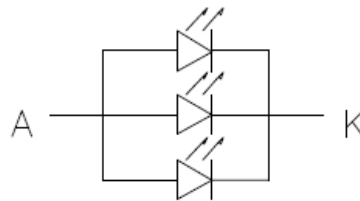
7.2 LED Backlight

Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I _F	--	60	--	mA	
Forward Voltage	V _F	--	3.2	--	V	
LED Life time	--	--	30,000	--	Hrs	Note

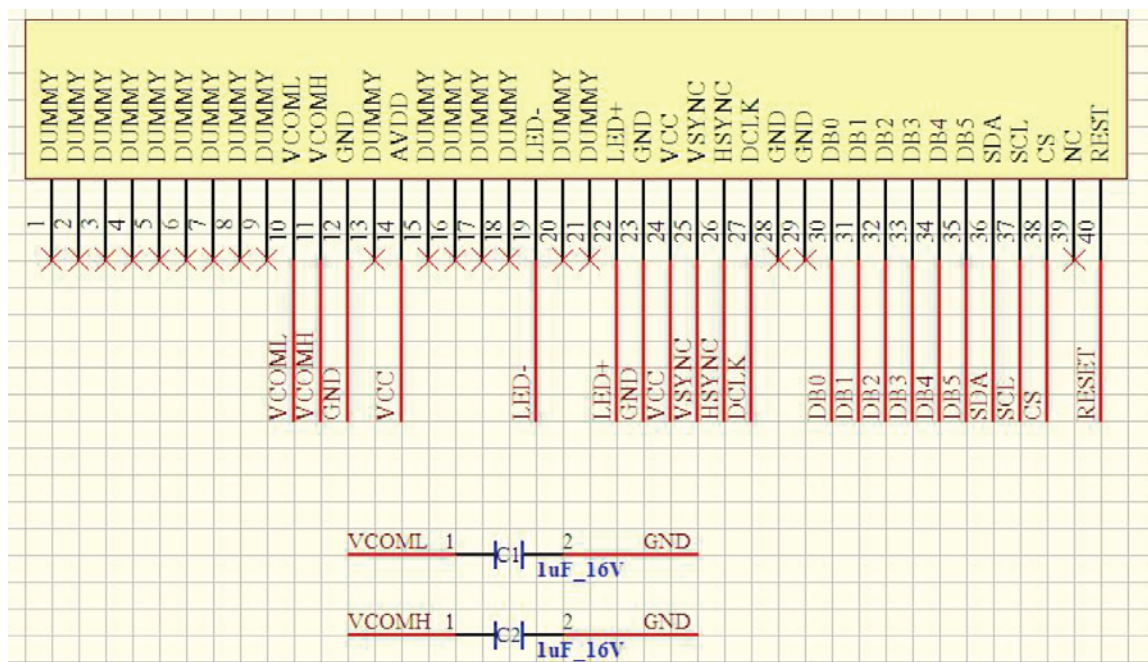
Note: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and I_L =60mA. The LED lifetime could be decreased if operating I_L is larger than 60mA.

CIRCUIT DIAGRAM



I_F=60mA, V_F=3.2V

7.3 Application Circuit



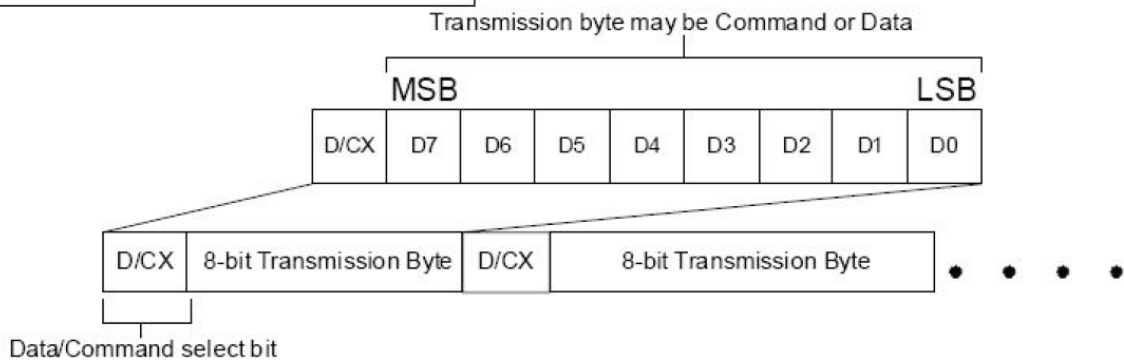
8. Command/AC Timing

8.1 SPI Timing

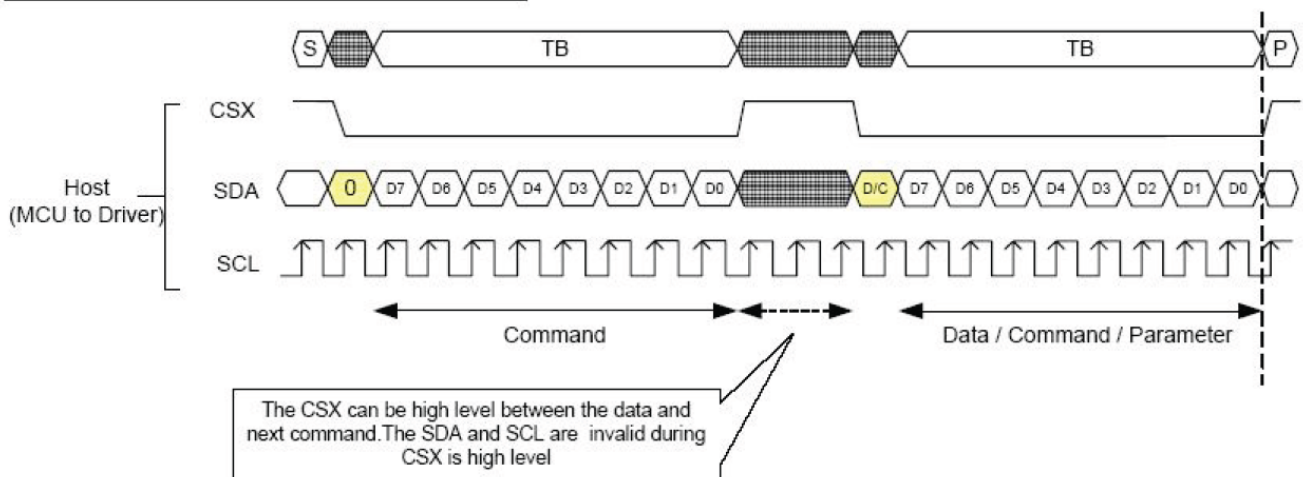
The write mode of the interface means that host writes commands or data to ILI9342. The 3-lines serial data packet contains a data/command select bit (D/CX) and a transmission byte. If the D/CX bit is “low”, the transmission byte is interpreted as a command byte. If the D/CX bit is “high”, the transmission byte is stored as the display data RAM (Memory write command), or command register as parameter.

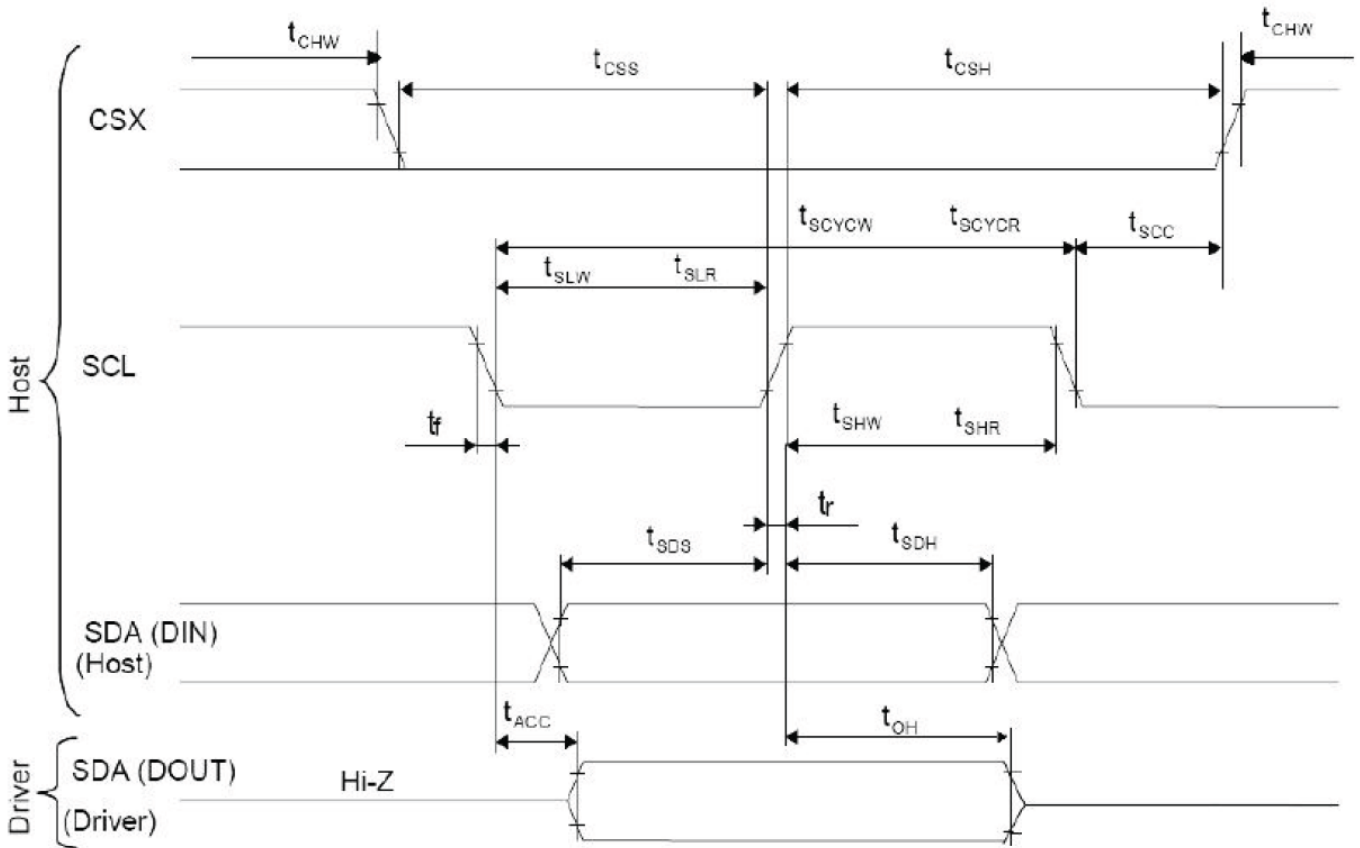
Any instruction can be sent in any order to ILI9342 and the MSB is transmitted first. The serial interface is initialized when CSX is high status. In this state, SCL clock pulse and SDA data are no effect. A falling edge on CSX enables the serial interface and indicates the start transmission. See the detailed data format for 3-/4-line serial interface.

Data Format for 3-line Serial Interface



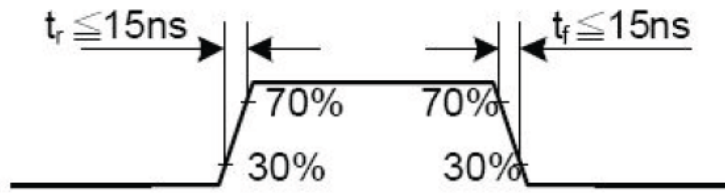
3-line Serial Interface Protocol





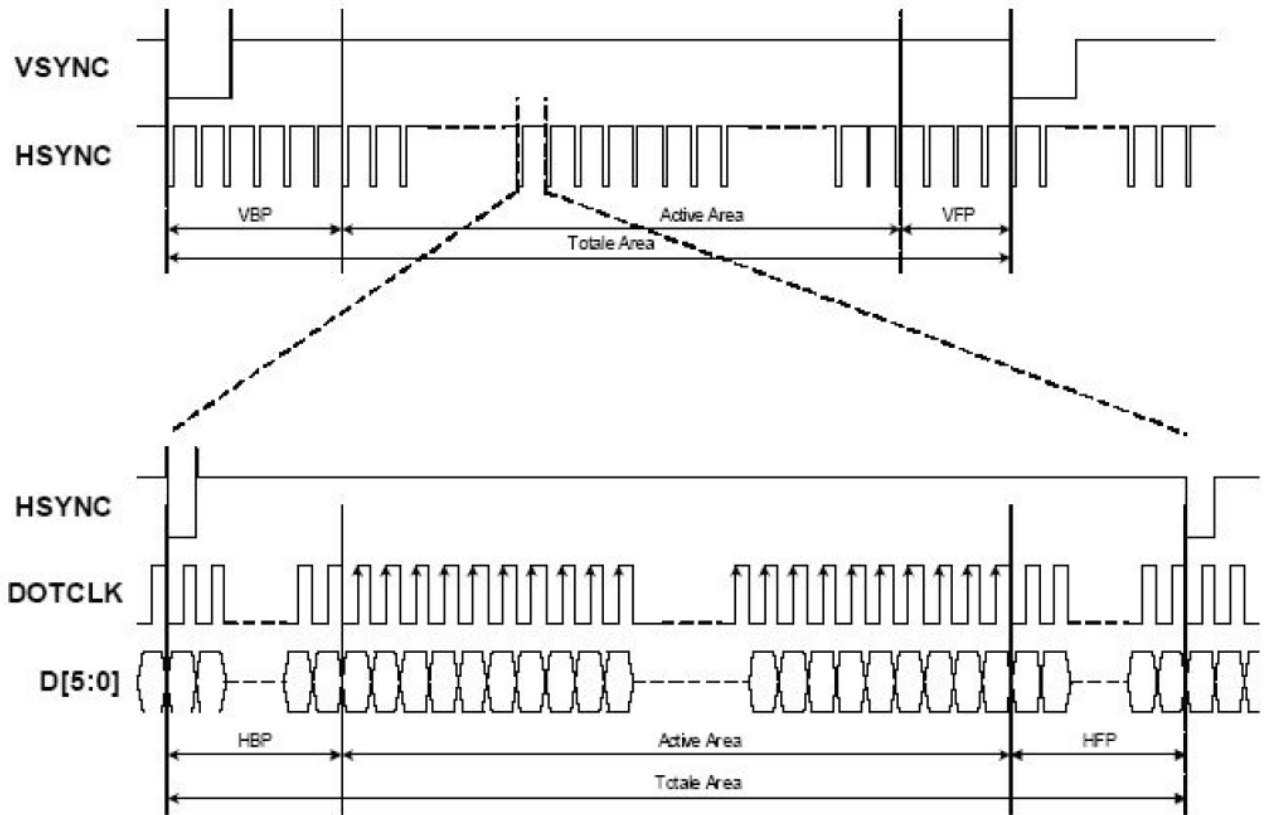
Signal	Symbol	Parameter	Min.	Max	Unit	Unit
SCL	t _{scycw}	Serial clock cycle (write)	66	--	ns	
	t _{shw}	SCL "H" pulse width (write)	33	--	ns	
	t _{slw}	SCL "L" pulse width (write)	33	--	ns	
	t _{scycr}	Serial clock cycle (read)	150	--	ns	
	t _{sshr}	SCL "H" pulse width (read)	75	--	ns	
	t _{slr}	SCL "L" pulse width (read)	75	--	ns	
SDA (Input)	t _{sds}	Data setup time (write)	10	--	ns	
	t _{sdh}	Data hold time (write)	10	--	ns	
SDA (Output)	t _{acc}	Access time (read)	30	50	ns	For maximum CL=30pF For minimum CL=8pF
	t _{oh}	Output disable time (read)	90	95	ns	
CSX	t _{chw}	CSX "H" pulse width	40	--	ns	
	t _{css}	SCL-CSX (write time)	15	--	ns	
	t _{csh}		75	--	ns	
	t _{css}	CSX-SCL (read time)	75	--	ns	
	t _{csh}					

Note: Ta= -40 to 85°C, IOVCC=1.65V to 3.3V, VCI=2.5V to 3.6V, AGND=DGND=0V



8.2 6-bit RGB Timing

SYNC Mode, RCM[1:0]="11"



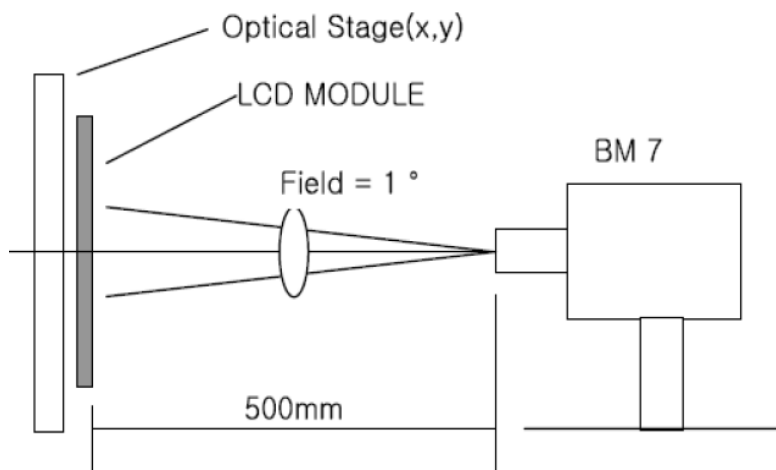
9. Optical Specification

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	--	1500	--		Note1 Note2
Response Time	Tr+Tf	25°C	--	30	40	ms	Note1 Note3
View Angles	ΘT	CR ≥ 10	--	80	-	Degree	Note 4
	ΘB		--	80	-		
	ΘL		--	80	-		
	ΘR		--	80	-		
Chromaticity	White	Brightness is on	x	0.263	0.313	0.363	Note5, Note1
			y	0.293	0.343	0.393	
	Red		x	0.584	0.634	0.684	
			y	0.302	0.352	0.402	
	Green		x	0.255	0.305	0.355	
			y	0.519	0.569	0.619	
	Blue		x	0.083	0.133	0.183	
			y	0.075	0.125	0.175	
Luminance	L		550	620	--	cd/m ²	Note1 Note6
Uniformity (White)	U		80	--	--	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C)

LED back-light: ON, Environment brightness < 150 lx

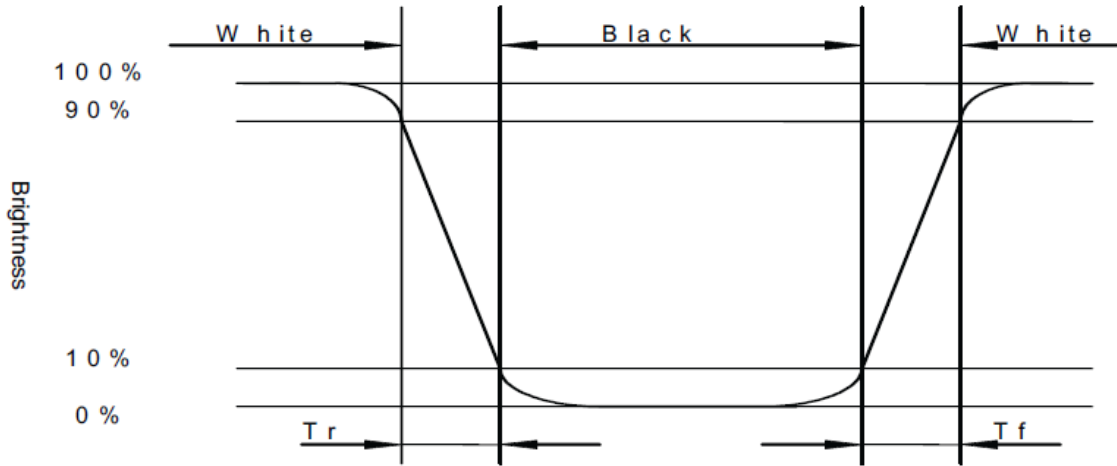


Note 2: Contrast ratio is defined as follow:

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

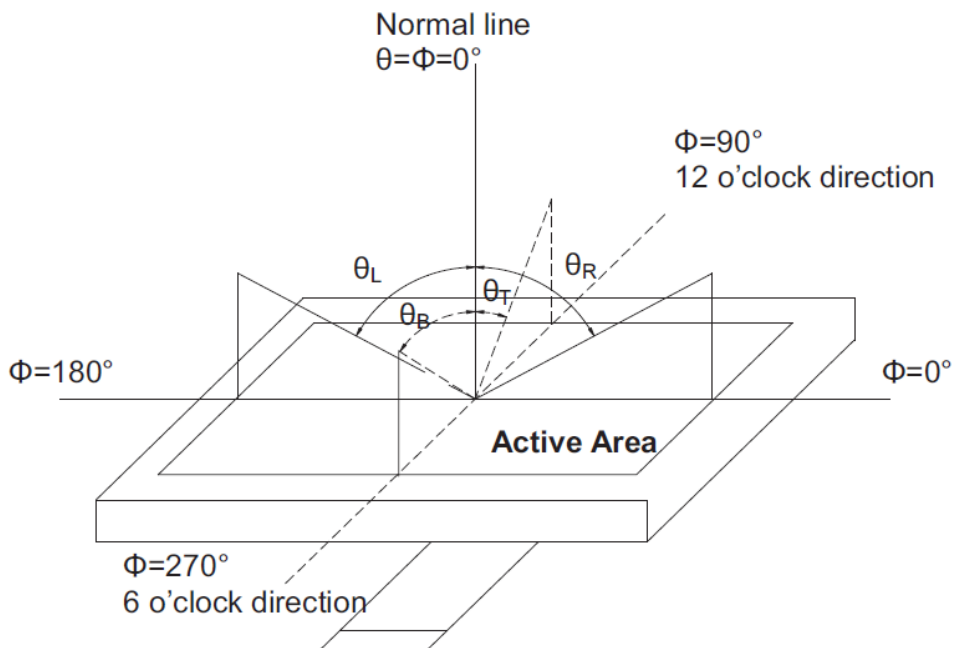
Note 3: Response time is defined as follow:

Response time is the time required for the display to transition from black to white (Rise Time, T_r) and from white to black(Decay Time, T_f).



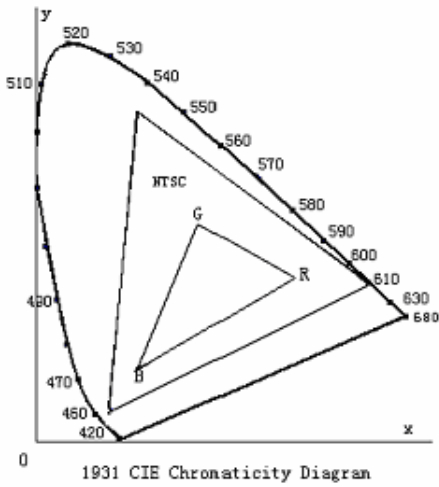
Note 4: Viewing angle range is defined as follow:

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.

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

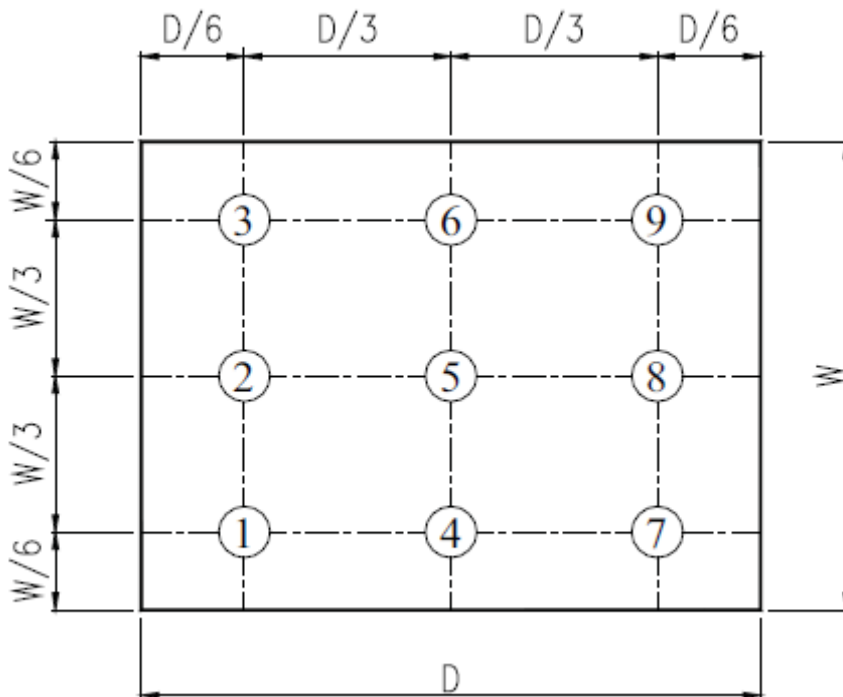


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ta= +60°C, 96hrs	Per table in below
2	Low Temp Operation	Ta= -10°C, 96hrs	Per table in below
3	High Temp Storage	Ta= +70°C, 96hrs	Per table in below
4	Low Temp Storage	Ta= -20°C, 96hrs	Per table in below
5	High Temp & High Humidity Storage	Ta= +40°C, 90% RH, 96hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30°C 30 min~+70°C 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.

11.4 Storage

- A. Store the products in a dark place at $+25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ 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

- A. 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.
- B. In order to make the display assembly stable and firm, ASI recommends to design some supporting at the display backside, especially for the display with tape-attached touch panel, such supporting is important and essential, or else, the display may drop-off from front after some period of time.
- C. Do not display the fixed pattern for a long time because it may develop image sticking due to the LCD structure. If the screen is displayed with fixed pattern, use a screen saver.

