

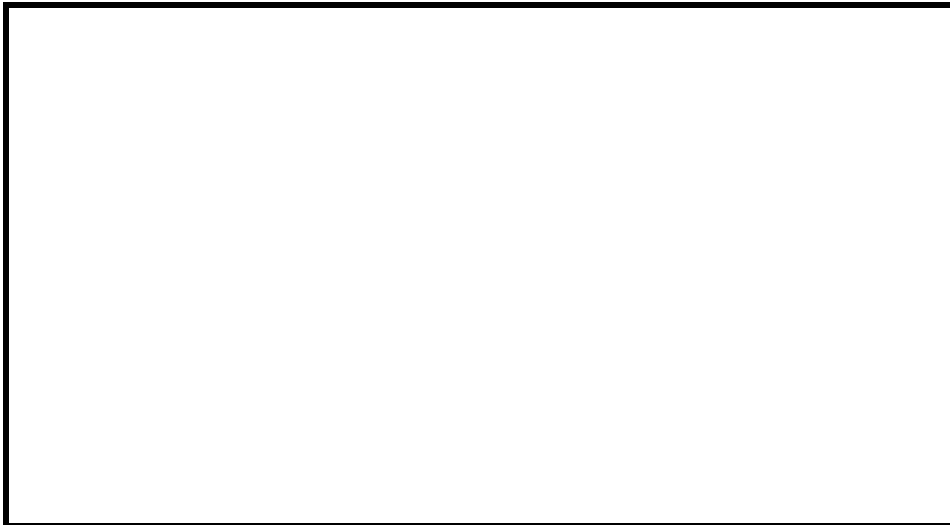
LIQUID CRYSTAL DISPLAY MODULE

**3.5" QVGA (320 x RGB x 240) TFT
with Touch-Panel**

Product Code: 35QVW1T-0

Product Specification

APPROVAL



Seiko Instruments Inc.
Mobile Display Division
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History of Revision

Revision	Contents	Date	In Charge
1.0	First publication	May. 27, 2008	S.Hashimoto

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1. General

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT ANY NOTICE.

1-1 Application

This specification applies to the LCD module designated 35QVW1T-0 LCD to be delivered from Seiko Instruments Inc. (hereinafter "SII").

1-2 Name of product, model number

Name of product: LCD module

Model number of SII: 35QVW1T-0

1-3 Mechanical Dimensions

Please refer to drawing No "35QVW1T-0 1A".

1-4 Quality Assurance Standard

Quality assurance standard should be based on the Delivery Inspection Standard.

Note:

(): Target value for sample production. Might be modified after evaluation of sample.

TBD: To Be Determined after evaluation of sample.

2. Product specifications

This product is LCD module with 3.5inch QVGA (320RGB x 240 dots) LCD module.

2-1 Basic Specifications

Module size:	76.9mm(W)x63.9mm(H)x4.3mm(t) (except FPC length)
Active area:	70.08mm(W)x52.56mm(H)
Dot pitch:	0.073mmx0.219mm, 116dpi
Weight:	36 g typ.
Display size:	3.5 inch
Number of pixels:	320RGBx240 dots
Dot layout:	Vertical stripes
Interface:	24bit Parallel RGB + Serial Peripheral Interface (SPI) SYNC (PCLK,HSYNC,VSYNC) mode, DE (PCLK,DE) mode
Number of colors:	262,144 colors, 16,194,277 colors (with dithering function)
Display mode:	TN Mode, Transmissive Mode, Normally White
Viewing direction:	6h
Drive method:	Line inversion
Back Light Unit:	Bottom edge type, 6-LEDs, Serial
LCD driver:	Himax, HX8238-A
Touch-Panel:	Film/Glass type
Surface treatment:	Anti glare type
Operating temperature:	From -20 to +60 °C (dry)
Storage temperature:	From -30 to +70 °C (dry)

2-2 Interface

No.	Symbol	Description
1	YU	Top electrode – differential analog
2	XL	Left electrode – differential analog
3	YD	Bottom electrode – differential analog
4	XR	Right electrode – differential analog
5	AVDD	Analog power supply: 3.3V(Typ.)
6	AVDD	Analog power supply: 3.3V(Typ.)
7	VSS	Ground: 0V
8	DVDD	Digital power supply: 3.3V(Typ.)
9	DVDD	Digital power supply: 3.3V(Typ.)
10	VSS	Ground: 0V
11	DISP	Display On/Off: H=Sleep mode, L=Normal operating mode
12	PCLK	Dot clock
13	VSYNC	Vertical sync
14	HSYNC	Horizontal sync
15	DE	Data enable
16	VSS	Ground: 0V
17	R7	Red data(MSB)
18	R6	Red data
19	R5	Red data
20	R4	Red data
21	R3	Red data
22	R2	Red data
23	R1	Red data
24	R0	Red data(LSB)
25	G7	Green data(MSB)
26	G6	Green data
27	G5	Green data
28	G4	Green data
29	G3	Green data
30	G2	Green data
31	G1	Green data
32	G0	Green data(LSB)
33	B7	Blue data(MSB)
34	B6	Blue data
35	B5	Blue data
36	B4	Blue data
37	B3	Blue data
38	B2	Blue data
39	B1	Blue data
40	B0	Blue data(LSB)
41	VSS	Ground: 0V
42	SDI	Serial data input
43	SCK	Serial transfer clock input
44	CSB	Chip select: Low active
45	RESB	System reset pin: Low active
46	SDO	Serial data output
47	VSS	Ground: 0V
48	VLED+	LED backlight power supply: anode
49	VLED-	LED backlight power supply: cathode
50	VSS	Ground: 0V

3. Recommended Power ON/OFF Sequence

3-1 Power ON Sequence

No.	Contents
1	Power (DVDD) ON
2	Wait till power (DVDD) will be stabilizing
3	Wait more than 1 us
4	Power (AVDD) ON
5	Wait till power (AVDD) will be stabilizing
6	Wait more than 10 us
7	Set "RESB" terminal to high-level
8	Input display control signal (PCLK/HSYNC/VSYNC...)
9	Wait more than 10 us
10	SPI accessing, if necessary *1, *2
11	Wait more than 1 us
12	Set "DISP" terminal to low-level
13	LCD display will be ON after 10 frames
14	Back light LED ON

NOTE: It is necessary to input PCLK before the falling edge of DISP.

Display starts at 10th falling edge of VSYNC after the falling edge of DISP.

*1: Refer to HX8238-A data sheet for Command Description, if necessary.

*2: Data transaction mode is determined by register "R0005h".

(R00005h)

IB15	IB14	IB13	IB12	IB11	IB10	IB9	IB8	IB7	IB6	IB5	IB4	IB3	IB2	IB1	IB0
<i>GHN</i>	<i>XDK</i>	<i>GDIS</i>	<i>LPF</i>	<i>DEP</i>	<i>CKP</i>	<i>VSP</i>	<i>HSP</i>	<i>DEO</i>	<i>DIT</i>	0	<i>PWM</i>	0	<i>FB2</i>	<i>FB1</i>	<i>FB0</i>

Register Bit	Value	Description
DEP	0	DE is negative polarity (Default)
	1	DE is positive polarity
CKP	0	Data is latched in PCLK falling edge
	1	Data is latched in PCLK rising edge (Default)
VSP	0	VSNC is negative polarity (Default)
	1	VSNC is positive polarity
HSP	0	HSYNC is negative polarity (Default)
	1	HSYNC is positive polarity
DEO	0	HSYNC/VSNC signals are also needed in DE mode.
	1	Only DE signal is needed in DE mode. (Default)
DIT	0	Dithering function is turned off (6bit colors: 262,144 colors)
	1	Dithering function is turned on (6bit+2bitFRC: 16,194,277 colors) (Default)

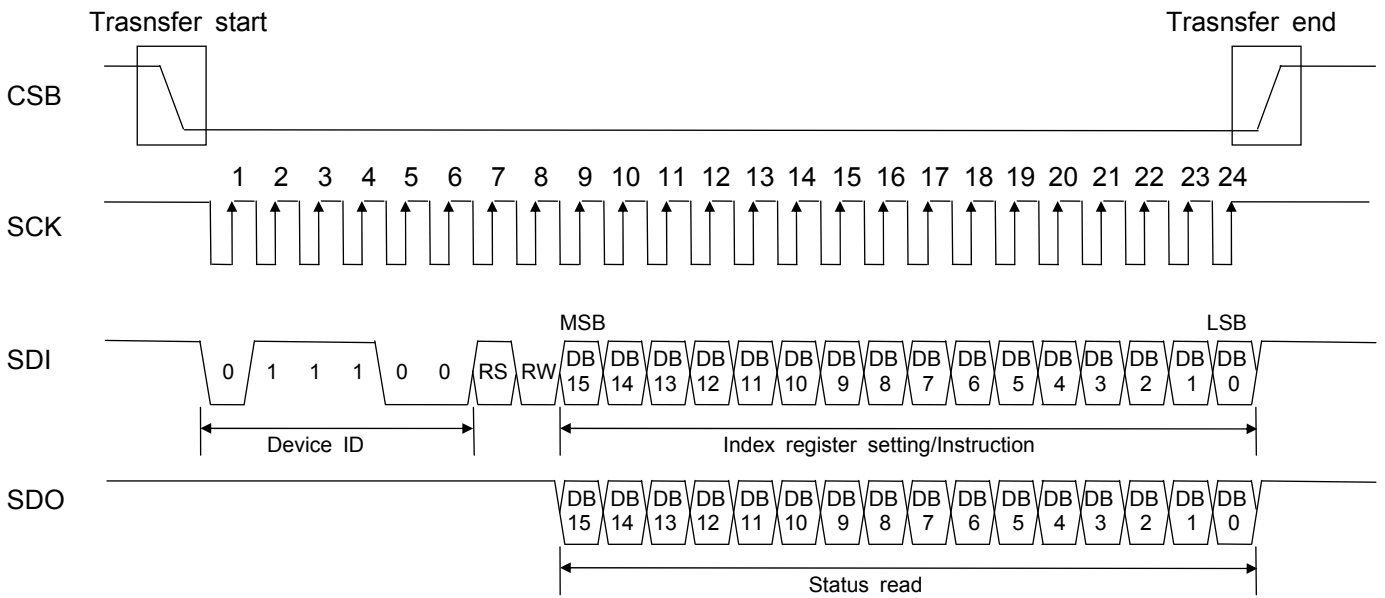
As for other settings and details, please refer to HX8238-A data sheet.

3-2 Power OFF Sequence

No.	Contents
1	Back light LED OFF
2	Set "DISP" terminal to high-level
3	Wait more than 10 us
4	SPI accessing, if necessary
5	Wait more than 6 frames
6	Stop display control signal(PCLK/HSYNC/VSNC...)
7	Wait more than 1 us
8	Set "RESB" terminal to low-level
9	Power (AVDD) OFF
10	Power (DVDD) OFF

NOTE: PCLK must be maintained at lease 6 frames after the rising edge of DISP.
 Display become off at the 6th falling edge of VSYNC after the rising edge of DISP.

3-3 Serial Peripheral Interface



RS=0: Register
 RS=1: Data

4. Electrical Characteristics

4-1 Absolute Maximum Rating

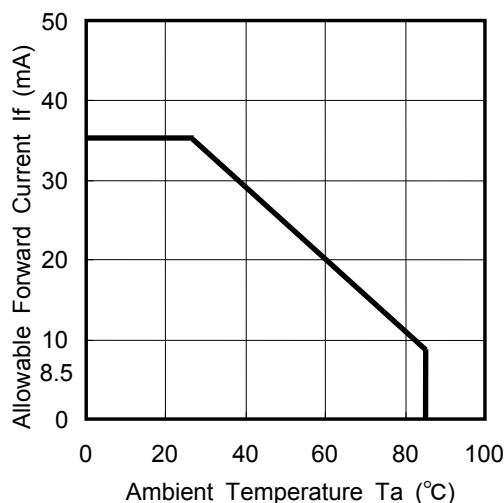
VSS=0V

Item		Symbol	Standard	Unit	Remark
Supply Voltage		DVDD	-0.3 to +4.0	V	
		AVDD	-0.3 to +5.0	V	
Backlight LED	DC forward current	If	35	mA	*1,2
	Reverse voltage	Vr	5	V	*2
	Power dissipation	Pd	123	mW	*2
Touch-Panel	Input voltage	Vin	7	V	
Storage temperature range		Tstg	-30 to +70	°C	Dry
Operating temperature range		Top	-20 to +60	°C	Dry

Note: Use over the absolute maximum rating might affect reliability and might cause malfunction.

*1: Ambient Temperature vs. Allowable Forward Current.

*2: Apply to 1 LED. Backlight consists of 6 LEDs.



4-2 Electrical Characteristics

VSS=0V, Ta=25 degree C

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply voltage	DVDD	1.8	3.3	3.6	V	*1
	AVDD	2.5	3.3	3.6	V	
Current consumption	IDVDD	-	0.2	0.4	mA	*2
	IAVDD	-	9	14	mA	
Input high voltage	VIH	0.8DVDD	-	DVDD	V	
Input low voltage	VIL	0	-	0.2DVDD	V	
Output high voltage	VOH	0.9DVDD	-	DVDD	V	
Output low voltage	VOL	0	-	0.1DVDD	V	
LED forward voltage	Vf	-	3.2	3.5	V	*3
LED current	IF	-	20	-	mA	

*1: $VSS < DVDD \leq AVDD$

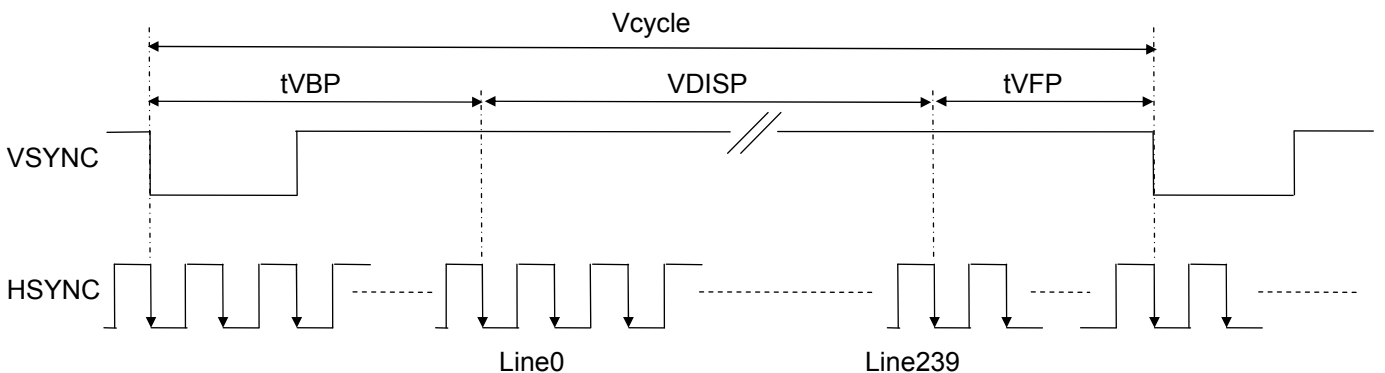
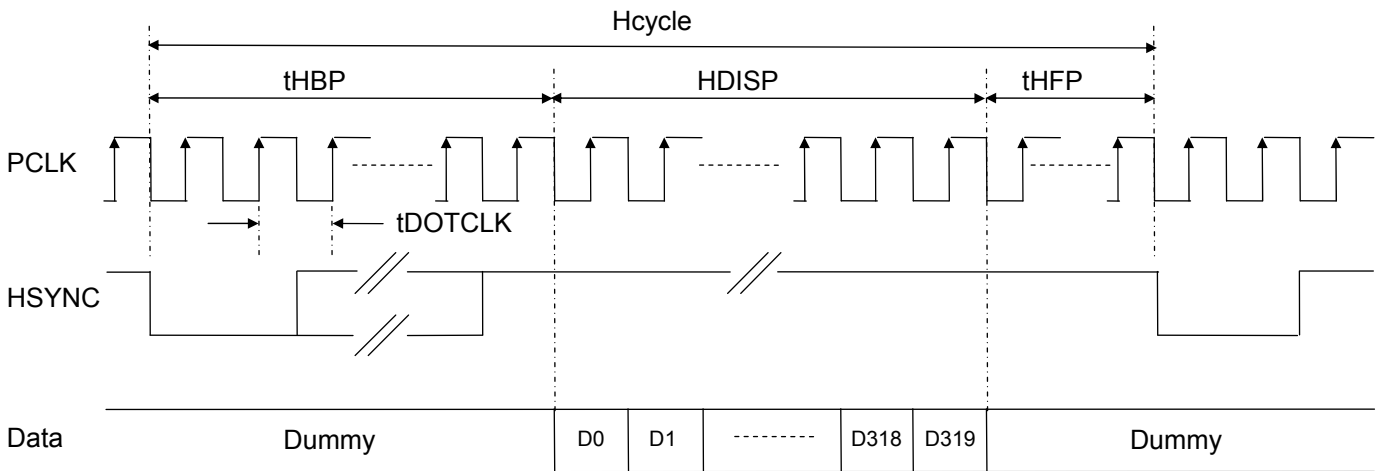
*2: DVDD=3.3V, AVDD=3.3V, fDOTCLK=6.5MHz, fV=60Hz, All black pattern.

*3: IF=20mA. Apply to 1 LED.

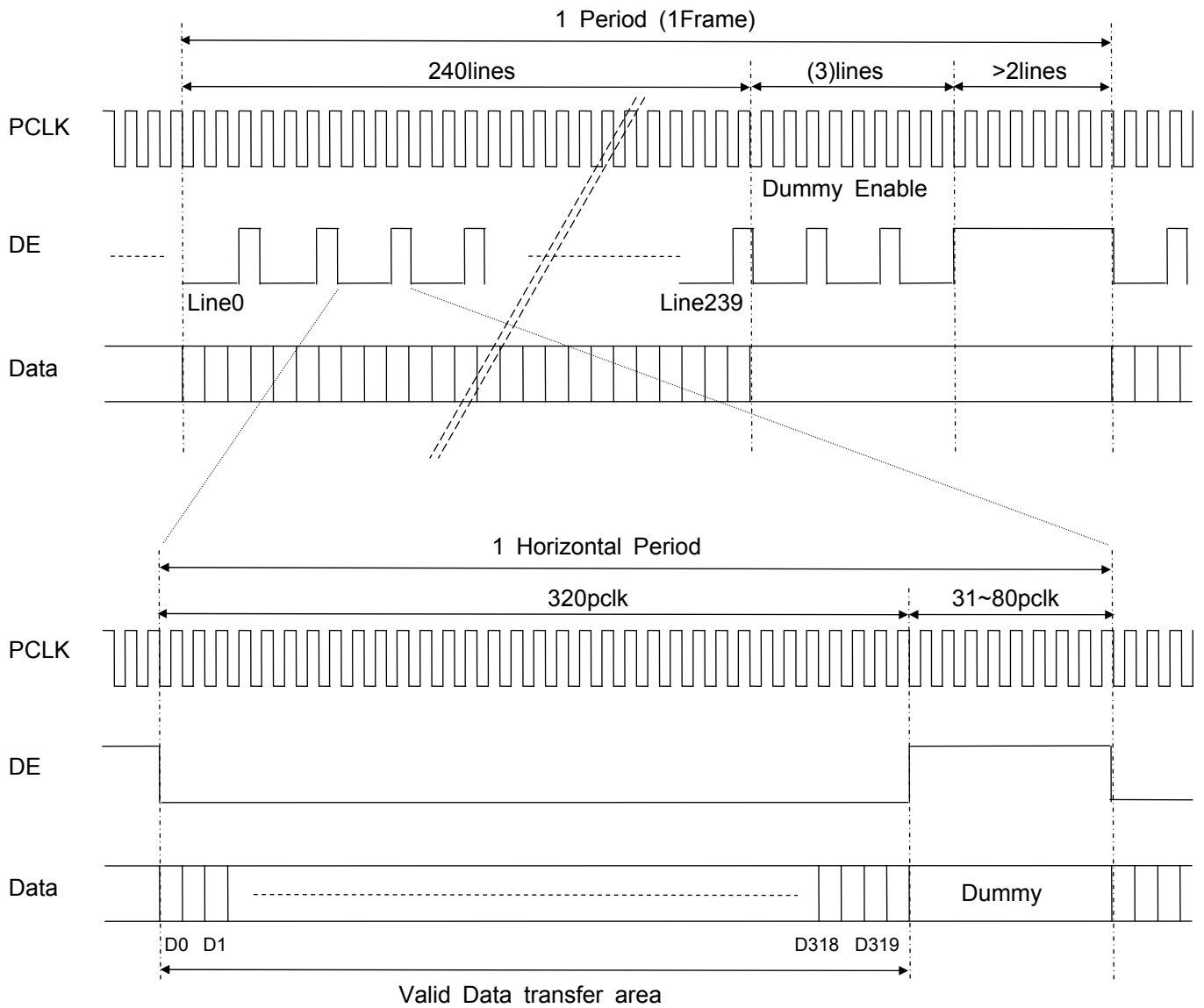
4-3 Parallel RGB Input Timing Characteristics (SYNC Mode)

VSS=0V, DVDD=3.3V, AVDD=3.3V, Ta=25 degree C

Item	Symbol	Min.	Typ.	Max.	Unit
DOTCLK Frequency	fDOTCLK	-	6.5	10	MHz
DOTCLK Period	tDOTCLK	100	154	-	ns
Horizontal Frequency(Line)	fH	-	14.9	22.35	KHz
Vertical Frequency(Refresh)	fV	-	60	90	Hz
Horizontal Back Porch	tHBP	-	68	-	tDOTCLK
Horizontal Front Porch	tHFP	-	20	-	tDOTCLK
Horizontal Data Start Point	tHBP	-	68	-	tDOTCLK
Horizontal Blanking Period	tHBP+tHFP	-	88	-	tDOTCLK
Horizontal Display Area	HDISP	-	320	-	tDOTCLK
Horizontal Cycle	Hcycle	-	408	450	tDOTCLK
Vertical Back Porch	tVBP	-	18	-	Lines
Vertical Front Porch	tVFP	-	4	-	Lines
Vertical Data Start Point	tVBP	-	18	-	Lines
Vertical Blanking Period	tVBP+tVFP	-	22	-	Lines
Vertical Display Area	VDISP	-	240	-	Lines
Vertical Cycle	Vcycle	-	262	350	Lines



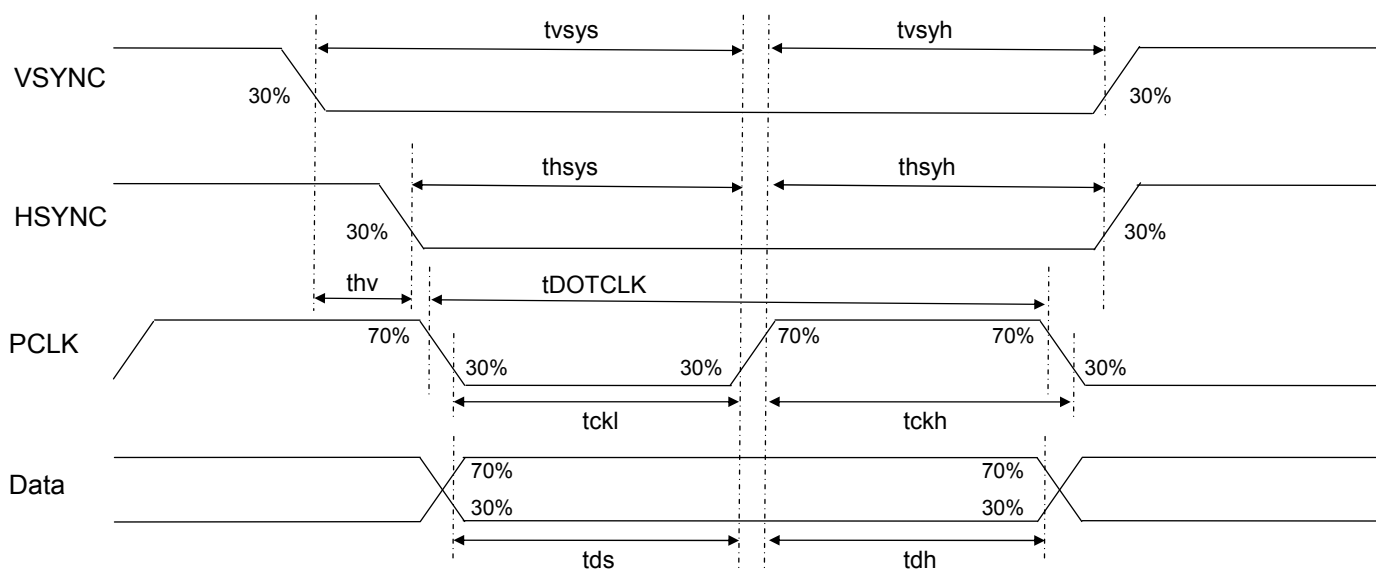
4-4 Parallel RGB Input Timing Characteristics (DE Mode)



4-5 AC Timing Characteristics (Pixel Timing)

VSS=0V, DVDD=3.3V, AVDD=3.3V, Ta=25 degree C

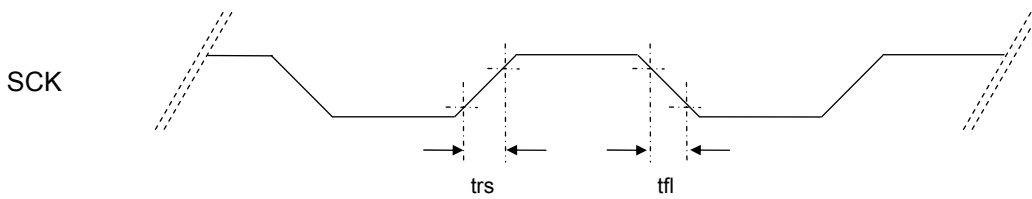
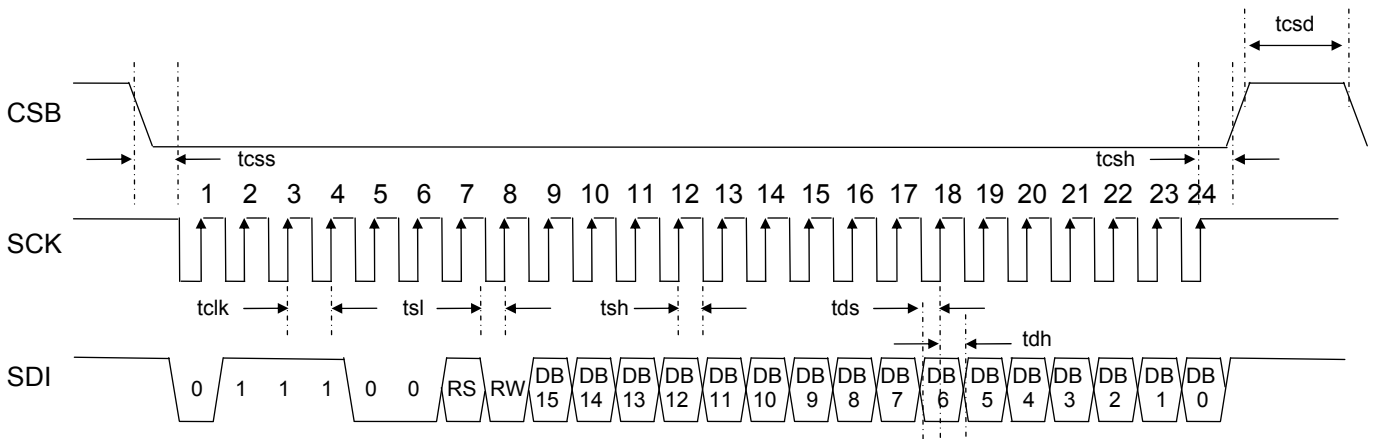
Item	Symbol	Min.	Typ.	Max.	Unit
DOTCLK Frequency	fDOTCLK	-	6.5	10	MHz
DOTCLK Period	tDOTCLK	100	154	-	ns
Vertical Sync Setup Time	tvsys	20	-	-	ns
Vertical Sync Hold Time	tvsyh	20	-	-	ns
Horizontal Sync Setup Time	thsys	20	-	-	ns
Horizontal Sync Hold Time	thsyh	20	-	-	ns
Phase difference of Sync Signal Falling Edge	thv	1	-	240	tDOTCLK
DOTCLK Low Period	tckl	50	-	-	ns
DOTCLK High Period	tckh	50	-	-	ns
Data Setup Time	tds	12	-	-	ns
Data Hold Time	tdh	12	-	-	ns
Reset pulse width	tRES	10	-	-	us



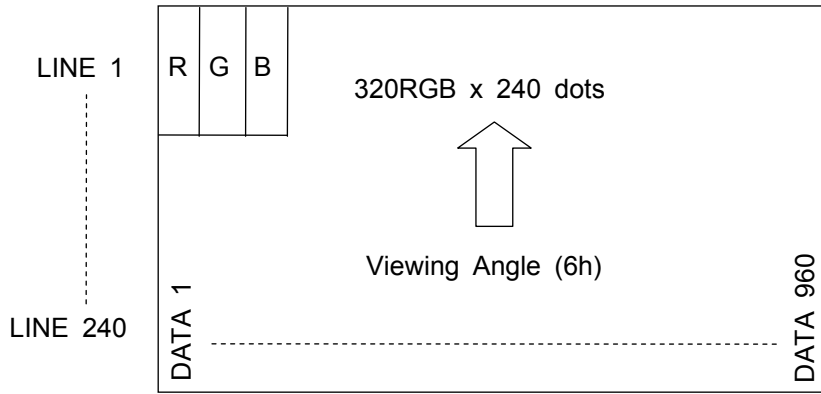
4-6 AC Timing Characteristics (SPI Timing)

VSS=0V, DVDD=3.3V, AVDD=3.3V, Ta=25 degree C

Item	Symbol	Min.	Typ.	Max.	Unit
Serial Clock Frequency	fclk	-	-	20	MHz
Serial Clock Cycle Time	tclk	50	-	-	ns
Clock Low Width	tsl	25	-	-	ns
Clock High Width	tsh	25	-	-	ns
Clock Rising Time	trs	-	-	30	ns
Clock Falling Time	tfl	-	-	30	ns
Chip Select Setup Time	tcss	0	-	-	ns
Chip Select Hold Time	tcsd	10	-	-	ns
Chip Select High Delay Time	tcsd	20	-	-	ns
Data Setup Time	tds	5	-	-	ns
Data Hold Time	tdh	10	-	-	ns



4-7 Pixel Data Format



4-8 Input Data Signal and Each Colors

DISPLAY		INPUT DATA SIGNAL																							
		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 COLOR	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
	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
	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
	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
	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
	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	0	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	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	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	dark	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	↑																								
	↓																								
	light	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
↓	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
RED	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
	dark	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
	↑																								
	↓																								
	light	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	
↓	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		
GREEN	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
	dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
	↑																								
	↓																								
	light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	
↓	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0		
BLUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		
GRAY SCALE OF WHITE	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	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	
	dark	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	
	↑																								
	↓																								
	light	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	
↓	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	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		

NOTE: 0 = Low level voltage, 1 = High level voltage

5. LCD Optical Characteristics

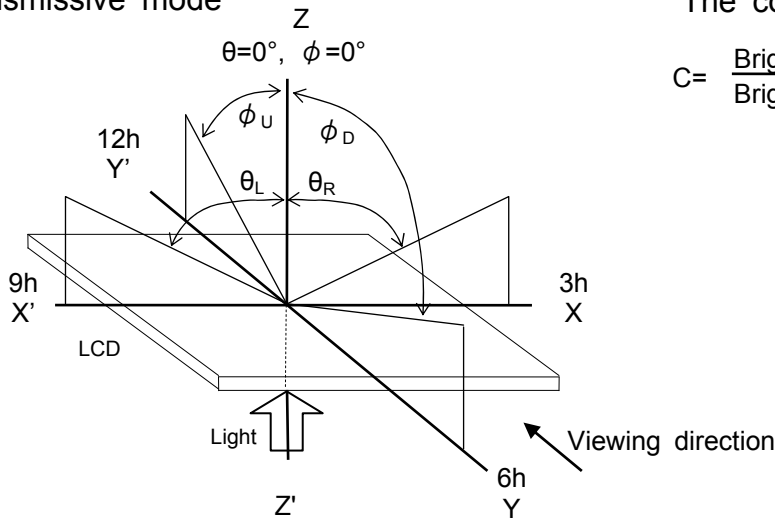
VSS=0V, DVDD=3.3V, AVDD=3.3V, fDOTCLK=6.5MHz, fV=60Hz, IF=20mA, Ta=25 degreeC

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Contrast ratio	C	$\theta=0^\circ, \phi=0^\circ$	150	400	-	-
Range of viewing angle (ϕ :6h-12h) *1	ϕ_U	C \geq 10	-	50	-	degree
	ϕ_D		-	65	-	
Range of viewing angle (θ :3h-9h) *1	θ_R		-	70	-	
	θ_L		-	70	-	
Color	White	x	0.27	0.32	0.37	-
		y	0.29	0.34	0.39	-
	Red	x	0.58	0.63	0.68	-
		y	0.31	0.36	0.41	-
	Green	x	0.29	0.34	0.39	-
		y	0.55	0.60	0.65	-
	Blue	x	0.10	0.15	0.20	-
		y	0.05	0.10	0.15	-
NTSC ratio		↑	55	60	-	%
B/W Response time	Ton	$\theta=0^\circ, \phi=0^\circ$	-	15	30	msec
	Toff		-	35	70	

*1: Without Touch Panel

*Definition of ϕ, θ

Transmissive mode



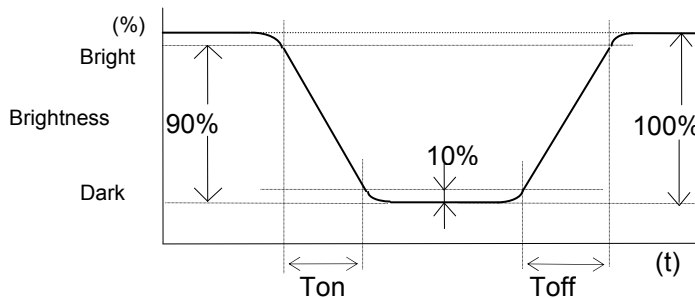
*Definition of contrast C

The contrast ratio is defined as follows:

$$C = \frac{\text{Brightness of unselected position(white)}}{\text{Brightness of selected position(black)}}$$

*Definition of response time (Ton, Toff)

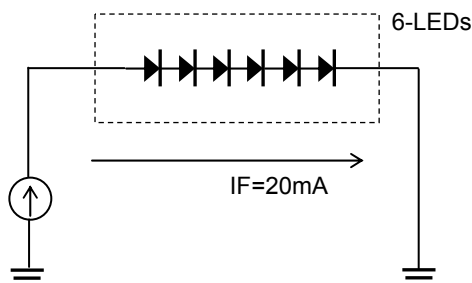
The response time is defined as the following figure.



6. LED Backlight Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	unit
Brightness *1 *2 *3	B_p	$T_a=25^{\circ}\text{C}\pm 3^{\circ}\text{C}$	250	350	-	cd/m^2
Uniformity *1 *2 *4	ΔB_p	30-80%RH	70	-	-	%

Note: Due to the dispersion of V_f , the fixed voltage supply can not control the brightness of LED. Therefore, SII strongly recommends using the constant current power supply.



*1 The data is measured after LEDs are turned on for 5 minutes.

*2 Tester: BM-7 (TOPCON) ; spot size= 1° field ; Distance=500mm

Conditions

LED backlight power supply : 20mA

LCD: White color

*3 Brightness in the center of the LCD panel.

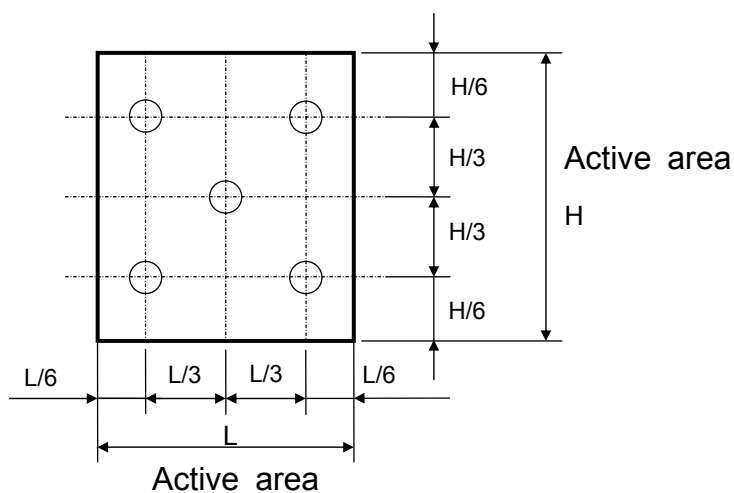
*4 Definition of Uniformity (ΔB_p)

$$\Delta B_p = B_p (\text{Min.}) / B_p (\text{Max.}) \times 100[\%]$$

$B_p (\text{max.})$ = Maximum brightness in 5 measurement spots (refer to below chart).

$B_p (\text{Min.})$ = Minimum brightness in 5 measurement spots (refer to below chart).

Measurement spots (5 spots)



7. Touch Panel Characteristics

7-1 Electrical characteristics

Ta=25 degree C

Item	Min.	Typ.	Max.	Unit	Remark
Linearity	-1.5	-	1.5	%	*1, *2
Terminal resistance	200	-	900	Ohm	X(Film side)
	200	-	900	Ohm	Y(Glass side)
Insulation resistance	20	-	-	M Ohm	DC 25V 1min.
Input Voltage	-	5.0	7.0	V	
Chattering	-	-	10	ms	*3
Transparency	79	80	-	%	

Note: Do not operate it with a thing except a polyacetal pen (Tip R0.8 or less) or a finger, Especially those with hard or sharp tips such as a ball point pen or a mechanical pencil.

*1: Definition of Linearity(%) = $\Delta V / (EV - SV) \times 100[\%]$

ΔV = The difference between the ideal voltage and measured voltage on each measuring line

SV = Voltage of starting Points

EV = Voltage of ending Points

*2: 80gf less input with Tip R0.8 polyacetal pen.

*3: Tip R0.8 polyacetal pen, Tip R8.0 Rubber.

7-2 Mechanical characteristics

Ta=25 degree C

Item	Min.	Typ.	Max.	Unit	Remark
Activation force	-	20	50	gf	*1
Pen Sliding Durability	Write 100,000	-	-	times	*2
Hitting Durability	1,000,000	-	-	times	*3
Surface hardness	2	-	-	H	*4

*1: Stylus pen Input: Tip R0.8 polyacetal pen or Finger

*2: Measurement for surface area

- Scratch 100,000 times straight line

- Force = 250gf

- Speed = 180mm/sec

- Length = 30mm

- Stylus = Tip R0.8 polyacetal pen

- Electric Load = None

*3: Measurement for center part

- Hit 1,000,000 times at the same point

- Force = 250gf

- Hitting Pad = Tip R0.8 polyacetal pen & Tip R8.0 silicon rubber

- Hitting speed = 3 times/sec

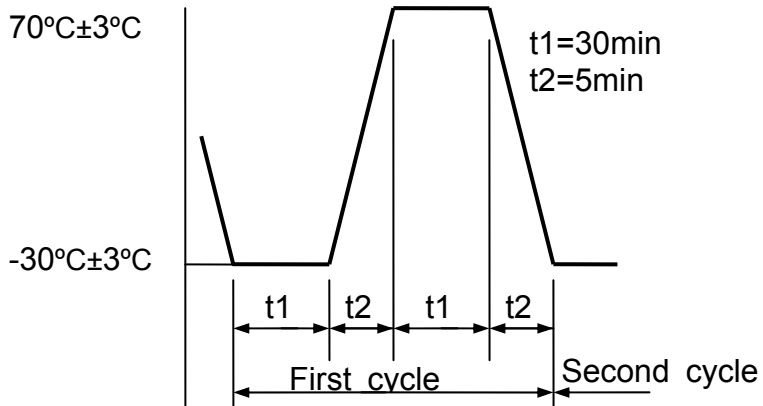
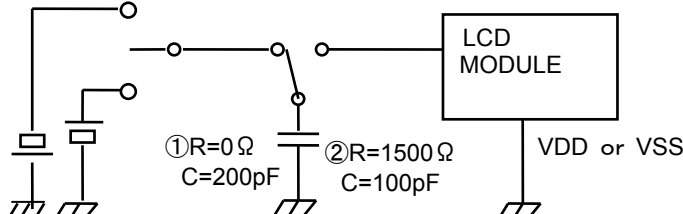
- Electric Load = None

*4: JIS K5400

8. Reliability

SII will develop engineering samples that meet the reliability level in mass production.

8-1 Reliability levels

Test Items	Condition
High temperature storage	+70°C±3°C, for 240 hours *Measure after 12hours left at normal temperature and humidity.
Low temperature storage	-30°C±3°C for 240 hours *Measure after 12hours left at normal temperature and humidity.
Operation at high temperature	+60°C±3°C, 30%RH max for 240 hours *Measure after 12hours left at normal temperature and humidity.
Operation at low temperature	-20°C±3°C, for 240 hours *Measure after 12hours left at normal temperature and humidity.
Operation at high temperature and high humidity	+40°C±3°C, 90%RH max. (no condensation) for 240 hours *Measure after 12hours left at normal temperature and humidity.
Temperature cycle storage	 <p>Repeat 5 cycles *Measure after 12hours left at normal temperature and humidity</p>
Vibration	Sweep at 10Hz to 50Hz, amplitude 1.5mm for 2 hours each in X, Y, and Z directions. Apply shipping package to this test.
Mechanical shock	Drop onto the tiled floor from 60 centi meter heights, 6 faces. Apply shipping package to this test.
ESD	<p>1) 200V max. under below condition. (EIA Standard: MM) 2) 1000V max. under below condition. (EIA Standard: HBM) (Each terminal on I/F.)</p> 

8-2 Criteria

- | | |
|---------------------------------|--|
| (1) Functional characteristics: | No abnormalities. |
| (2) Display characteristics: | Satisfy the original standard.
No uneven contrast, No bubble, No blur, etc. |
| (3) Electrical characteristics: | Satisfy the original standard. |
| (4) Appearance: | No relief, etc at joint. |

9. Handling Precautions

9-1 Operation

Burn-in sometimes happens when the same character was displayed at along time. Therefore, to prevent Burn-in, SII recommended to set up a Screen-saver function.

9-2 Safety

DO NOT put it in your mouth in case LCD panel has broken. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

9-3 Handling

- (1) The LCD panel is plate glass. **DO NOT** subject the panel to mechanical shock or to excessive force on its surface.
- (2) The polarizer attached to the display is very easy to damage, handle it with care to avoid scratching.
- (3) To avoid contamination on the display surface, **DO NOT** touch the display surface with bare hands.
- (4) Provide a space so that the LCD panel does not come into contact with other components.
- (5) To protect the LCD panel from external pressure, put covering glass (acrylic board or similar board) to keep appropriate space between them.
- (6) Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where dew condensation occurs.
- (7) Property of semiconductor devices may be affected when they are exposed to light possibly resulting in malfunctioning of the ICs.
To prevent such malfunctioning of the ICs, your design and mounting layout done are so that the IC is not exposed to light in actual use.

9-4 Static Electricity

- (1) Ground soldering iron tips, tools and testers when they operate.
- (2) Ground your body when handling the products.
- (3) **DO NOT** apply voltage to the input terminal without applying power supply.
- (4) **DO NOT** apply voltage that exceeds the absolute maximum rating.
- (5) Store the products in an anti-electrostatic container.

9-5 Storage

Store the products in a dark place at 25 ± 10 degree C, low humidity (65%RH or less). **DO NOT** store the products in an atmosphere containing organic solvents or corrosive gases.

9-6 Cleaning

- (1) **DO NOT** wipe the polarizer with dry cloth, as it might cause scratch.
- (2) Wipe the polarizer with a soft cloth soaked with petroleum IPA, other chemical might damage.

9-7 Waste

When dispose of LCD module, manage it as the production waste.

10. Design/Handing Guideline for Touch Panel

10-1 Bezel/Housing design

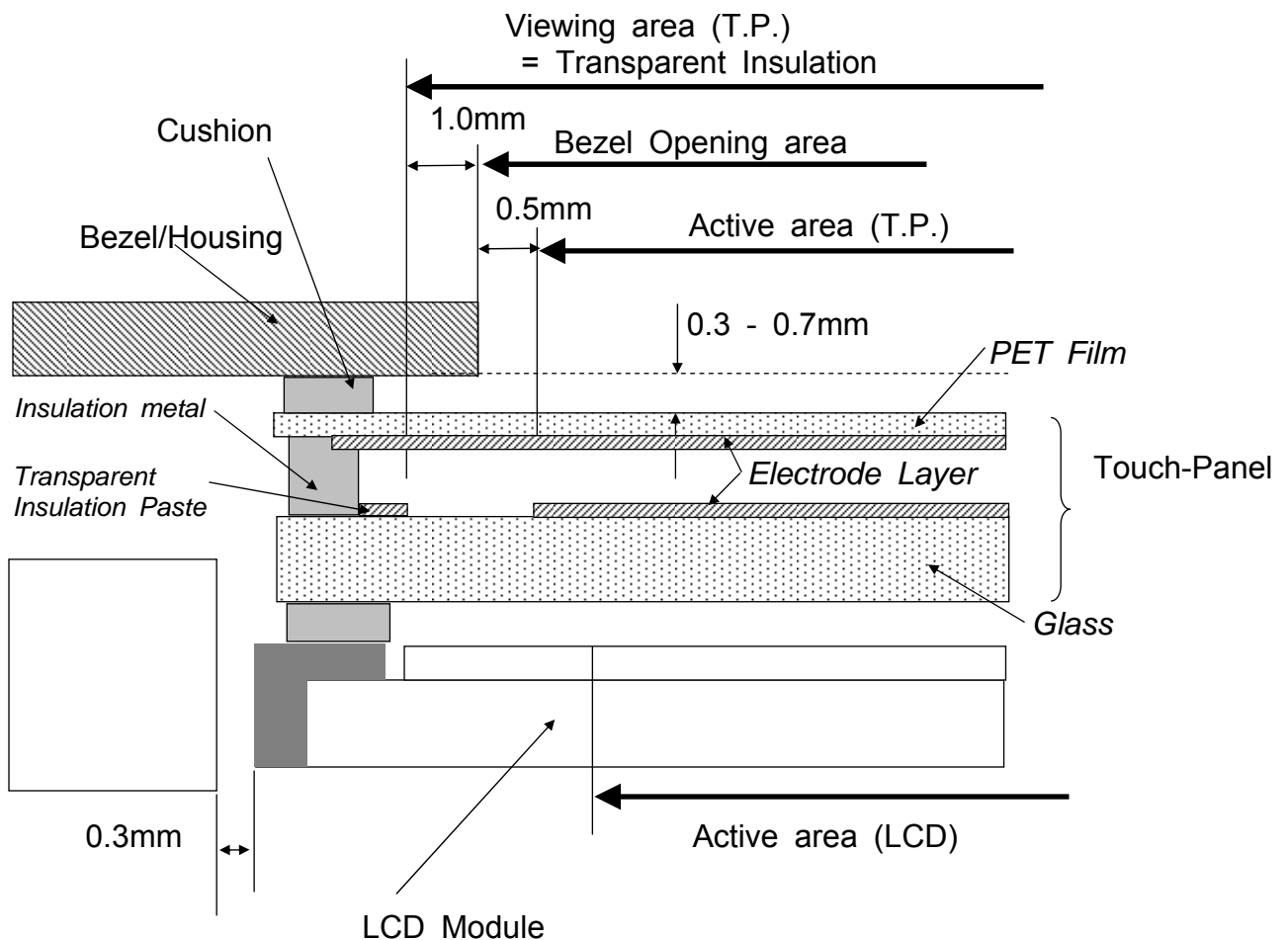
- (1) If a consumer will put a palm on housing in normal usage, care should be taken as follows.
- (2) Keep the gap, for example 0.3 to 0.7mm, between bezel edge and T/P surface. The reason is to avoid the bezel edge from contacting T/P surface that may cause "short" with bottom layer
- (3) Insertion a cushion material is recommended.
- (4) The cushion material should be limited just on the busbar insulation paste area. If it is over the transparent insulation paste area, a "short" may be occurred.
- (5) There is one where a resistance file is left in the T/P part of the end of the pole. Design to keep insulation from the perimeter to prevent from mis-operation and so on.

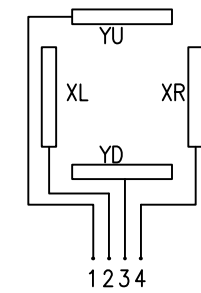
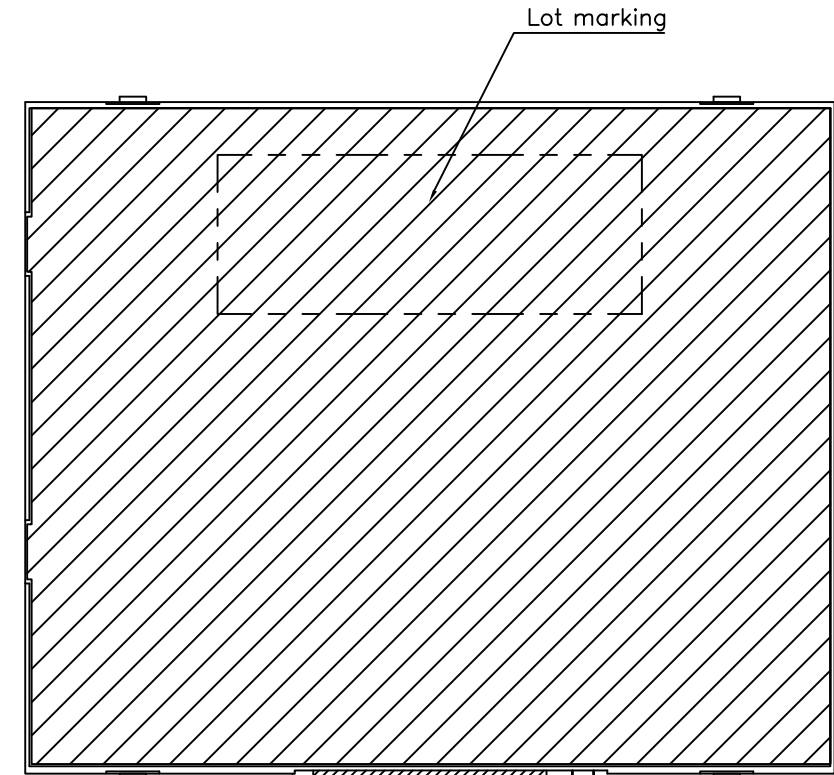
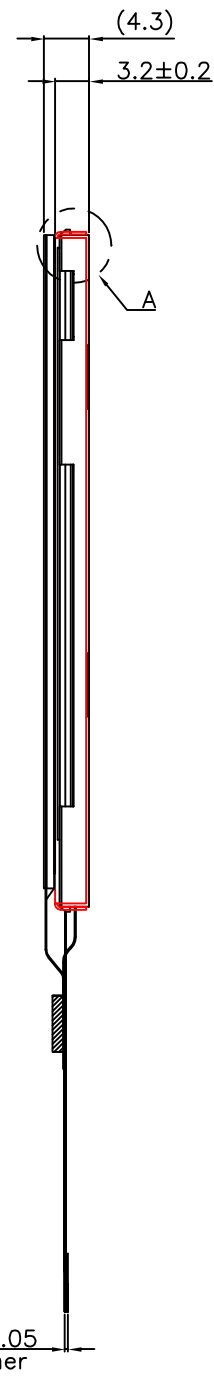
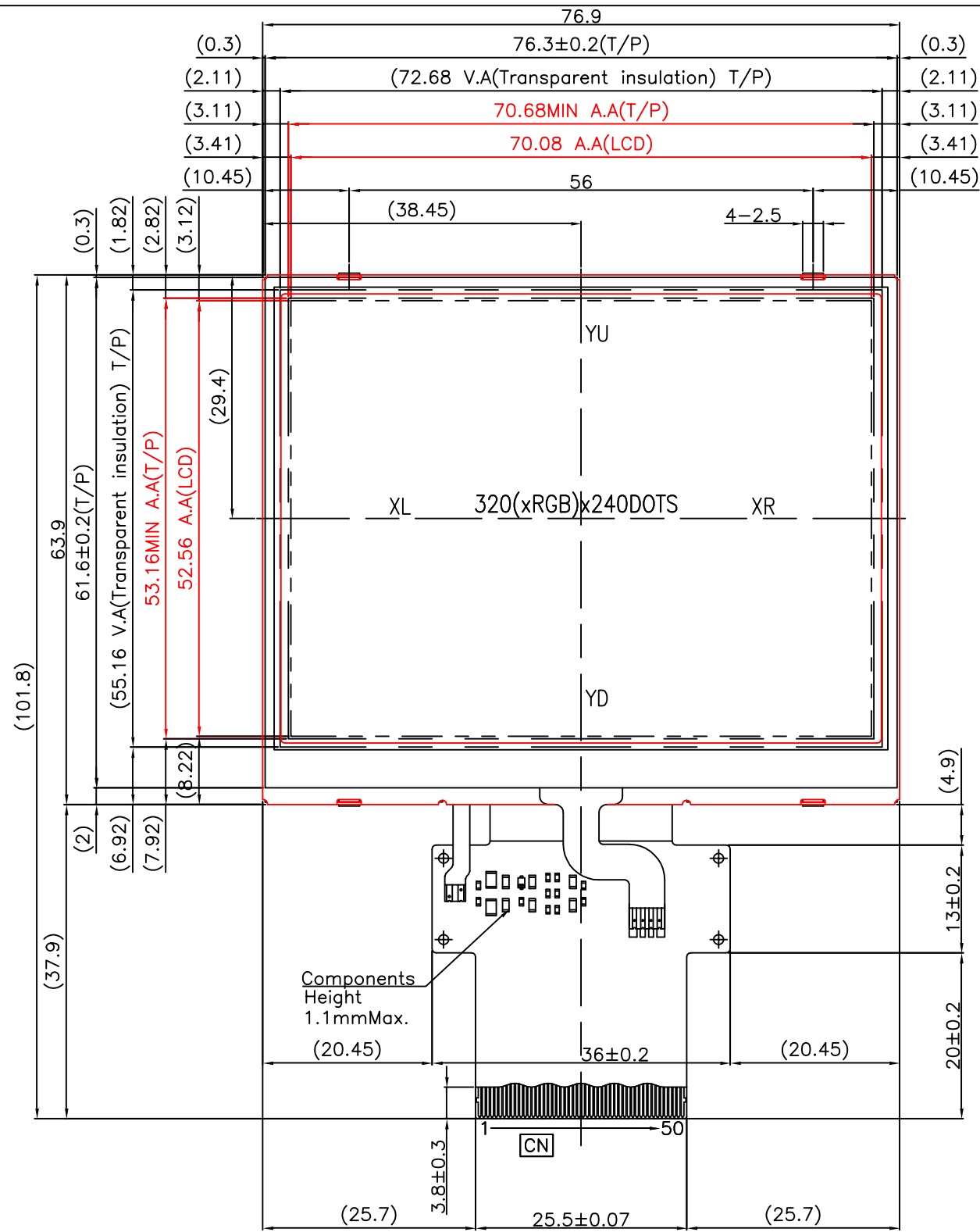
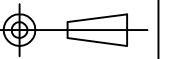
10-2 Mounting on display and housing bezel

- (1) In all cases, T/P should be supported from the backside of the Plastic.
- (2) Do not to use an adhesive tape to bond it on the front of T/P and hang it to the housing bezel.
- (3) Never expand the T/P top layer (PET Film) like a balloon by internal air pressure. The life of the T/P will extremely short.
- (4) Top layer, PET, dimension is changing with environment temperature and humidity. Avoid a stress from housing bezel to top layer, because it may cause "waving".
- (5) The input to the Touch Panel sometimes distorts touch panel itself.

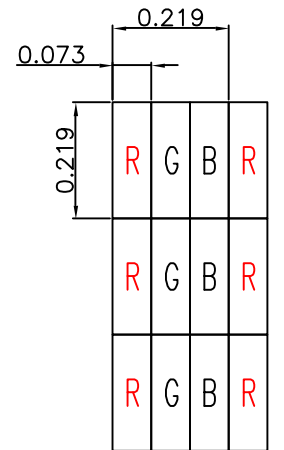
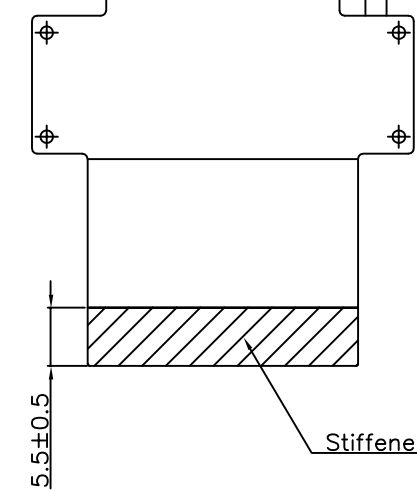
10-3 Prohibited Operation

To using the stylus pen or fingernail sliding at the edge of the housing is prohibited. It would cause the cracking of the ITO coating and damage the touch panel. It also request not to press this area while assembling.

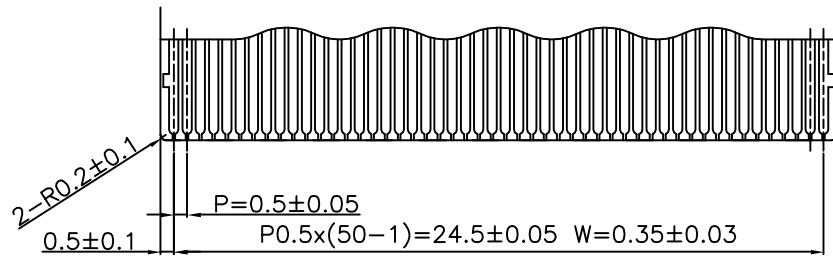




T/P Circuit Diagram



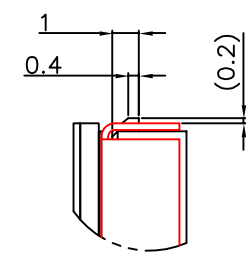
Dot Detail (S=100/1)



FPC/CN Detail(S=5/1)

Note:Connector recommendation
HIROSE FH12A-50S-0.5S

CN					
No.	Signal	No.	Signal	No.	Signal
1	YU	21	R3	41	VSS
2	XL	22	R2	42	SDI
3	YD	23	R1	43	SCK
4	XR	24	R0	44	CSB
5	AVDD	25	C7	45	RESB
6	AVDD	26	C6	46	SDO
7	VSS	27	C5	47	VSS
8	DVDD	28	C4	48	VLED+
9	DVDD	29	C3	49	VLED-
10	VSS	30	C2	50	VSS
11	DISP	31	C1		
12	PCLK	32	C0		
13	VSYNC	33	B7		
14	HSYNC	34	B6		
15	DF	35	B5		
16	VSS	36	B4		
17	R7	37	B3		
18	R6	38	B2		
19	R5	39	B1		
20	R4	40	B0		



Detail A (S=5/1)

MATERIAL					
TREATMENT					
PART NUMBER	SCALE(A2)	UNIT	DATE		
(1)	2/1	1=1mm	May.22,2009		
CAL.				35QVW1T-0	
TITLE				Assembly drawing	REV. 1
DRAWING				No. 35QVW1T-0 1A	PAGE 1
Seiko Instruments Inc.					
ST08-193	1	Set up for mass production			
CHIEF	LEADER	DESIGNED	DRAWN	CHECKED	
TAKAHASHI	ICHINO	ICHINO	ICHINO	SAITO	