HITACHI

Displays, Hitachi, Ltd.
3300 Hayano, Mobara City
Chiba Pref. 297 Japan
TEL : +81-475-25-9005 (Dial In)
FAX : +81-475-22-5217

For Messrs :

Date : Aug. 2, 2000

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

SX19V007-ZZA

CONTENTS

Accepted by : _____

Proposed by : N. Aoyama

RECORD OF REVISIONS

Date	Sheet No.	Summary
Mar.13,2000	3284PS 2707-SX19V007-ZZA-3 Page 7-1/1	7. BLOCK DIAGRAM (1) Added "TS1","TS2","Temperature Sensor", and "Note 1"
	3284PS 2708-SX19V007-ZZA-3 Page 8-6/6	8.6 INTERNAL PIN CONNECTION (1) Changed Signal of Pin 1 and 2 PIN No. SIGNAL FUNCTION 1 NC —— 2 NC —— ↓ 1 TS2 Temperature Sensor PIN2 2 TS1 Temperature Sensor PIN1
	3284PS 2711-SX19V007-ZZA-3 Page 11-1/3	11.1 MOUNTING PRECAUTIONS (1) Revised Location of spacers
Apr.17,2000	3284PS 2705-SX19V007-ZZA-4 Page 5-1/3	5.1 ELECTRICAL CHARACTERISTICS OF LCD Changed Contrast Adjustment Voltage TYP TYP Ta= 5°C : T.B.D → 1.65 Ta=25°C : (1.8) → 1.8 Ta=40°C : T.B.D → 1.95
Aug. 2,2000	3284PS 2705-SX19V007-ZZA-5 Page 5-1/3	5.1 ELECTRICAL CHARACTERISTICS OF LCD Added (Note 9)
	3284PS 2705-SX19V007-ZZA-5 Page 5-2/3	5.2.4 OPTICAL CHARACTERISTICS Changed Transparency Specification 80%min → 79%min
	3284PS 2709-SX19V007-ZZA-5 Page 9-1/2	9.1 DIMENSIONAL OUTLINE (1) Fixed touch panel size and position Size A → 173.2, Size B → 11.65 (2) Changed table of "Size A & B depend on type of T/P" (3) Changed size of effective area of touch panel 154.06×116.14 → Size A (154.2 or 153.2) ×116.14
	3284PS 2712-SX19V007-ZZA-5 Page 12-2/2	12.2 REVISION (1) Revised Item of A and B (2) Added Rev.C

3. GENERAL DATA

(1) Part Name	SX19V007-ZZA
(2) Module Dimensions	197.0(W) mm × 145.0(H) mm × 9.8max (D) mm
(3) Display Size	151.657(W) mm × 113.737(H) mm Diagonal size 19cm (7.5")
(4) Dot Pitch	0.079(W) mm × 0.237(H) mm
(5) Resolution	640 × 3 (R,G,B)(W) × 480 (H) dots
(6) Duty Ratio	1/497 (Recommendation)
(7) LCD Type	Negative type
(8) Display Type	Passive matrix color STN
(9) View ing Direction	6 O'clock
(10) Backlight	Cold Cathode Fluorescent Lamp (CFL) × 1
(11) Weight	350 g typ
(12) Pow er Supply Voltage	3.3V only
(13) Touch panel Type	Resistance type

4. ABSOLUTE MAXIMUM RATINGS

4. 1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS (LCM)

VSS=0V:Standard

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Pow er Supply for Logic	VDD-VSS	0	7.0	V	
Contrast Adjustment Voltage	VCON-VSS	0	VDD	V	
Input Voltage	Vi	-0.3	VDD+0.3	V	Note 1
Input Current	Ii	0	1	A	
Static Electricity	-	-	-	-	Note 2

Note 1 $\overline{\text{DISP•OFF}}$, FLM, CL1, CL2, D0~D7

Note 2 Please ensure you are grounded w hen handling LCM

4. 2 ELECTRICAL ABSOLUTE MAXIMUM RATINGS (TOUCH PANEL)

ITEM	SPECIFICATION	NOTE
Voltage	(7VDC) (max)	
Current	(25mA) (max)	

4. 3 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		COMMENT
	MIN	MAX	MIN	MAX	
Ambient Temperature	5°C	40°C	-20°C	60°C	Note 2, 3
Humidity	Note 1		Note 1		Without condensation
Vibration	-	2.45 m/s^2	-	11.76 m/s^2 Note 5	Note 4
Shock	-	29.4 m/s^2	-	490 m/s^2 Note 5	XYZ directions 11ms
Corrosive Gas	Not Acceptable		Not Acceptable		

Note 1 Ta≦40°C : 85%RH max.

Ta>40°C : Absolute humidity must be low er than the humidity of 85%RH at 40°C.

Note 2 Ta at -20°C for <48h, at 60°C for <168h

Note 3 Background color changes slightly depending on ambient temperature.
This phenomenon is reversible.

Note 4 5Hz~100Hz (Except resonance frequency)

Note 5 The LCM w ill resume normal operation after finishing the test.

Note 6 The CFL life time w ill be reduced by operated at 5°C. Also the response time w ill be slow er during operation at 5°C. Please make sure that the characteristics of the inverter meet the CFL specifications.

5. ELECTRICAL CHARACTERISTICS

5. 1 ELECTRICAL CHARACTERISTICS OF LCD

VSS=0V

ITEM	SYMBOL	CONDITION		MIN	TYP	MAX	UNIT
Power Supply Voltage	VDD	VDD-VSS=3.3V		3.15	3.30	3.45	V
Contrast Adjustment Voltage (Note 1)	VCON	-		0.8	-	2.8	V
Input Voltage for Logic Circuits (Note 2)	Vi	"H" level		0.8VDD	-	VDD	V
		"L" level		0	-	0.2VDD	
Power Supply Current (Note 3)(Note 4)	IDD	VDD-VSS=3.3V	Q	-	50	-	mA
			CF	-	80	120	
Input Leak Current	Icon(Note5)	Vcon=0.8~2.8V		-	-	(20)	μA
	Iin (Note2)	Vin=VDDorVSS		-	-	±1.0	
Contrast Adjustment Voltage (Note 6)	Vcon	Ta= 5°C, ϕ=0°		0.8	1.65	-	V
		Ta=25°C, ϕ=0°		-	1.8	-	
		Ta=40°C, ϕ=0°		-	1.95	2.8	
Frame Frequency (Note 7)	fFLM	-		80	100	120	Hz

(Note 1) The brightness will increase with decreasing contrast adjustment voltage.
(Note 2) DISP•OFF, FLM, CL1, CL2, D0~D7
(Note 3) fFLM=100Hz, Ta=25°C, "Q" test pattern(Q) and Checker pattern(CF) used as Display pattern.
(Note 4) Rush Current at Power ON : 2A(PK) × 100μs
(Note 5) VCON
(Note 6) The Contrast Adjustment Voltage is specified as 1.8±0.3V under the condition, that optimum contrast is obtained by naked eyes with a "Q" test pattern.
fFLM=100Hz, 1/497Duty
(Note 7) Please set the frame frequency so as to avoid flicker and rippling on the display.
(Note 8) The CFL cable has the following absolute maximum ratings.
VCFL side : 2kV
VSS side : 300V
This CFL inverter shall not exceed the specified voltage.
(Note 9) Some points for attention while setting the driving condition of an appliance.
(1) Frame Frequency
Please set the frame frequency as the typical value (central value) which is shown in CAS. According to the characteristic of response time of LC material, that setting the frame frequency near the minimum value or under the minimum value shown in CAS will cause a frame with moving phenomenon.
(2) Setting value of Vcon
Vcon, adjusted to get the best contrast ratio of LCD module, is adjusted to be distributed within the tolerance ±0.3V of central value in CAS before LCD modules ship the factory. The below items are recommended at customer side.
(i) When designing the appliance, please set the Vcon value as an adjustable value.
(ii) And the Vcon value must be able to be adjusted to match the most suitable Vcon to get the best contrast ratio. A fixed Vcon value is usually a little different from the most suitable Vcon value of LCD module and causes a misjudgment.
(iii) The Vcon adjustment (when D/A [Digital/Analogue] converter is used) is recommended to be set as 50mV at most per step. That one step is more than 50mV may cause the input value to be not able to match the most suitable value.
The characteristic of contrast ratio can not present absolutely.

5. 2 ELECTRICAL CHARACTERISTICS OF TOUCH PANEL

5.2.1 OPERATING CONDITION

ITEM	SPECIFICATION
Operating Voltage	5VDC
Operating Current	10~25mA

5.2.2 ELECTRICAL CHARACTERISTICS

ITEM		SPECIFICATION	NOTE
Resistance between terminal	X1-X2	350~1050Ω	
	Y1-Y2	200~600Ω	
Insulance Resistance	X-Y	10MΩ min	Operating Voltage : 25VDC
Linearity	X	1.5% max	See Note 1
	Y	1.5% max	
Chattering		10msec max	

5.2.3 MECHANICAL CHARACTERISTICS

ITEM	SPECIFICATION	NOTE
Pen input pressure	0.5N max	
Surface hardness	2H min	JIS K 5400

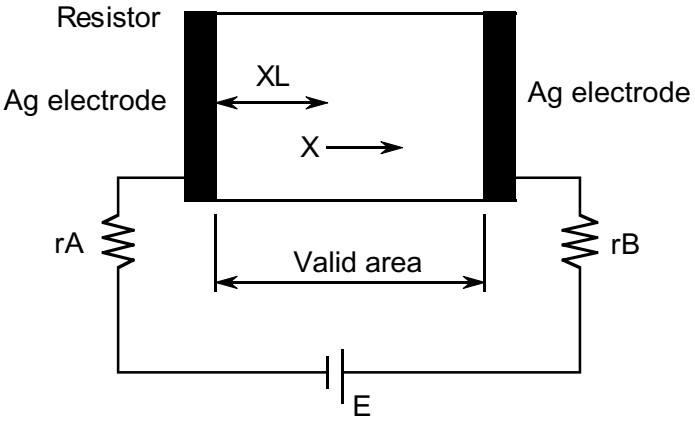
5.2.4 OPTICAL CHARACTERISTICS

ITEM	SPECIFICATION	NOTE
Transparency	79% min	

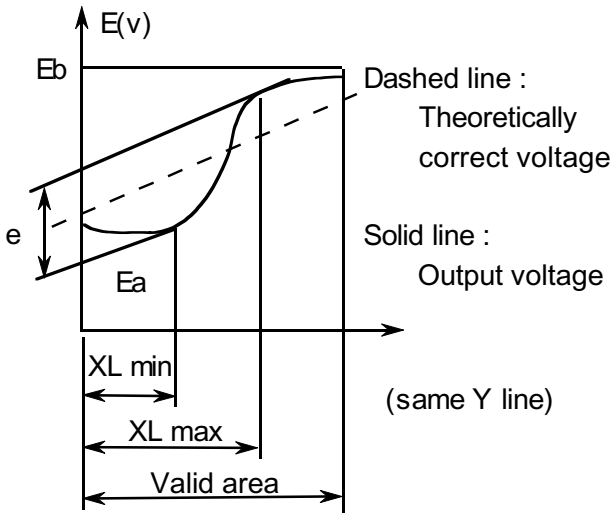
Note 1 : Test Method and Conditions

The difference ("e") between the theoretical output voltage and the actual output voltage when pressure is applied to any point within the valid area must be as indicated below.

$e \leq$ applied voltage $\times$ 0.03 ($=\pm 0.015$)



rA, rB = Resistance of Pattern



5. 3 ELECTRICAL CHARACTERISTICS OF BACKLIGHT

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Lamp Voltage	VL	-	(460)	-	Vrms	Ta=25°C
Frequency	fL	(50)	(60)	(70)	kHz	
Lamp Current (1Lamp) (Note6)	IL	(3.0) (Note 2)	(4.0)	(5.0) (Note 2)	mA	Ta=25°C
Starting discharge Voltage	VS (Note 2)	(1400)	-	-	Vrms	Ta=5°C

(Note 1) Please design your CFL driving circuit (inverter) according to the above specifications. Please contact Hitachi if you need to operate under that the above specified conditions.

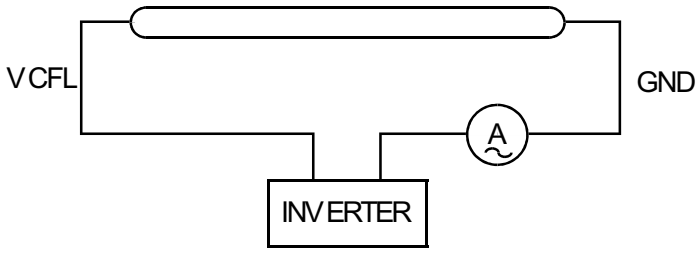
(Note 2) The starting discharge voltage increased with lower ambient temperature. Please check the characteristics of your inverter as to ensure discharge at low temperature.

(Note 3) The average CFL life time decreases when being operated at lower temperature.

(Note 4) Lower driving frequency of CFL inverter may cause mechanical noise of the backlight system.

(Note 5) Please check the CFL inverter characteristics at low temperature.

(Note 6)



(Note 7) We recommend to equip protection circuit (To stop output) which works under abnormal operation to the inverter for CFL.

6. OPTICAL CHARACTERISTICS

6.1 OPTICAL CHARACTERISTICS OF LCD Ta=25°C (Backlight On)

ITEM		SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	NOTE
View ing area		$\phi 2$-$\phi 1$	θ=0°, K≧2.0	-	(40)	-	deg	1),2)
Contrast ratio		K	ϕ=0°, θ=0°	-	(40)	-	-	3),5),6)
Response time (rise)		tr	ϕ=0°, θ=0°	-	(300)	-	ms	4)
Response time (fall)		tf	ϕ=0°, θ=0°	-	(250)	-	ms	4)
Color tone (Primary Color)	Red	x	ϕ=0°, θ=0°	-	(0.49)	-	-	7)
		y		-	(0.30)	-	-	
	Green	x		-	(0.31)	-	-	
		y		-	(0.51)	-	-	
	Blue	x		-	(0.16)	-	-	
		y		-	(0.14)	-	-	
	White	x		-	(0.28)	-	-	
		y		-	(0.30)	-	-	

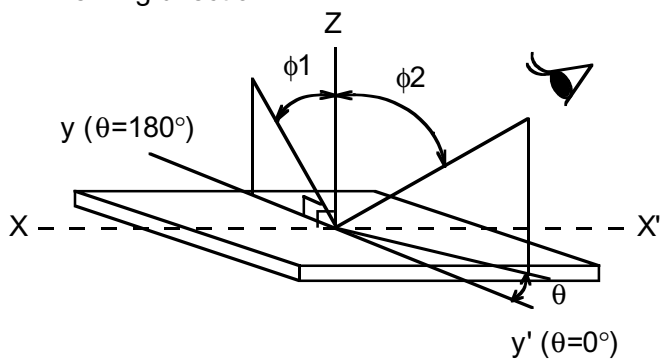
(Measurement condition : Hitachi standard)

Note 1)~7) : See next page.

Note 1. Definition of θ and ϕ

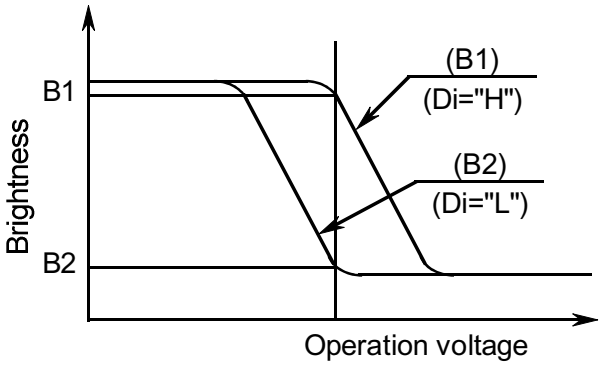
(Normal)

View ing direction

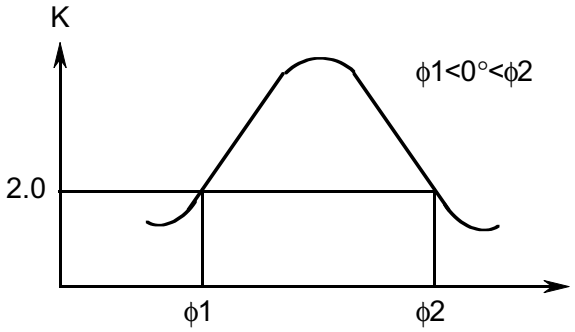


Note 3. Definition of contrast "K"

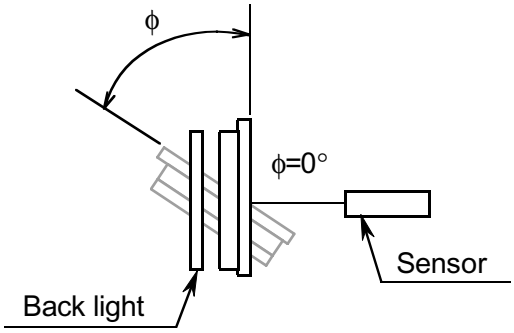
$$K = \frac{\text{Brightness of selected area (B1)}}{\text{Brightness of non-selected area (B2)}}$$



Note 2. Definition of view ing angle ϕ1 and ϕ2

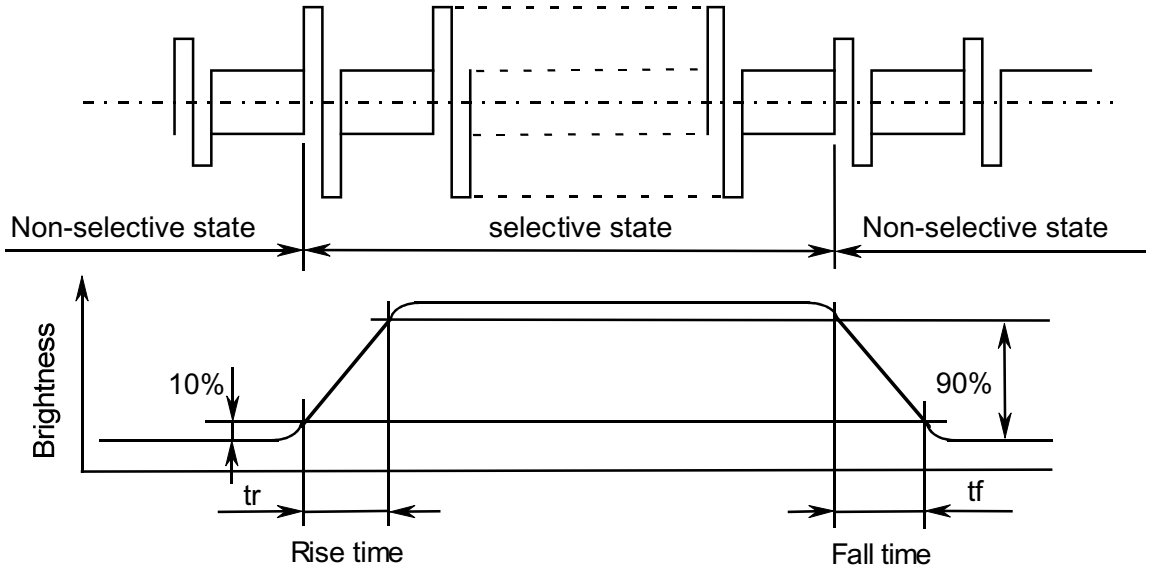


Contrast ratio K vs view ing angle ϕ



Sensor : BM-7 or similar equipment

Note 4. Definition of optical response time



Note 5. Minimum value is for reference only.

Note 6. Hitachi w ill do sampling inspection for minimum value.

Note. 7 The LCD driving voltage should be adjusted as to obtain maximum contrast.

6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT

ITEM	MIN	TYP	MAX	UNIT	NOTE
Brightness	-	70	-	cd/m^2	IL=(4.0)mA Note 1),2)
Rise Time	-	5	-	Minute	IL=(4.0)mA Brightness 80%
Brightness Uniformity	-	-	±30	%	Undermentioned Note 1),4)

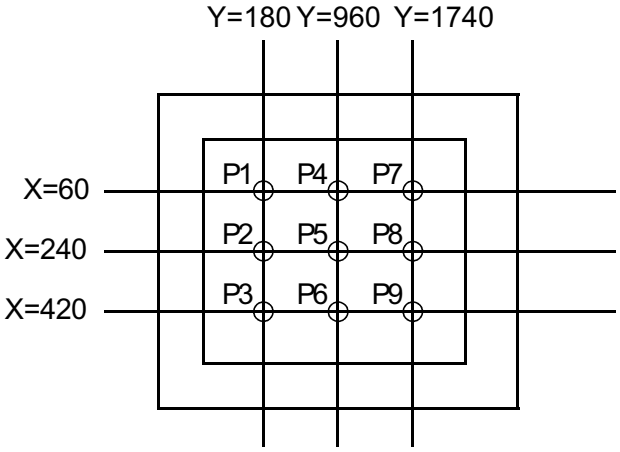
Measurement condition : Hitachi standard)

CFL : 0h operation, Ta=25°C
Display data should all be "ON"
The LCD driving voltage should be adjusted so as to obtain maximum contrast when display is all "Q".

(Note 1) Measurement after 10 minutes of CFL operating.
Average value of 9 measurement location (Note 3).

(Note 2) Brightness control set to 100%

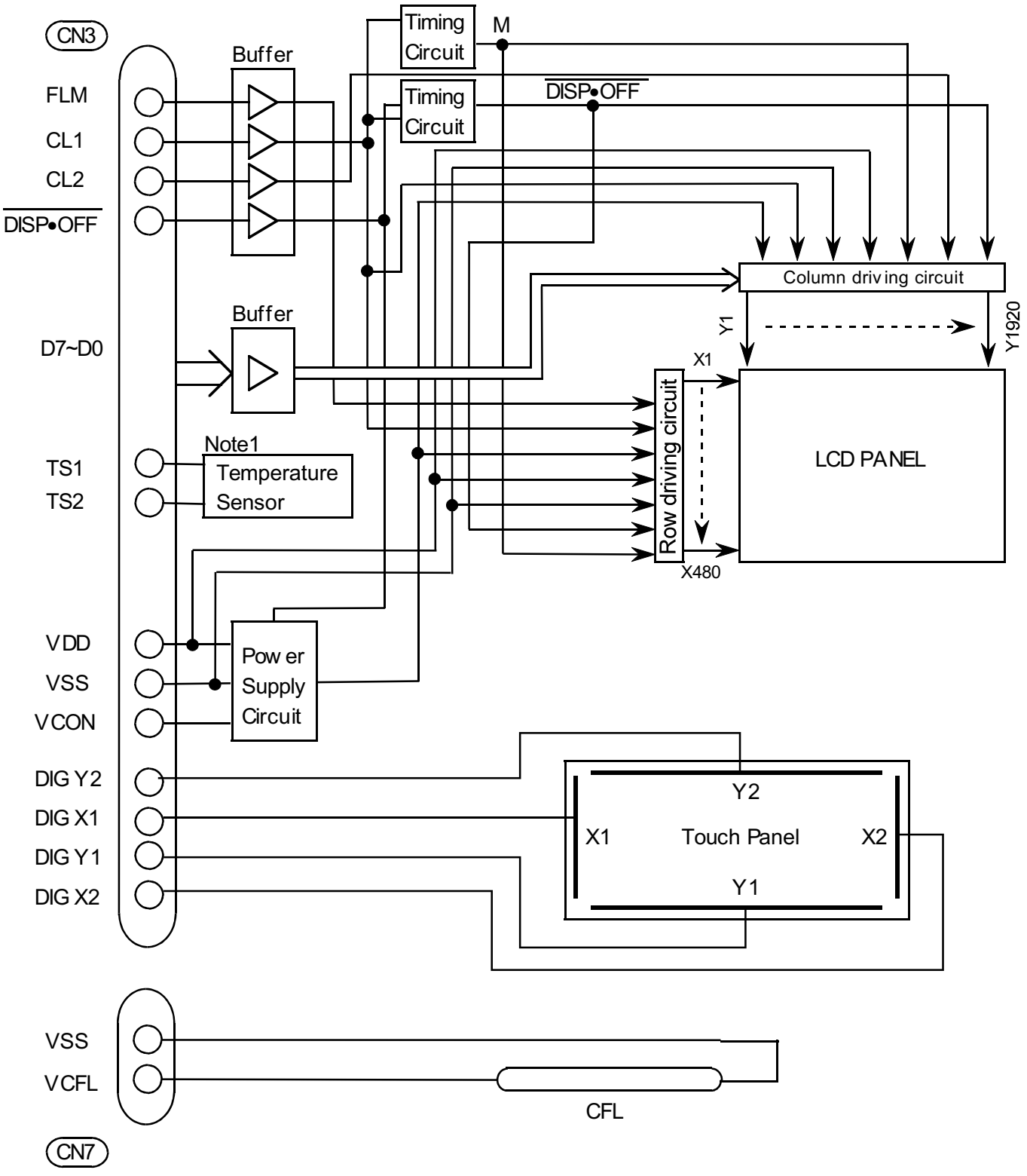
(Note 3) Measurement on the following 9 locations on the display.



(Note 4) Definition of brightness tolerance.

$$\left(\frac{\text{Max brightness or Min brightness - Average brightness}}{\text{Average brightness}} \right) \times 100$$

7. BLOCK DIAGRAM

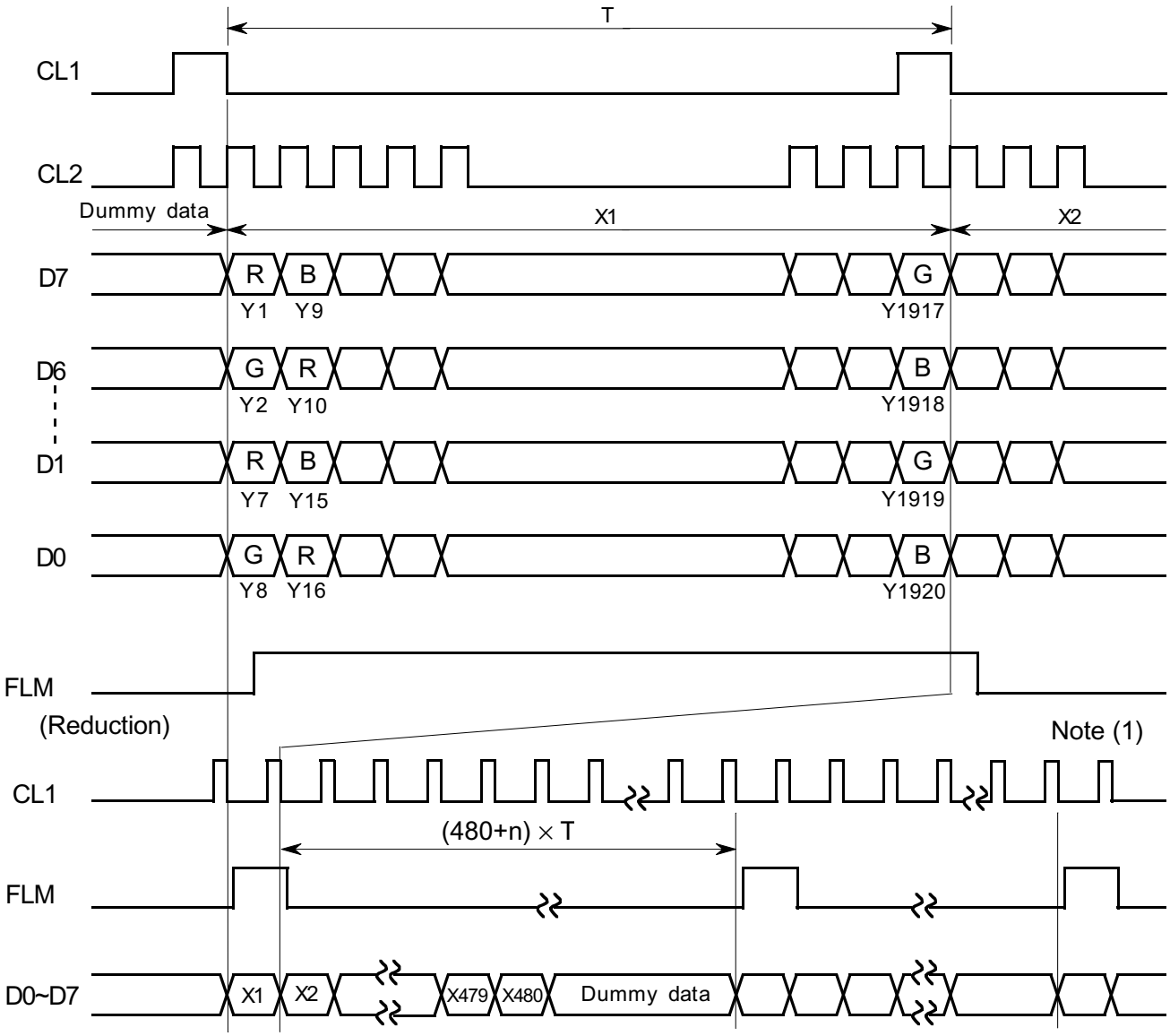


Note1; TDK NTCC20124CH104KCT

Displays, Hitachi, Ltd.	Date	Aug. 2, 2000	Sh. No.	3284PS 2707 -SX19V007-ZZA - 5	Page	7-1/1

8. INTERFACE TIMING DIAGRAM

8.1 TIMING CHART

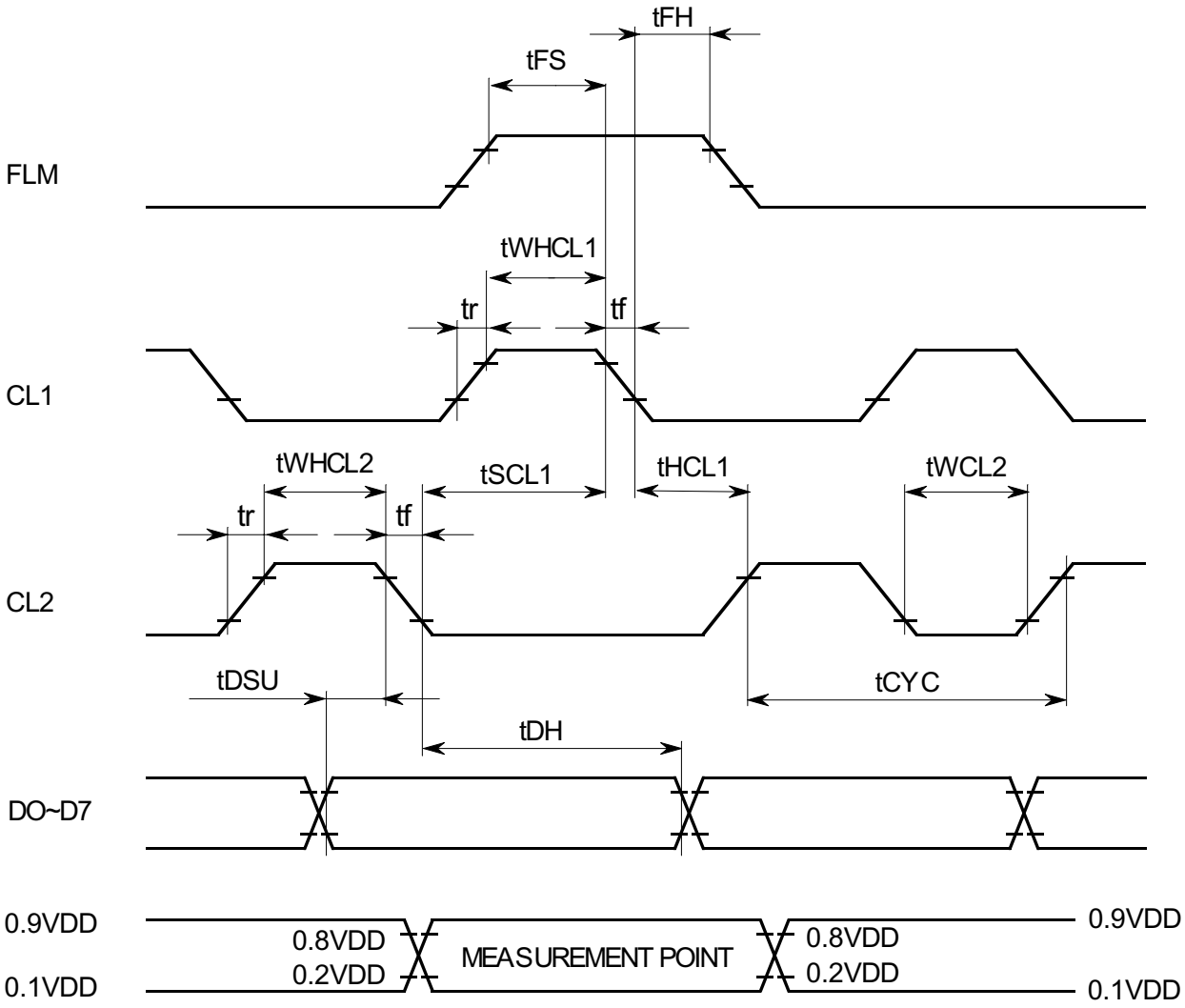


Note (1) : The blanking interval when switching lines should be equal to the interval between two CL1 pulses.

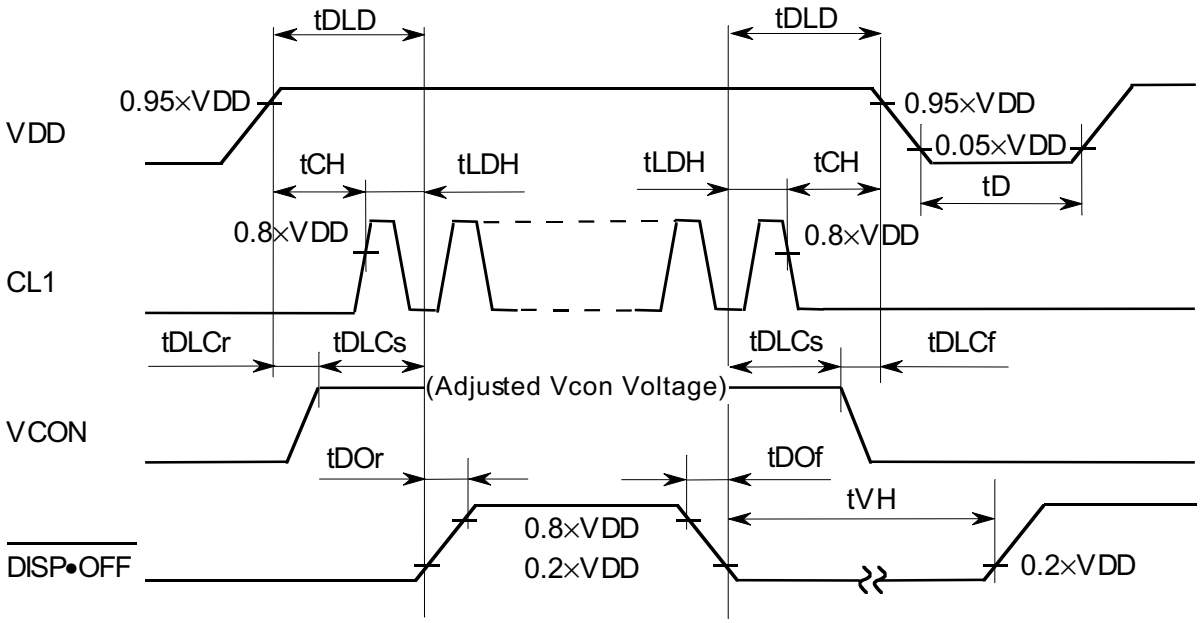
8.2 INTERFACE TIMING SPECIFICATION

VDD=3.3±0.15V, VSS=0V, Vcon=0.8~2.8V, Ta=+5°C~+40°C

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
CL1 pulse w idth "H"	tWHCL1	200	—	—	ns
Clock cycle time	tCYC	40	—	—	ns
CL2 pulse w idth	tWCL2	15	—	—	ns
Clock set up time	tSCL1	20	—	—	ns
Clock hold time	tHCL1	50	—	—	ns
Clock rise fall time	tr, tf	—	—	30	ns
Data set up time	tDSU	10	—	—	ns
Data hold time	tDH	10	—	—	ns
"FLM" set up time	tFS	100	—	—	ns
"FLM" hold time	tFH	30	—	—	ns



8.3 POWER ON / OFF SEQUENCE



SYMBOL	MIN	MAX	UNIT	COMMENT
tDLD	100	-	ms	(Note 1)
tCH	0	200	ms	
tLDH	20	-	ms	
tDOr	-	100	ns	(Note 2)
tDOf	-	100	ns	
tDLCr	0	-	ms	
tDLCf	0	-	ms	
tDLCs	0	-	ms	(Note 2,3)
tVH	200	-	ms	(Note 4)
tD	400	-	ms	(Note 1)

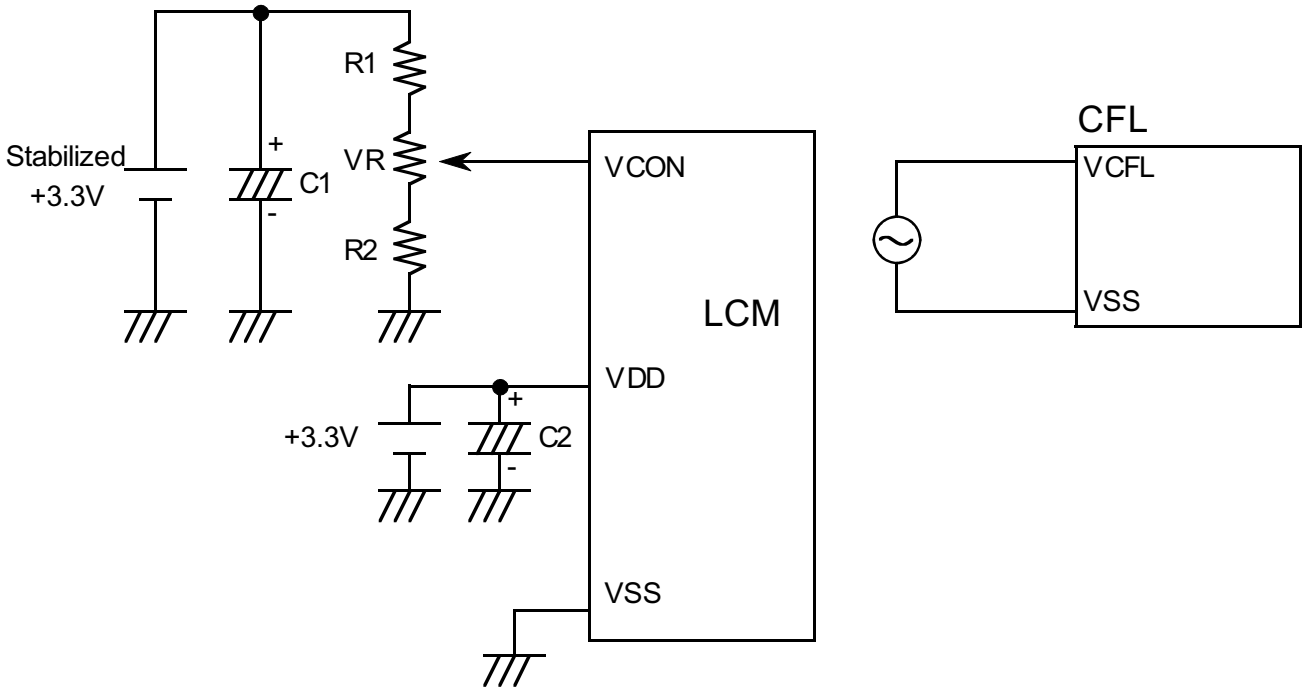
(Note 1) Please keep the specified sequence. Using other than recommended sequence may cause permanent damage to the LCD panel.

(Note 2) Please use $\overline{\text{DISP•OFF}}$ function. Switching by other than the $\overline{\text{DISP•OFF}}$ function may cause display deterioration.

(Note 3) $0.8 \leq$ Vcon ≤ 2.8V
Vcon voltage should be set up to adjusted voltage before $\overline{\text{DISP•OFF}}$ signal arises. Otherwise, when $\overline{\text{DISP•OFF}}$ signal arises, adjusted contrast image may not be generated.

(Note 4) Please keep the specified sequence of $\overline{\text{DISP•OFF}}$ signal because if the tVH is short enough, LCD panel may not be restarted.

8.4 POWER SUPPLY FOR LCM



8.5 INPUT DATA ALLOCATION TABLE

Data Signal		D7	D6	D5	D4	D3	D2	D1	D0	D7	D6	D5	D4	-----	D4	D3	D2	D1	D0
Y / X		1	2	3	4	5	6	7	8	9	10	11	12	-----	1916	1917	1918	1919	1920
	1	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
	2	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
	3	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
	4	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
	5	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮		⋮	⋮	⋮	⋮	⋮
	478	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
	479	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
	480	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B

R : RED
G : GREEN
B : BLUE

8.6 INTERNAL PIN CONNECTION

CN3 MOLEX 52435-2891

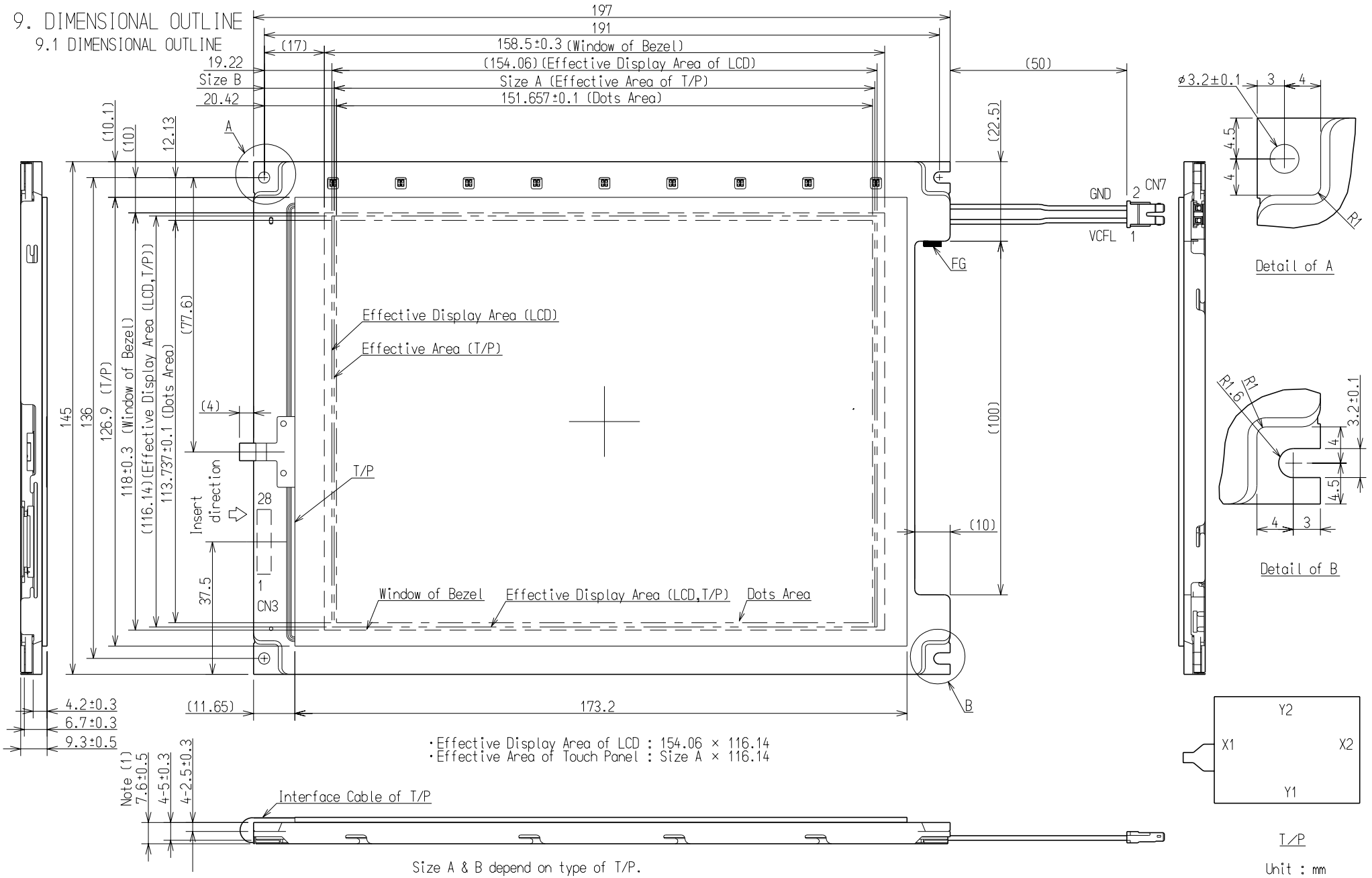
PIN No.	SIGNAL	LEVEL	FUNCTION
1	TS2	-	Temperature Sensor PIN2
2	TS1	-	Temperature Sensor PIN1
3	VSS	-	GND
4	Vcon	-	Contrast Adjustment Voltage
5	VSS	-	GND
6	VDD	-	Pow er Supply for Logic
7	VDD	-	Pow er Supply for Logic
8	$\overline{\text{DISP•OFF}}$	H / L	H : ON / L : OFF
9	D7	H / L	Display Data
10	D6		
11	D5		
12	D4		
13	D3		
14	D2		
15	D1		
16	D0		
17	VSS	-	GND
18	CL2	H / L	Data Shift
19	VSS	-	GND
20	CL1	H / L	Data Latch
21	VSS	-	GND
22	FLM	H	First Line Marker
23	VSS	-	GND
24	VSS	-	GND
25	DIGY2	-	Touch panel Y2
26	DIGX1	-	Touch panel X1
27	DIGY1	-	Touch panel Y1
28	DIGX2	-	Touch panel X2

CN7 JST : BHSR-02VS-1 (Suitable Connector : (1) SM02B-BHSS-1-TB
or
(2) housing : BHSMR-02VS-1
contact pin : SBHSM-002T-P0.5)

PIN No.	SIGNAL	LEVEL	FUNCTION
1	VCFL	A C	Pow er Supply for CFL
2	VSS	-	GND for CFL

9. DIMENSIONAL OUTLINE

9.1 DIMENSIONAL OUTLINE



・Effective Display Area of LCD : 154.06 × 116.14
・Effective Area of Touch Panel : Size A × 116.14

Size A & B depend on type of T/P.

T/P	Size A	Size B
Type A	154.2	19.15
Type B	153.2	19.65

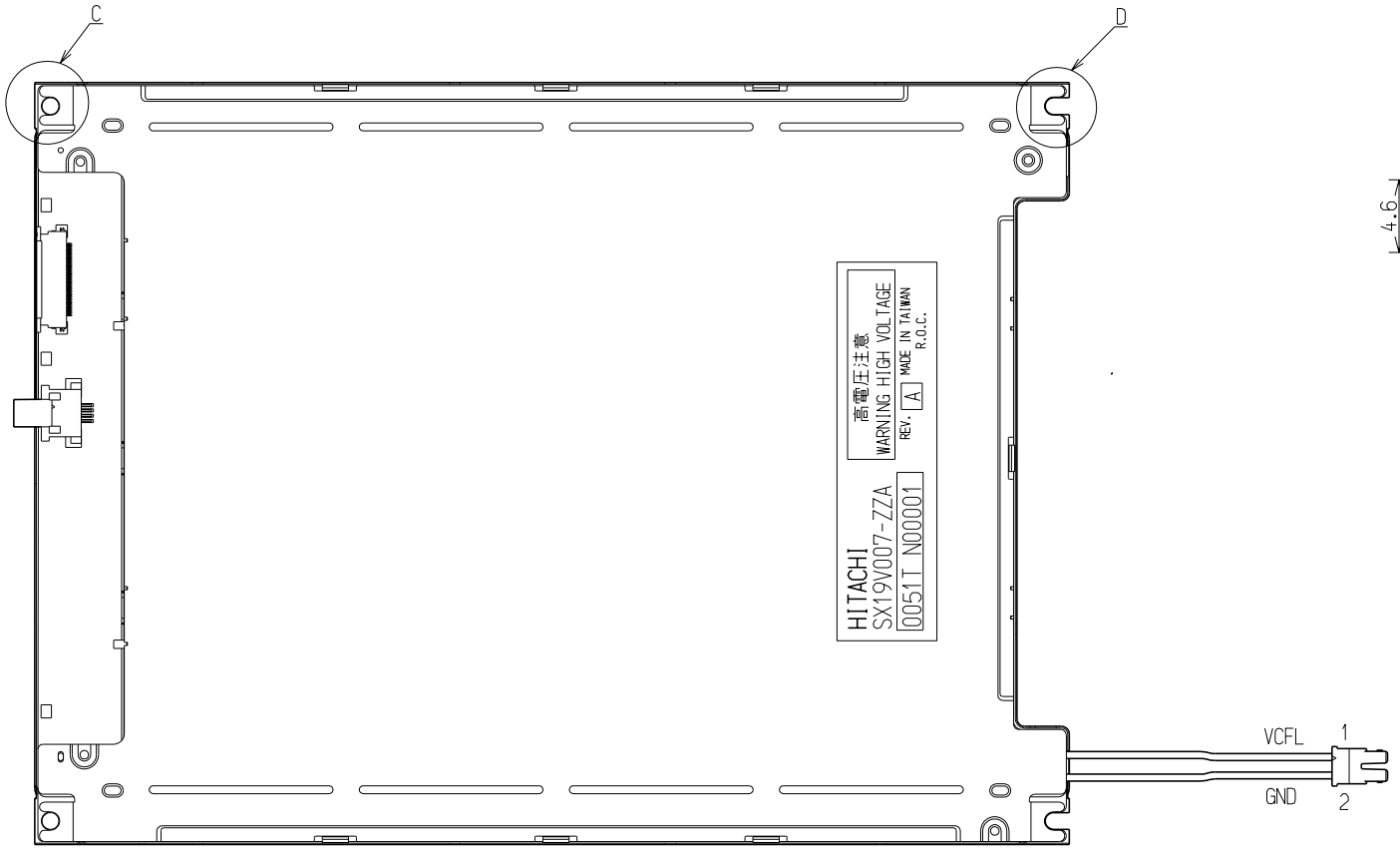
Note(1) Measurment should be done under a pressure of 9.8×10^{4}Pa at the measurment point.

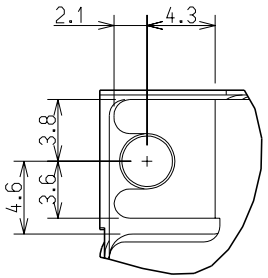
CN3 Molex : 52435-2891
CN7 JST : BHSR-02VS-1

T/P

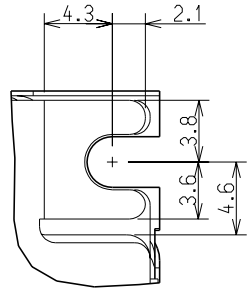
Unit : mm
Scale : NTS
Measurment tolerance : ±0.5

9.2 BACK SIDE





Detail of C



Detail of D

Unit : mm
Scale : NTS

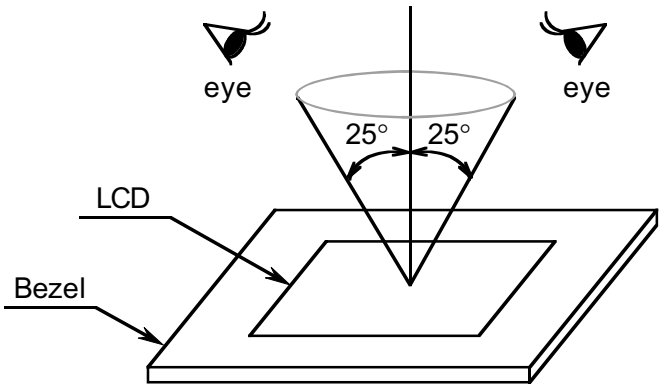
Displays, Hitachi,Ltd.	Date	Aug. 2,2000	Sh. No.	3284PS 2709 - SX19V007-ZZA - 5	Page	9-2/2

10. APPEARANCE STANDARD

10.1 APPEARANCE INSPECTION CONDITION

Visual inspection should be done under the following condition.

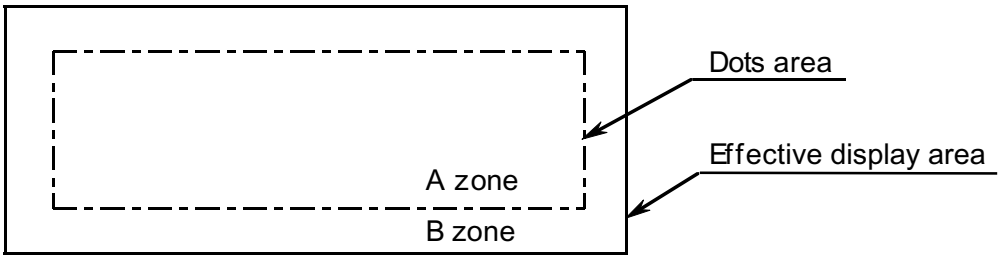
(1) The inspection should be done in a dark room.
(2) The CFL should be lighted with the recommended inverter.
(3) The distance between the eyes of the inspector and the LCD Module should be 25cm.
(4) The viewing zone is shown the figure.
Viewing angle $\leqq$ 25°



10.2 DEFINITION OF ZONE

A zone : The dots area specified on page 9-1/2 of this document.

B zone : Area between the effective display area line and the dots area (A zone) line specified on page 9-1/2 of this document.



10.3 APPEARANCE SPECIFICATION

(1) LCD APPEARANCE

*) If any problem related to this section occurs, both parties (Customer and HITACHI) shall discuss the matter in detail.

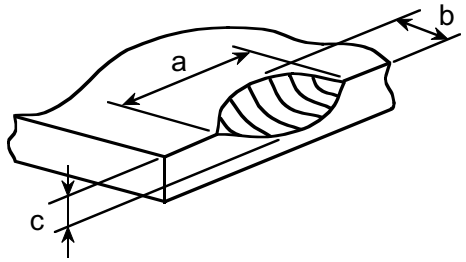
No.	ITEM	CRITERIA			APPLIED ZONE
L	Scratches	Distinguished one is not acceptable (To be judged by HITACHI STANDARD)			A
	Dent	Same as above			A
	Wrinkles in Polarizer	Same as above			A
	Bubbles	Average diameter D (mm)	Maximum acceptable number		A
		$D \leq 0.2$	ignored		
		$0.2 < D \leq 0.3$	12		
		$0.3 < D \leq 0.5$	3		
		$0.5 < D$	none		
C	Stains, Foreign material, Dark spots	Filamentous (Line shape)			A,B
		Length L (mm)	Width W (mm)	Maximum acceptable number	
		$L \leq 2.0$	$W \leq 0.03$	ignored	
		$L \leq 3.0$	$0.03 < W \leq 0.05$	6	
		$L \leq 2.5$	$0.05 < W \leq 0.1$	1	
D		Round (Dot shape)			A,B
		Average diameter D (mm)	Maximum acceptable number	Minimum space	
		$D < 0.2$	ignored	—	
		$0.2 \leq D < 0.3$	10	10 mm	
		$0.3 \leq D < 0.4$	5	30 mm	
		$0.4 \leq D$	none	—	
		The total number	Filamentous + Round = 10		
		Those which can be wiped off easily are acceptable			
	Color tone	To be judged by HITACHI STANDARD			A
	Color uniformity	Same as above			A

No.	ITEM	CRITERIA				APPLIED ZONE
LCD	Contrast irregularity (Spot)	Average diameter D (mm)	Contrast	Maximum acceptable number	Minimum space	
		D≦0.25	To be judged by HITACHI STANDARD	ignored	——	A
		0.25<D≦0.35		10	20mm	
		0.35<D≦0.5		4	20mm	
		0.5<D≦0.7		3	50mm	
		0.7<D		none	——	
	Contrast irregularity (Line) (A pair of scratches)	Width W (mm)	Length L (mm)	Maximum acceptable number	Minimum space	
		W ≦ 0.25	L ≦ 1.2	2	20mm	A
		W ≦ 0.2	L ≦ 1.5	3	20mm	
		W ≦ 0.15	L ≦ 2.0	3	20mm	
		W ≦ 0.1	L ≦ 3.0	4	20mm	
		The whole number		6		
	Rubbing Scratch	To be judged by HITACHI STANDARD				——

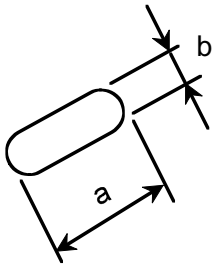
(2) CFL BACKLIGHT APPEARANCE

No.	ITEM	CRITERIA			APPLIED ZONE
CFL BACKLIGHT	Dark spots White spots Foreign material (Spot)	Average diameter D (mm)		Maximum Acceptable number	
		D ≦ 0.4		ignored	A
		0.4 < D		none	
	Foreign material (Line)	Width W (mm)	Length L (mm)	Maximum acceptable number	
		W ≦ 0.2	L ≦ 2.5	1	A
			2.5 < L	none	
		0.2 < W	——	none	
	Scratches	Width W (mm)	Length L (mm)	Maximum acceptable number	
		W ≦ 0.1	——	ignored	
		0.1 < W ≦ 0.2	L ≦ 11.0	1	A
			11.0 < L	none	
		0.2 < W	——	none	

(3) TOUCH PANEL APPEARANCE

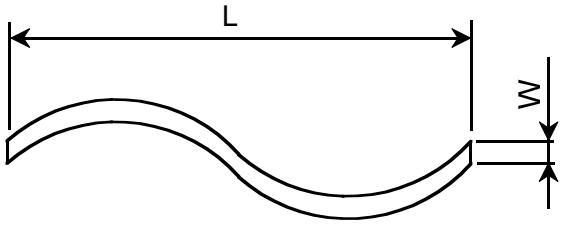
No.	ITEM	CRITERIA		APPLIED ZONE
TOUCH PANEL	Foreign material (Black or White spots)	Average diameter D (mm)	Criteria	A
		D ≦ 0.25	ignored	
		0.25 < D ≦ 0.35	6	
		0.35 < D	none	
	Foreign material (Line) or Scratches	Width W (mm)	Criteria	A
		W ≦ 0.05	ignored	
		0.05 < W ≦ 0.1	10 ≦ L : none L < 10 : 4	
		0.1 < W	Spot spec	
	Fisheyes on film surface	Average diameter D (mm)	Criteria	A
		D ≦ 0.2	ignored	
		0.2 < D ≦ 0.4	6	
		0.4 < D ≦ 0.6	2	
		0.6 < D	none	
	Uncleanliness	No conspicuous dirt		A
	Glass chipping	a ≦ 5 , b ≦ 3 , c ≦ 1.1 None of the above figures may be exceeded. The number of chipped are as does not need to be considered. 		
	Crack in glass plate	No cracks are allow ed		

Note (1) Definition of Average diameter (D)



$$D = \frac{a+b}{2}$$

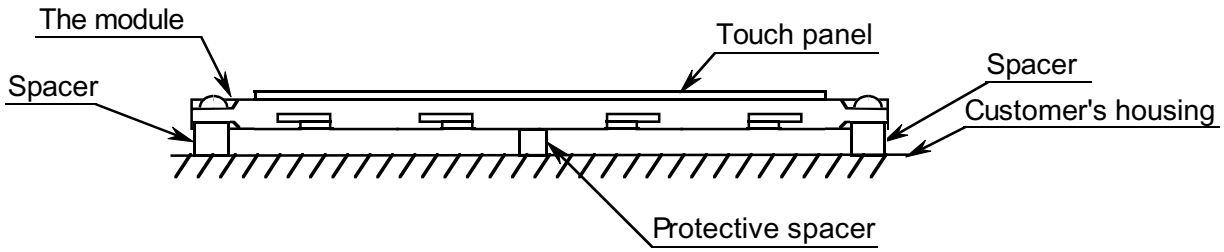
Note (2) Definition of Length (L) and Width (W)



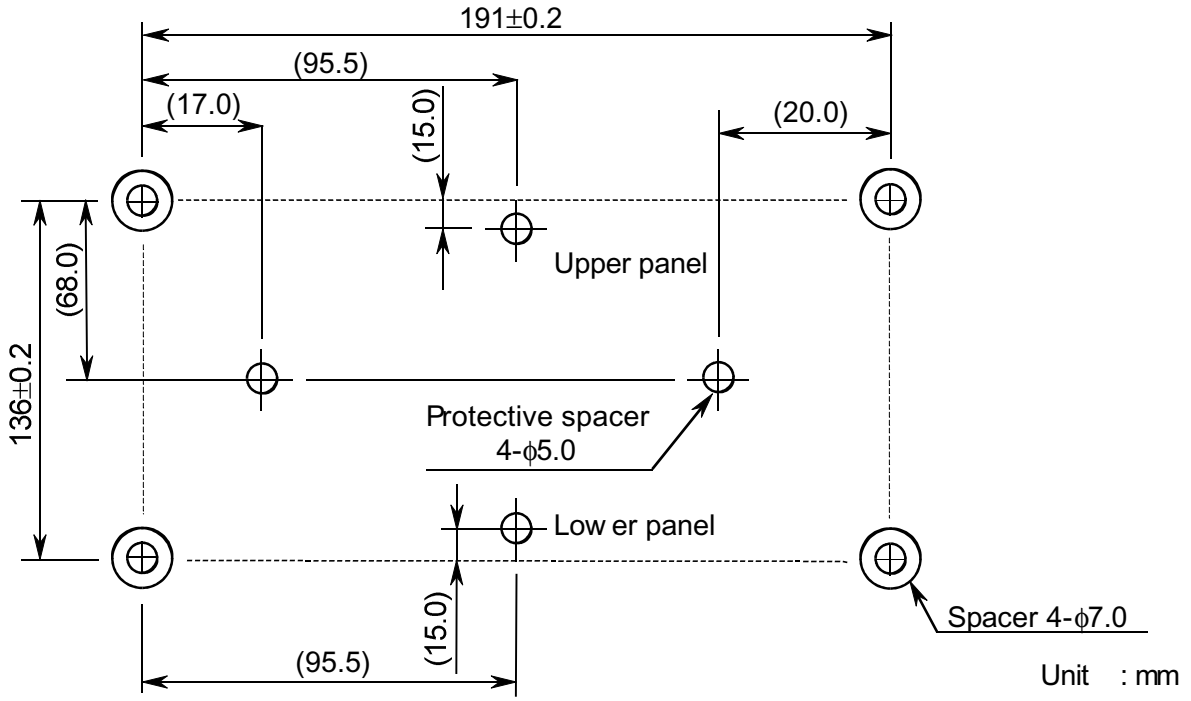
11. PRECAUTION IN DESIGN

11. 1 MOUNTING PRECAUTIONS

Please mount the LCD Module by using mounting holes provided. While mounting please pay attention to the follow ings.



Example of mounting



Unit : mm
Scale : NTS

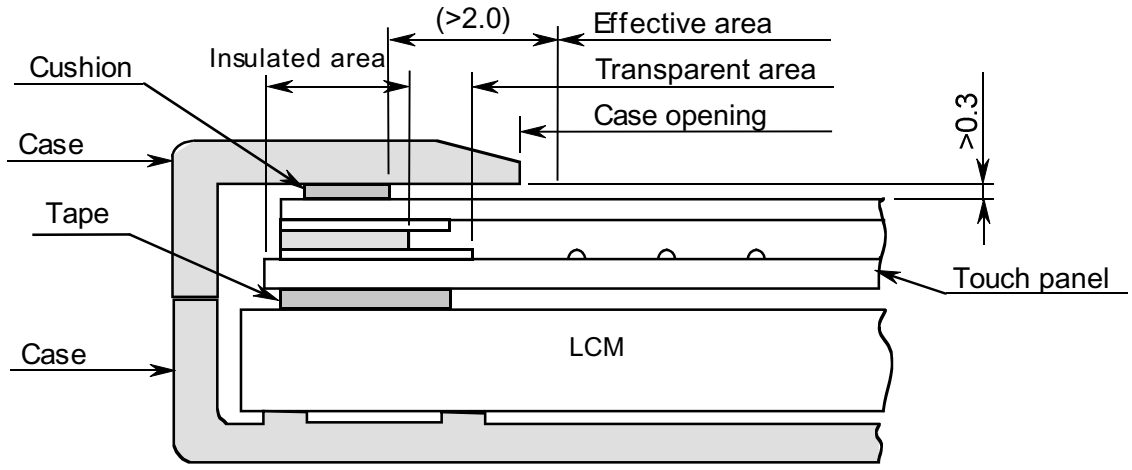
Location of spacers

(1) To prevent the module cover from being pressed, the distance betw een the module and the fitting plate, w hich means the length of the spacers, should be shorter than 1.0mm.

(2) The use of protective spacers are recommend in order to protect the module from shock.

(3) For the module to be used at upright position, the case shall have a structure w here the touch panel screen does not shift w ith its ow n w eight.

(4) When assembling the touch panel and your case, please refer to the figure below.



(5) The clearance between the touch panel and the case shall be designed so that the case edge never presses the input screen when it is deformed by heat or other causes.

(6) The case shall be designed not to touch the tail portion (FPC for touch panel).

(7) The boundary space between the effective area and the insulated area is unstable. Touching this area may effect the operation of the touch panel. The case must be designed so that it does not touch the boundary space.

11.2 PRECAUTIONS AGAINST ELECTROSTATIC DISCHARGE

As this module contains C-MOS LSIs, caution should be taken in regard to electrostatic discharge. Please make sure that the operator is connected to ground through a list band etc. Also please do not touch I/F pins directly.

11.3 POWER ON SEQUENCE

Input signals should not be applied to LCD module before power supply voltage is applied and reaches the specified voltage (3.0±0.15V).

If the specified power on sequence is not kept, C-MOS LSIs of LCD module may get damaged due to latch up.

11.4 HANDLING PRECAUTIONS

(1) As the polarizer on the top, and the aluminum plate on the bottom of the LCD module tend to be easily damaged, they should be handled with care. Please do not touch, push or rub with any material harder than 3H.

(2) As the adhesives used for attaching the upper/lower polarizers and aluminum plate are made from organic substances which will be deteriorated by a chemical reaction with such chemicals as acetone, toluene, ethanol and isopropylalcohol. For cleaning normal hexane is recommended. Please contact Hitachi in case you need to use chemicals other than the above.

(3) For cleaning lightly wipe the dirty surface with absorbent cotton or other soft material like chamois, soaked in the recommended chemicals without scrubbing it hardly.
Always wipe the surface horizontally or vertically. Never wipe in circles. To prevent the display surface from being damage, it is normally sufficient, to wipe it with absorbent cotton.

(4) Immediately wipe off saliva or water drop from the display area because it may cause deformation or fading of the colors.

(5) Fogy dew deposited on the display surface may cause damage, to the polarizer.
In case the display has stored at low temperatures, please allow the display to warm up to room temperature before taking it out of its compartment.

(6) Please do not touch the display area or I/F pins barehanded because it may cause stains on the display area or shorts between terminals. Please be aware that some cosmetics are detrimental to polarizers.

(7) Please take caution when handling the LCM so as not cause cracks or chips chipped to the LCD glass. Please do not apply any shock to the LCM since the glass may break.

(8) Please keep maximum pressure to the display surface to less than 1.96×10^4 Pa.
In case the pressure area is less than $1cm^2$, maximum pressure must be less than 1.96N.

(9) Please handle the LCD module by holding it on the side or back metal frame.

(10) Top sheets shall be cleaned gently using a soft cloth such as those used for glasses.
Hard wiping accumulated dust will leave scars on the surface even using a cloth.

11.5 OPERATION PRECAUTION

(1) Using the LCM module beyond the specified maximum ratings may result in its permanent destruction. LCM module's should usually be used under recommended operating conditions shown in chapter 5. Exceeding any of these conditions may adversely affect its reliability.

(2) The response time will be strongly increased at temperatures below the specified operating temperature range. The background color will change to a dark blue at temperatures about the specified operating temperature range. However those phenomena are reversible and will disappear when returning to the specified operating temperature range.

(3) If the display surface is pushed hard during operation, some display patterns will be abnormally displayed.

(4) Even a slight dew depositing on the terminals may cause electrochemical reaction which leads to terminal open circuit. Please operate the LCD module under the relative condition of 40°C 85%RH.

(5) Resistance range : Your controller shall be set up to allow the resistance range of touch panel specified in our CAS.

(6) Pointed position of touch panel may shift owing to a change in resistance of touch panel depending on the operation condition. To compensate this shift, the set shall be given a calibration function.

(7) Input shall be made with a stylus pen (polyacetal, R0.8). Chances are very high that use of a metal piece including a ball point pen or sharp edge will impair accuracy.

(8) The touch panel is an auxiliary input device. The system shall be designed to have other input device.

11.6 STORAGE

In case of storing the LCD module for a long period of time (for instance, for years) for the purpose of replacement use, the following precautions necessary.

(1) Please store the LCD modules in a dark place ; do not expose them to sunlight or ultraviolet light.

(2) Please keep the temperature between 10°C and 35°C at normal humidity.

(3) Please store the LCD modules in the container which was used for shipping by Hitachi.

(4) No articles shall be left on the surface over an extended period of time.

11.7 SAFETY

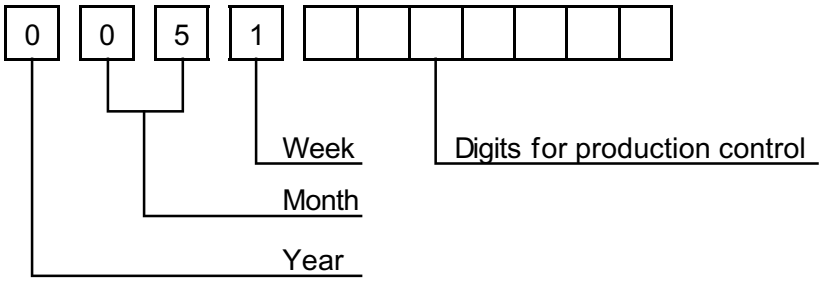
The LCD modules include a Cold Cathode Fluorescent Lamp (CFL). The CFL contains a small amount of mercury. Please follow local ordinances or regulations for disposal.

Wear finger cots or gloves whenever handling or assembling a touch panel because its glass edges are sharp.

12. DESIGNATION OF LOT MARK

12.1 LOT MARK

Lot mark is consisted of 4 digits for production lot and
6 or 7 digits for production control.



Year	Figure in lot mark
2000	0
2001	1
2002	2
2003	3

Month	Figure in lot mark	Month	Figure in lot mark
Jan.	01	July	07
Feb.	02	Aug.	08
Mar.	03	Sep.	09
Apr.	04	Oct.	10
May	05	Nov.	11
June	06	Dec.	12

Week (day in Calender)	Figure in lot mark
1~7	1
8~14	2
15~21	3
22~28	4
29~31	5

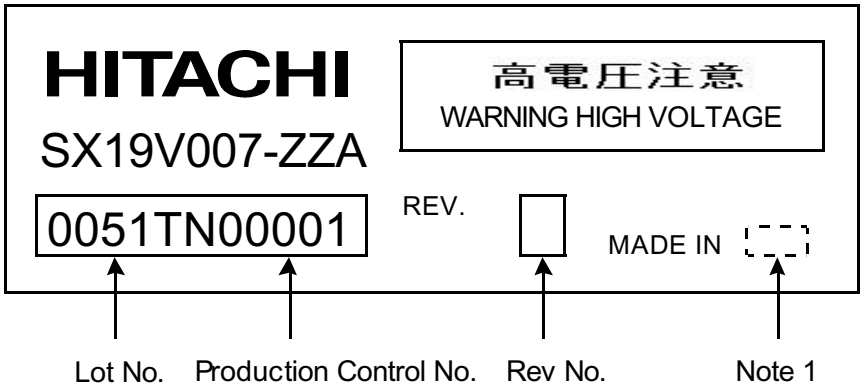
12.2 REVISION

REV No.	ITEM	LOT No.	PRODUCTION CONTROL No.
A	Segment LCD Driver : BD66134S		00001~
B	Segment LCD Driver : BD66134U		00001~
C	Segment LCD Driver : WFP-7102		00001~

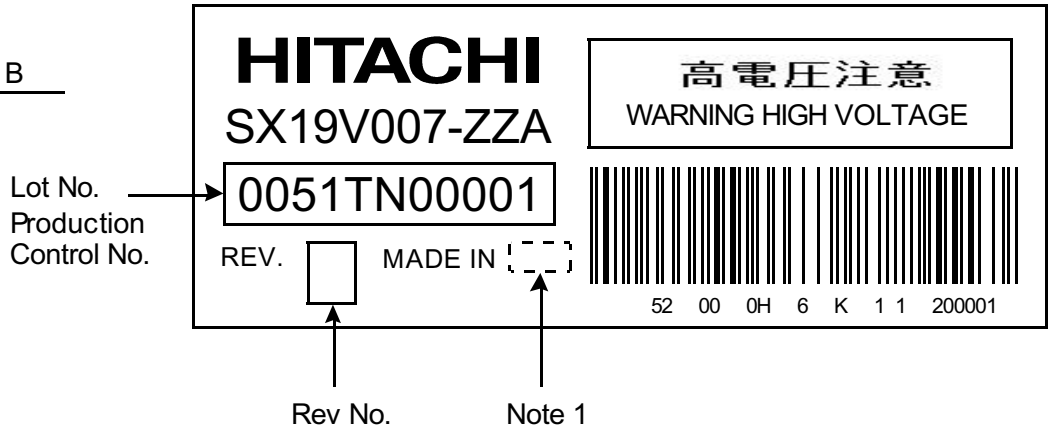
12.3 LOCATION OF LOT MARK

Either Label A or Label B is being attached on the back side of LCM.

Label A



Label B



Note 1 : JAPAN or TAIWAN

13. PRECAUTION FOR USE

(1) A limit sample should be provided by the both parities on an occasion when the both parties agree to its necessity.
Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

(2) On the following occasions, the handling of the problem should be decided through discussion and agreement between responsible persons of the both parties.

(1) When a question is arisen in the specifications.
(2) When a new problem is arisen which is not specified in the specifications.
(3) When an inspection specification change or operating condition change by customer is reported to HITACHI, and some problem is arisen in the specification due to the change.
(4) When a new problem is arisen at the customer's operating set for sample evaluation

(3) Regarding the treatment for maintenance and repairing, both parties will discuss it in six month later after latest delivery of this product.

The precaution that should be observed when handling LCM have been explained above.
If any points are unclear or if you have any requests, please contact Hitachi.