

HITACHI

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FOR MESSRS : _____

DATE : Apr.03,2003

CUSTOMER'S ACCEPTANCE SPECIFICATIONS SX09Q005-ZZA CONTENTS

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* When product will be discontinued, customer will be informed by HITACHI with twelve months prior announcement.

ACCEPTED BY: _____

PROPOSED BY: Jimmy Ho

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RECORD OF REVISION

DATE	SHEET No.	SUMMARY
Apr.03,'03	7B64PS 2704 SX09Q005-ZZA-2 Page 4-1/2	Added: 4.2 ABSOLUTE MAXIMUM RATING (TOUCH PANEL) Operating Temperature -5°C~60°C Storage Temperature -20°C~70°C
	7B64PS 2704 SX09Q005-ZZA-2 Page 4-2/2	Change: 4.3 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS Operating Temperature -20°C~70°C Storage Temperature -30°C~80°C
	7B64PS 2705 SX09Q005-ZZA-2 Page 5-3/4	Added: 5.2.5 CIRCUIT RESISTANCE RATE
	7B64PS 2709 SX09Q005-ZZA-2 Page 9-1/1	Change: FPC OUTLINE (7) → (12.5) (4.4) → (4)

3.GENERAL DATA

(1) Part Name	SX09Q005-ZZA
(2) Module Size	94.7(W)mm x 73.3(H)mm x 7.5(D)mm
(3) Active Area	73.9(W)mm x 55.42(H)mm
(4) Dot Pitch	0.077(W)mm x 0.231(H)mm
(5) Dot Size	0.057(W)mm x 0.211(H)mm
(6) Resolution	320 x 3(R.G.B)(W) x 240(H)dots
(7) Duty Ratio	1/242
(8) LCD Type	Color STN transmissive type (Negative type) The upper polarizer is Anti-glare type. The bottom polarizer is transmissive type.
(9) Viewing Direction	6 O'clock
(10) Backlight	LED(Color : White)
(11) Power Consumption(Total)	(0.55)W typ.
(12) Weight	(60)g typ.
(13) Power Supply Voltage	VDD , VEE , V3 , V4 , V5 , V6 , VLED
(14) Touch Panel	Resistance type

4. ABSOLUTE MAXIMUM RATINGS

4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS(LCM)

VSS=0V:Standard

ITEM	SYMBOL	MIN.	MAX.	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	0	7.0	V	
Power Supply for LCD	VEE-VSS	0	40.0	V	
Input Voltage	Vi	-0.3	VDD+0.3	V	(Note 1)
Input Current	li	0	1	A	
Static Electricity	-	-	-	-	(Note 2)

Note 1: \overline{DOFF} ,FLM,CL1,CL2,D0~D7,M

Note 2: Make certain you are grounded when handling LCM.

4.2 ABSOLUTE MAXIMUM RATING (TOUCH PANEL)

ITEM	SPECIFICATION	UNIT	COMMENT
Operating Voltage	70	V	
Contact Current	20	mA	
Operating Temperature	-5~60	°C	Without Condensation
Storage Temperature	-20~70	°C	

4.3 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

I T E M	OPERATING		STORAGE		COMMENT
	MIN.	MAX.	MIN.	MAX.	
Ambient temperature	-20°C	70°C	-30°C	80°C	(Note 2,3,4)
Humidity	(Note 1)		(Note 1)		Without condensation
Vibration	-	2.45m/s ²	-	11.76m/s ²	1 h max. (Note 5,6)
Shock	-	29.4m/s ²	-	490m/s ²	XYZ directions 11ms (Note 5,6)
Corrosive Gas	Not acceptable		Not acceptable		

Note 1: $T_a \leq 40^\circ\text{C}$: 85%RH max.

$T_a > 40^\circ\text{C}$: Absolute humidity must be lower than the humidity of 85%RH at 40°C.

Note 2: T_a at -20°C ----- < 48h , at 70°C ----- < 168h.

Note 3: Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note 4: The response time less than 5°C will be slower.

Note 5: This module should be operated normally after finish the test.

Note 6: The module do not have mounting hole.

It should be fixed by the may of sandwiching-like method. (Fig.1)

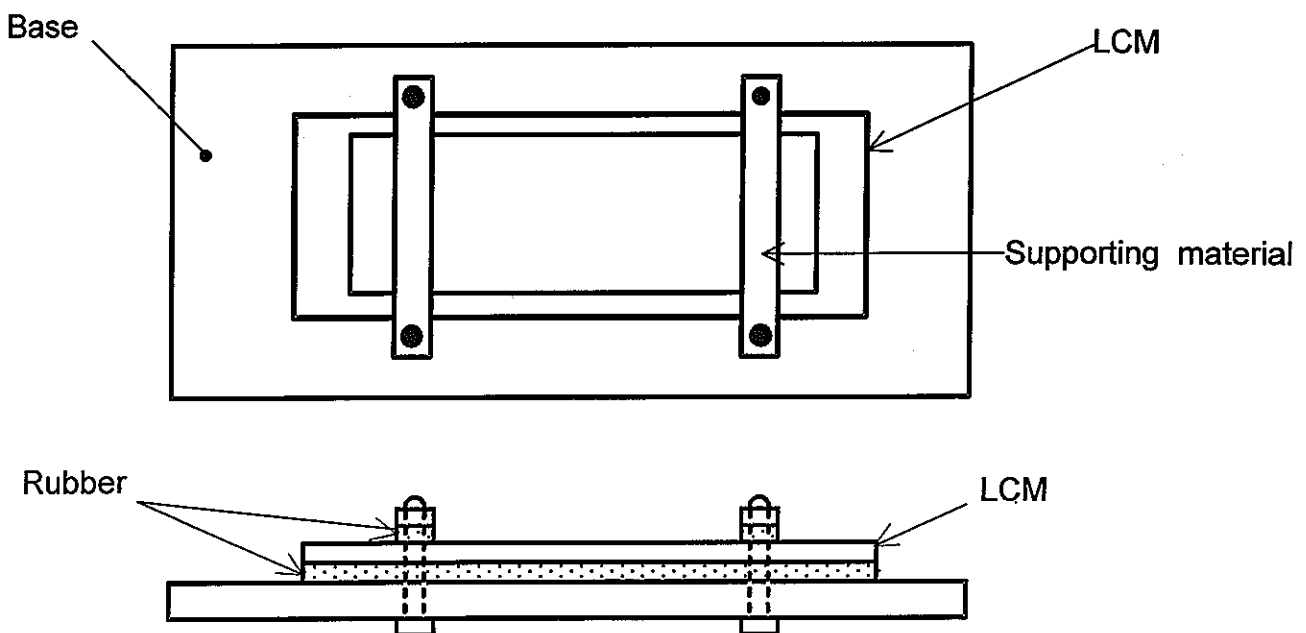


Fig.1

5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS OF LCD

VSS=0V

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	COMMENT
Power Supply Voltage	VDD	VDD-VSS	2.7	3.3	4.5	V	
Input Voltage for Logic Circuits	Vi	"H" level	0.8VDD	-	VDD	V	(Note 1)
		"L" level	0	-	0.2VDD		
Power Supply Current	IDD	VDD-VSS=3.3V	-	(0.6)	-	mA	(Note 2,5)
	IEE	VEE=22.5V	-	(1)	-		
	I6	V6=21.18V	-	(0.05)	-		
	I5	V5=1.32V	-	(0.05)	-		
	I4	V4=2.65V	-	(0.5)	-		
Operating Voltage	VEE	Ta = -5°C, φ=0°	-	(23.3)	-	V	
		Ta=25°C, φ=0°	-	(22.5)	-		
		Ta=60°C, φ=0°	-	(21.6)	-		
Frame Frequency	fFLM	-	60	70	100	Hz	(Note 3)

Note 1: \overline{D} OFF,FLM,CL1,CL2,D0~D7,M.

Note 2: fFLM=70Hz Ta=25°C, Display pattern : Checker pattern.

Note 3: Need to make sure of flickering and rippling of display when setting the frame frequency and M signal frequency in your set.

Note 4: Bias : 1/17

Note 5: VEE,VSS,V3,V4,V5 and V6 are power supply voltage for LCD
 $(VEE-V6)=(V6-V3)=(V4-V5)=(V5-VSS)$

5.2 ELECTRICAL CHARACTERISTICS OF TOUCH PANEL

5.2.1 OPERATING CONDITION

ITEM	SPECIFICATION	COMMENT
Operating Voltage	5 VDC	
Operating Current	20 mA max.	

5.2.2 ELECTRICAL CHARACTERISTICS

ITEM	SPECIFICATION	COMMENT
Resistance Between Terminal	X1-X2	290~840 Ω
	Y1-Y2	220~670 Ω
Insulance Resistance	X-Y	20MΩ min.
Linearity	X	±1.5% max.
	Y	±1.5% max.
Chattering	10ms max.	Operating Voltage : 25VDC Condition See Note 1

5.2.3 MESCHANICAL CHARACTERISTICS

ITEM	SPECIFICATION	COMMENT
Pen input pressure	10g~50g	R0.8mm , Poly-acetal Pen
Finger input pressure	10g~50g	R8.0mm , Silicone Rubber
Surface hardness	2H min.	JIS K5400

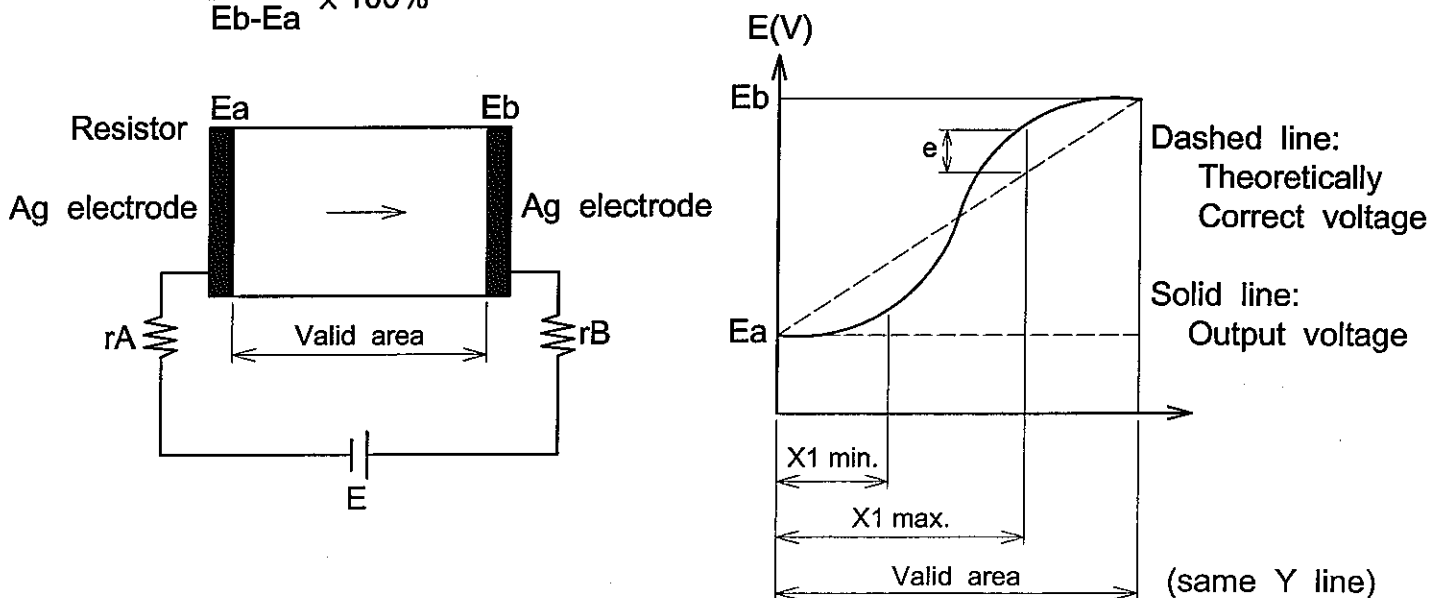
5.2.4 OPTICAL CHARACTERISTICS

ITEM	SPECIFICATION	COMMENT
Transparency	80% 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.

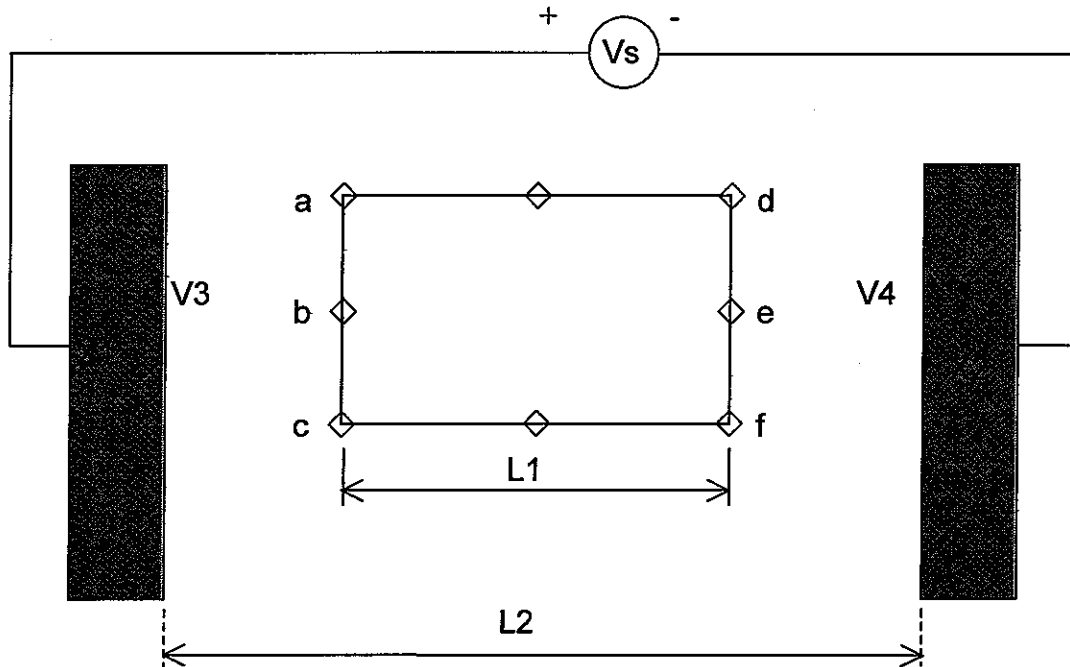
$$\frac{e}{E_b - E_a} \times 100\%$$



5.2.5 CIRCUIT RESISTANCE RATE

TERMINAL	CIRCUIT RESISTANCE RATE
X1-X2	10% max.
Y1-Y2	10% max.

CIRCUIT RESISTANCE RATE CALCULATE METHOD BY TEST MACHINE



Take example by Circuit Resistance Percentage X :

$$V1 = (Va+Vb+Vc) / 3$$

$$V2 = (Vd+Ve+Vf) / 3$$

Use linear extra interpolation , find out V3 , V4

$$V_D = V3 - V4$$

$$\text{Circuit Resistance (\%)} = (V_S - V_D) / V_S \times 100\%$$

$$\text{Circuit Resistance in (\%)} = (V_S - V3) / V_S \times 100\%$$

$$\text{Circuit Resistance out (\%)} = V4 / V_S \times 100\%$$

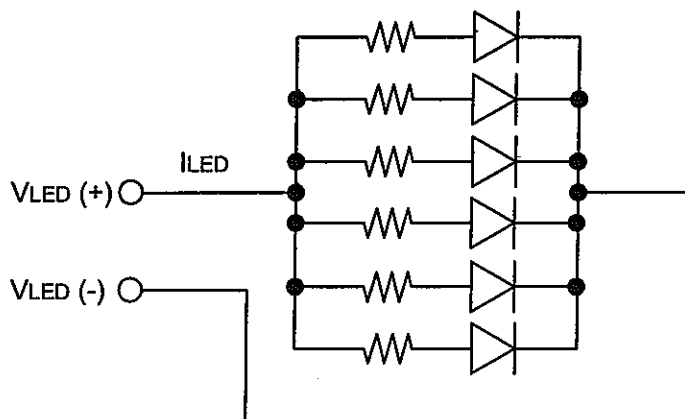
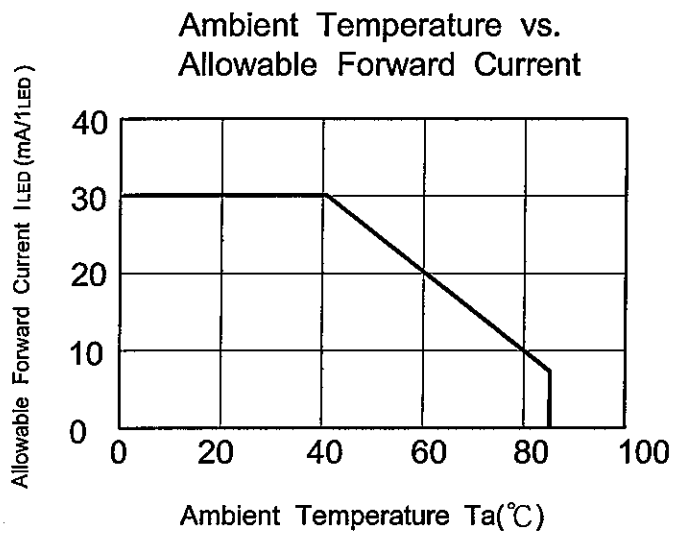
$$\text{Circuit Resistance in} + \text{Circuit Resistance out} = \text{Circuit Resistance}$$

5.3 ELECTRICAL CHARACTERISTICS OF LED BACKLIGHT

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	COMMENT
Power Supply Voltage for LED	VLED	—	—	5.0	5.2	V	
Power Supply Current for LED	ILED	VLED=5.0V	—	108	120	mA	(Note 1,2)

Note 1: The ILED changes depending on ambient temperature.

Note 2: $T_a \leq 60^\circ\text{C}$ ($20\text{mA} \times 6 = 120\text{mA}$ max.)



6. OPTICAL CHARACTERISTICS

6.1 TRANSMISSIVE MODE

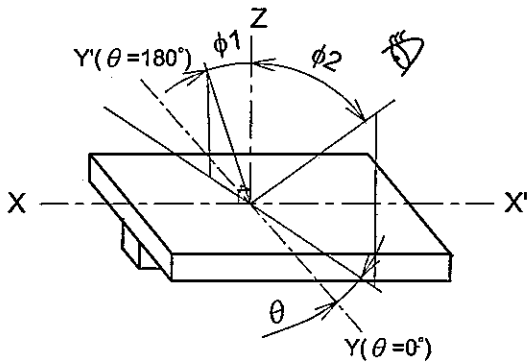
Ta=25°C (Backlight on)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	COMMENT	
Viewing Angle	$\phi 2-\phi 1$	$\theta = 0^\circ, K \geq 2.0$	-	(60)	-	deg.	(Note 1,2)	
		$\theta = 90^\circ, K \geq 2.0$	-	(60)	-			
Contrast Ratio	K	$\phi = 0^\circ, \theta = 0^\circ$	-	(30)	-	-	(Note 3,5)	
Response Time (Rise + Fall)	tr+tf	$\phi = 0^\circ, \theta = 0^\circ$	-	(450)	-	ms	(Note 4)	
Color Tone (Primary Color)	Red	x	$\phi = 0^\circ, \theta = 0^\circ$	-	(T.B.D)	-	-	(Note 6)
		y		-	(T.B.D)	-	-	
	Green	x		-	(T.B.D)	-	-	
		y		-	(T.B.D)	-	-	
	Blue	x		-	(T.B.D)	-	-	
		y		-	(T.B.D)	-	-	
	White	x		-	(T.B.D)	-	-	
		y		-	(T.B.D)	-	-	

(Measurement condition : HITACHI standard)

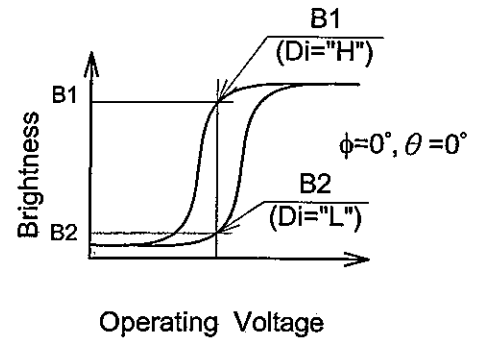
Note 1~6 : Page 6-2/3.

Note 1: Definition of θ and ϕ
(Normal)
Viewing Direction

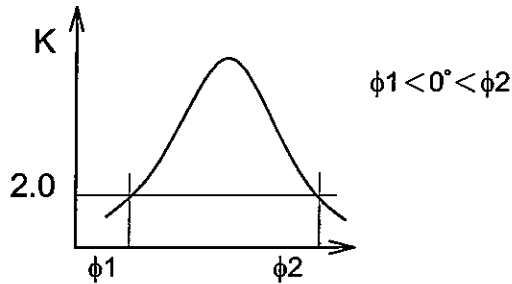


Note 3: Definition of contrast "K"

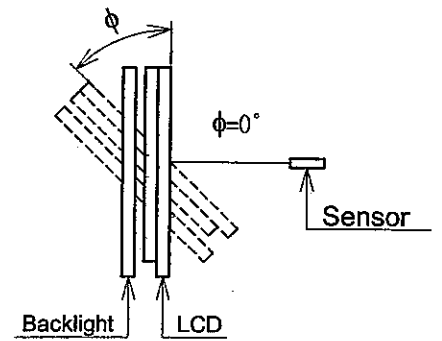
$$K = \frac{\text{Brightness of selected area (B1)}}{\text{Brightness of non-selected area (B2)}}$$



Note 2: Definition of viewing angle ϕ_1 and ϕ_2

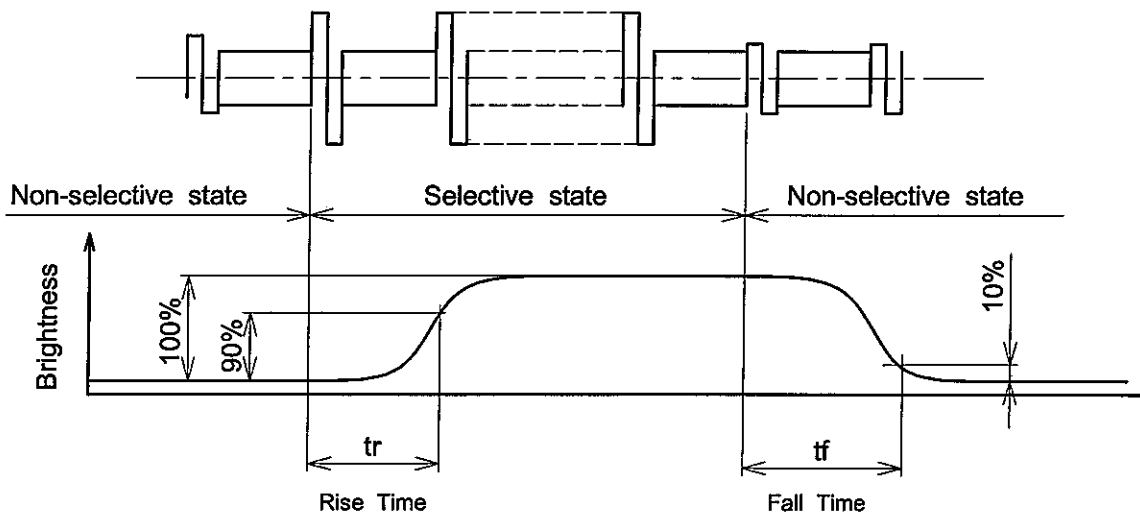


Contrast ratio K vs viewing angle ϕ



Sensor : BM-7 or similar equipment
Aperture : 1°
Distance : 0.4m

Note 4: Definition of optical response time



Note 5: HITACHI will do sampling inspection for minimum value.

Note 6: The LCD driving voltage should be adjusted as to obtain maximum contrast.

6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT

ITEM	MIN.	TYP.	MAX.	UNIT	COMMENT
Brightness	-	(48)	-	cd/m ²	ILED=108mA , (Note 1)
Brightness Uniformity	-	(±35)	-	%	(Note 1,2,3)

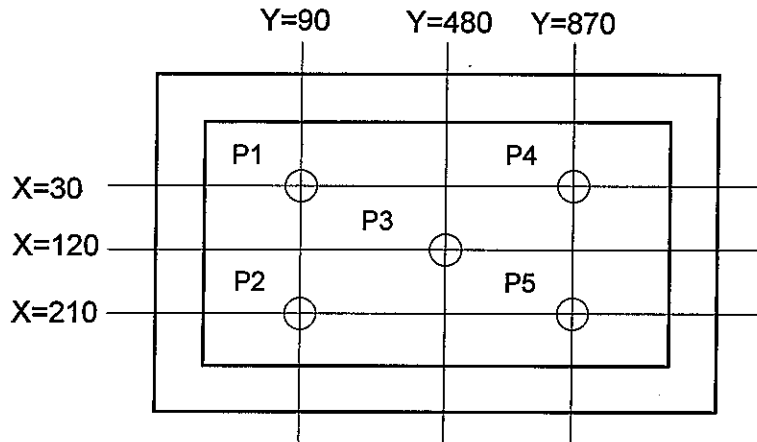
(Measurement condition : HITACHI standard)

Note 1: Ta=25°C

Display data should all be "ON"

The LCD driving voltage should be adjusted so as to obtain maximum contrast when display pattern is all "Q"

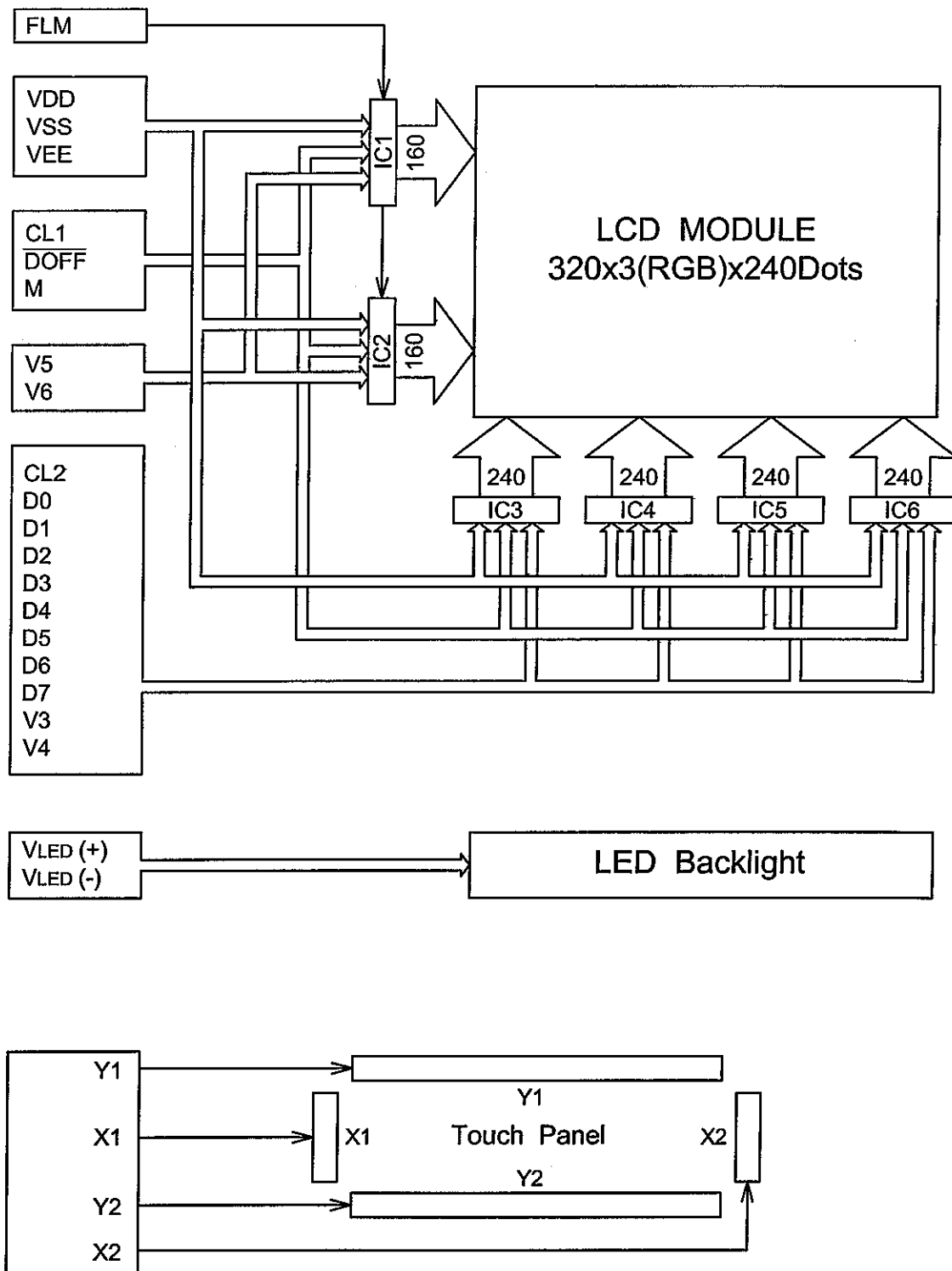
Note 2: Measurement of the following 5 places on the display.



Note 3: Definition of the brightness tolerance.

$$\left(\frac{\text{max. brightness or min. brightness} - \text{Average brightness}}{\text{Average brightness}} \right) \times 100\%$$

7. BLOCK DIAGRAM

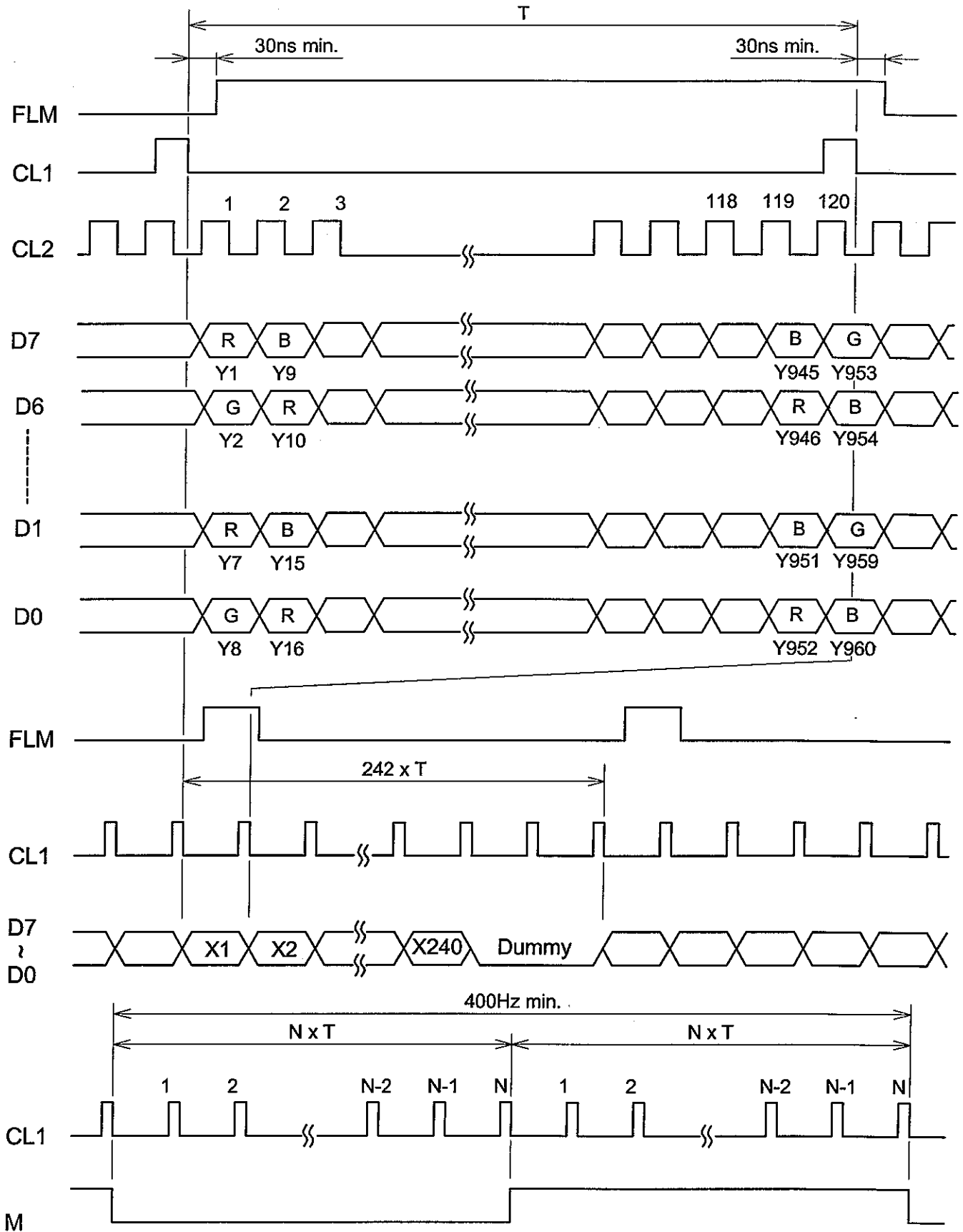


Note 1: Controller and bias voltage supply circuit are not included.

Note 2: VEE, VSS, V3, V4, V5 and V6 are power supply voltage for LCD.
(VEE > V6 > V3 > V4 > V5 > VSS)

8. INTERFACE TIMING CHART

8.1 TIMING CHART

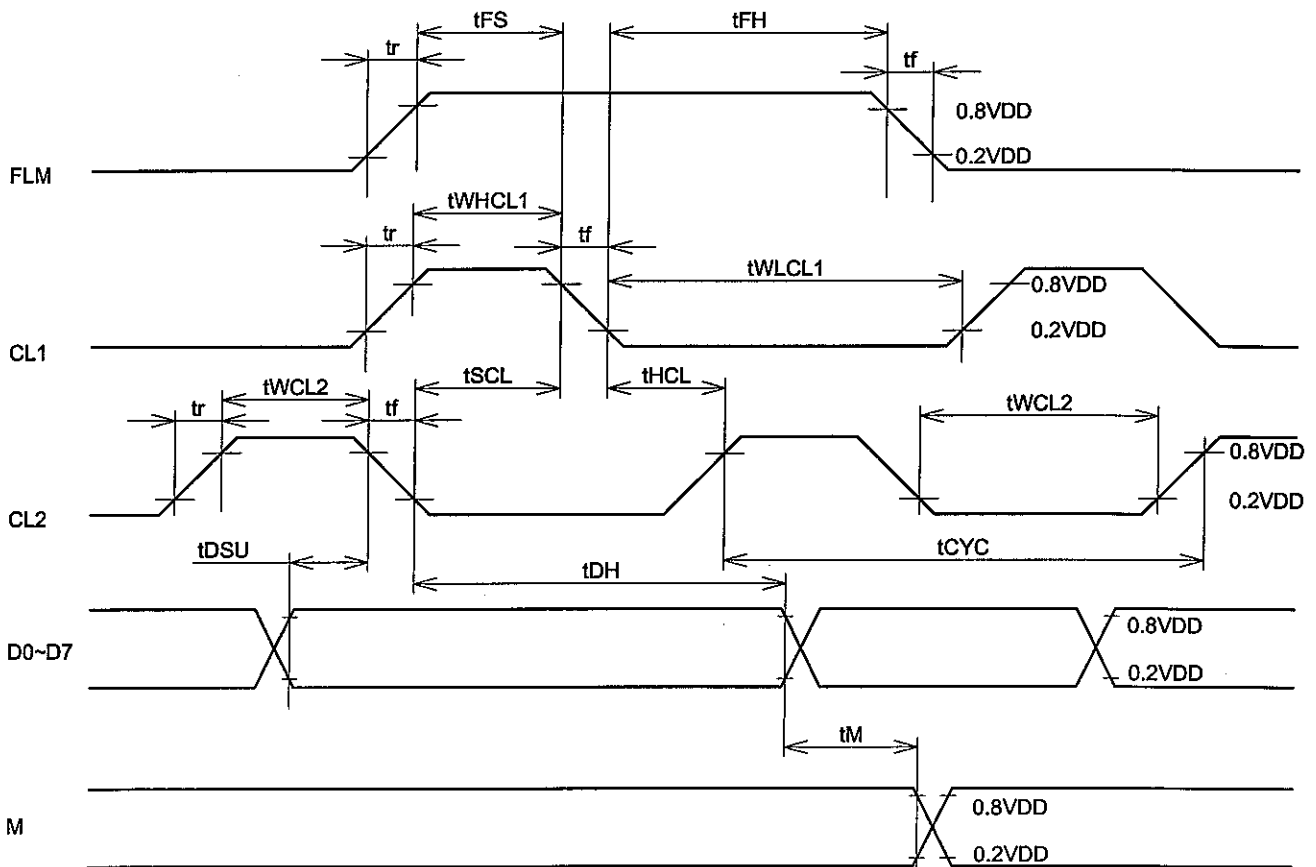


Note 1: M signal should be kept least 400Hz, and 50% duty.
 Note 2: $f_{FLM}=70\text{Hz}, N=21$ (Recommend).

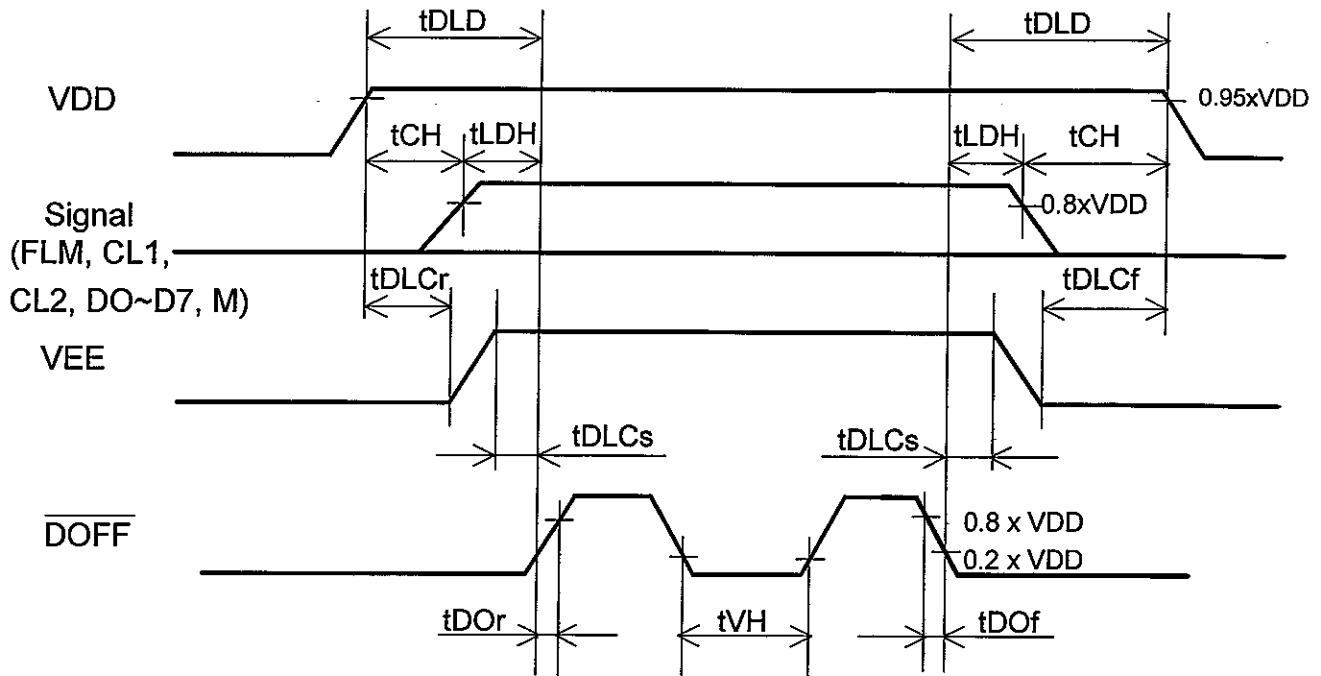
8.2 TIMING CHARACTERISTICS

VDD=2.7~4.5V, VSS=0V, Ta=-20°C~70°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
CL1 Pulse width "H"	t _{WHCL1}	30	-	-	ns
CL1 Pulse width "L"	t _{WLCL1}	370	-	-	ns
Clock cycle time	t _{CYC}	100	-	-	ns
CL2 pulse width	t _{WCL2}	37	-	-	ns
Clock set up time	t _{SCL}	100	-	-	ns
Clock hold time	t _{HCL}	100	-	-	ns
Clock rise/fall time	t _r , t _f	-	-	30	ns
Data set up time	t _{DSU}	35	-	-	ns
Data hold time	t _{DH}	35	-	-	ns
"FLM" set up time	t _{FS}	100	-	-	ns
"FLM" hold time	t _{FH}	30	-	-	ns
M delay time	t _M	-	-	300	ns



8.3 POWER ON/OFF SEQUENCE



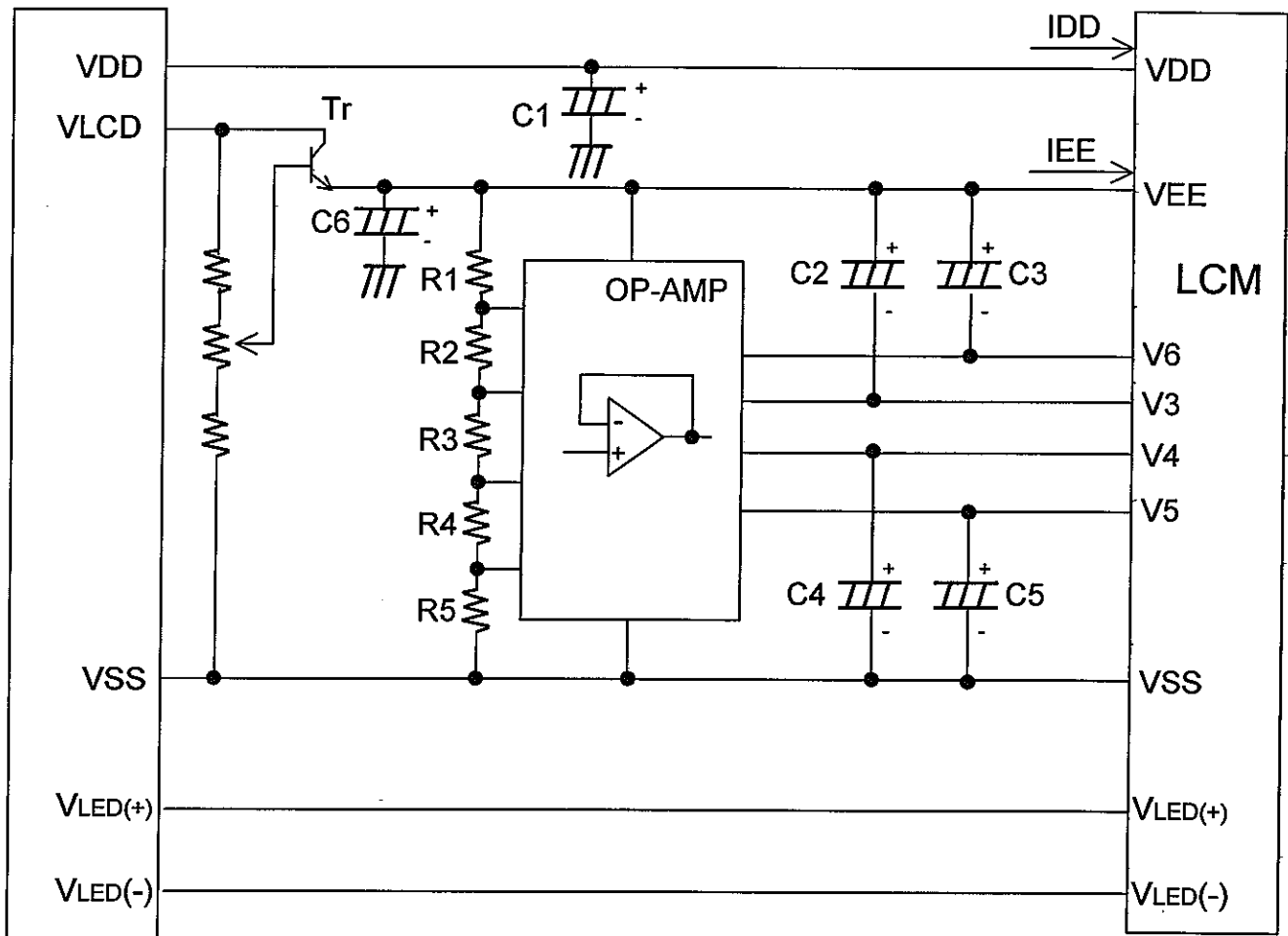
SYMBOL	MIN.	MAX.	UNIT	COMMENT
t_{DLD}	200	-	ms	(Note 1,2)
t_{CH}	0	-	ms	
t_{LDH}	20	-	ms	
t_{DOOr}	-	100	ns	
t_{DOOf}	-	100	ns	
t_{DLCr}	20	-	ms	
t_{DLCf}	0	-	ms	
t_{DLCs}	20	-	ms	
t_{VH}	200	-	ms	

Note 1: Please keep the specified sequence because wrong sequence may cause permanent damage to the LCD panel.

Note 2: HITACHI recommends you to use \overline{DOFF} function.

Display quality may deteriorate if you don't use \overline{DOFF} function.

8.4 POWER SUPPLY FOR LCM EXAMPLE



- R1=R2=R4=R5 : (3k Ω ±0.1%)
 R3 : (39k Ω ±0.1%)
 C1~C6 : (3.3 μ F~4.7 μ F)
 Tr : Recommend 2SD1368
 Op-Amp : Recommend LA324N

8.5 INPUT DATA ALLOCATION TABLE

DATA SIGNAL	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	D 7	D 6	D 5	D 4	-----	D 4	D 3	D 2	D 1	D 0
	Y													9 5 6	9 5 7	9 5 8	9 5 9	9 5 0
X	1	2	3	4	5	6	7	8	9	10	11	12	-----					
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
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
138	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
139	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
140	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
141	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
142	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
143	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
144	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
145	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
238	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
239	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
240	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

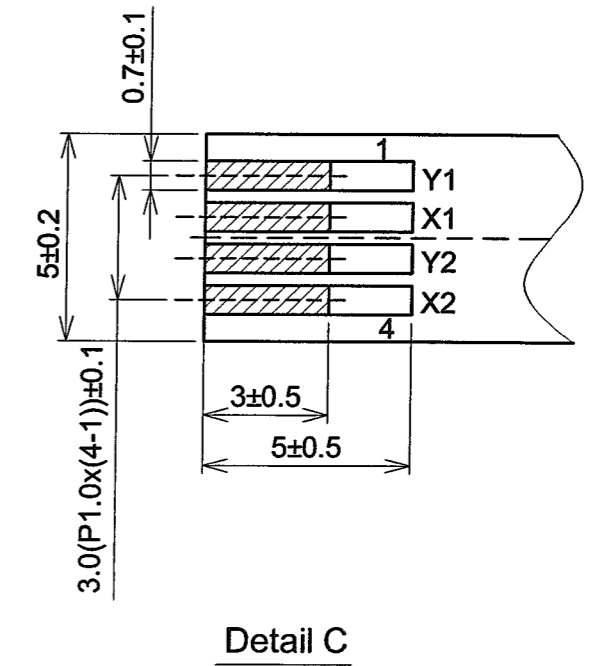
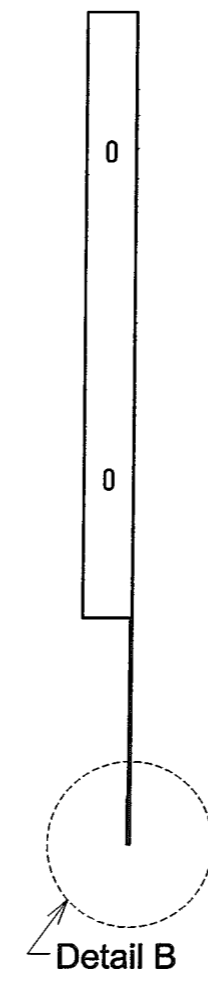
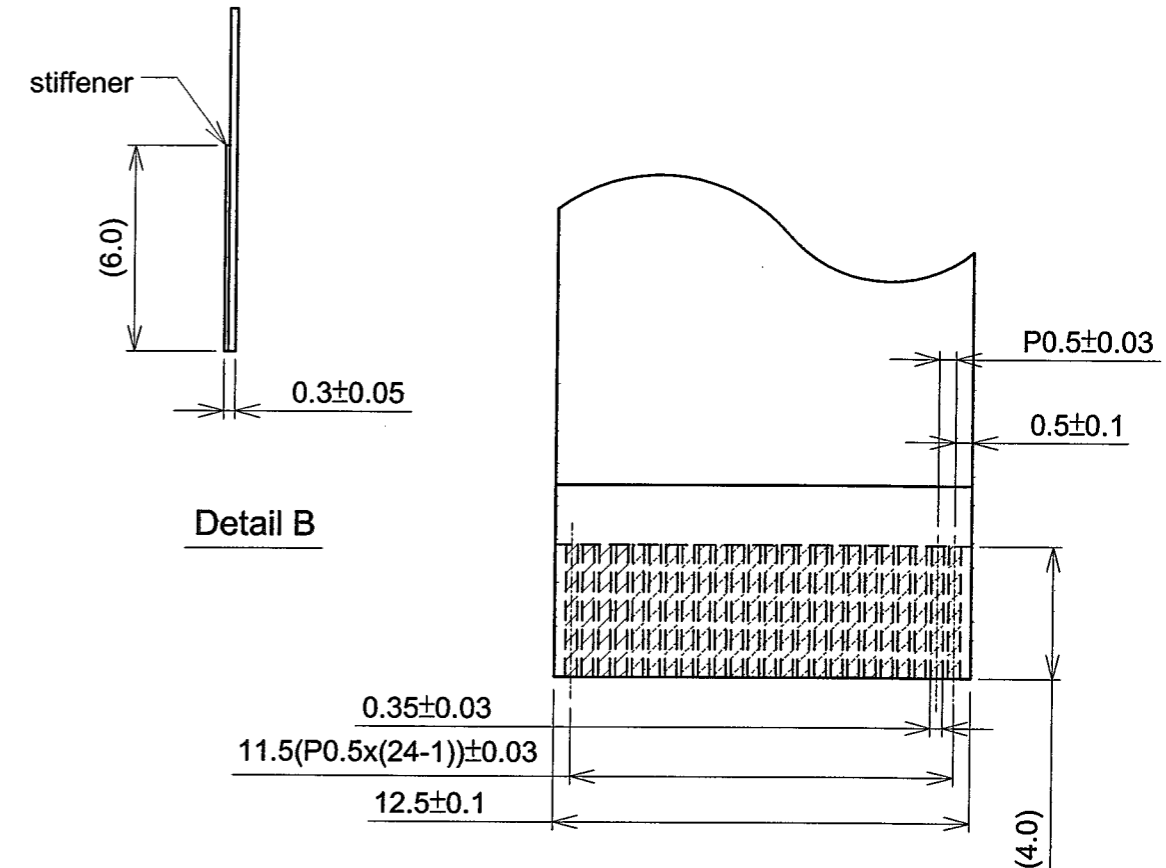
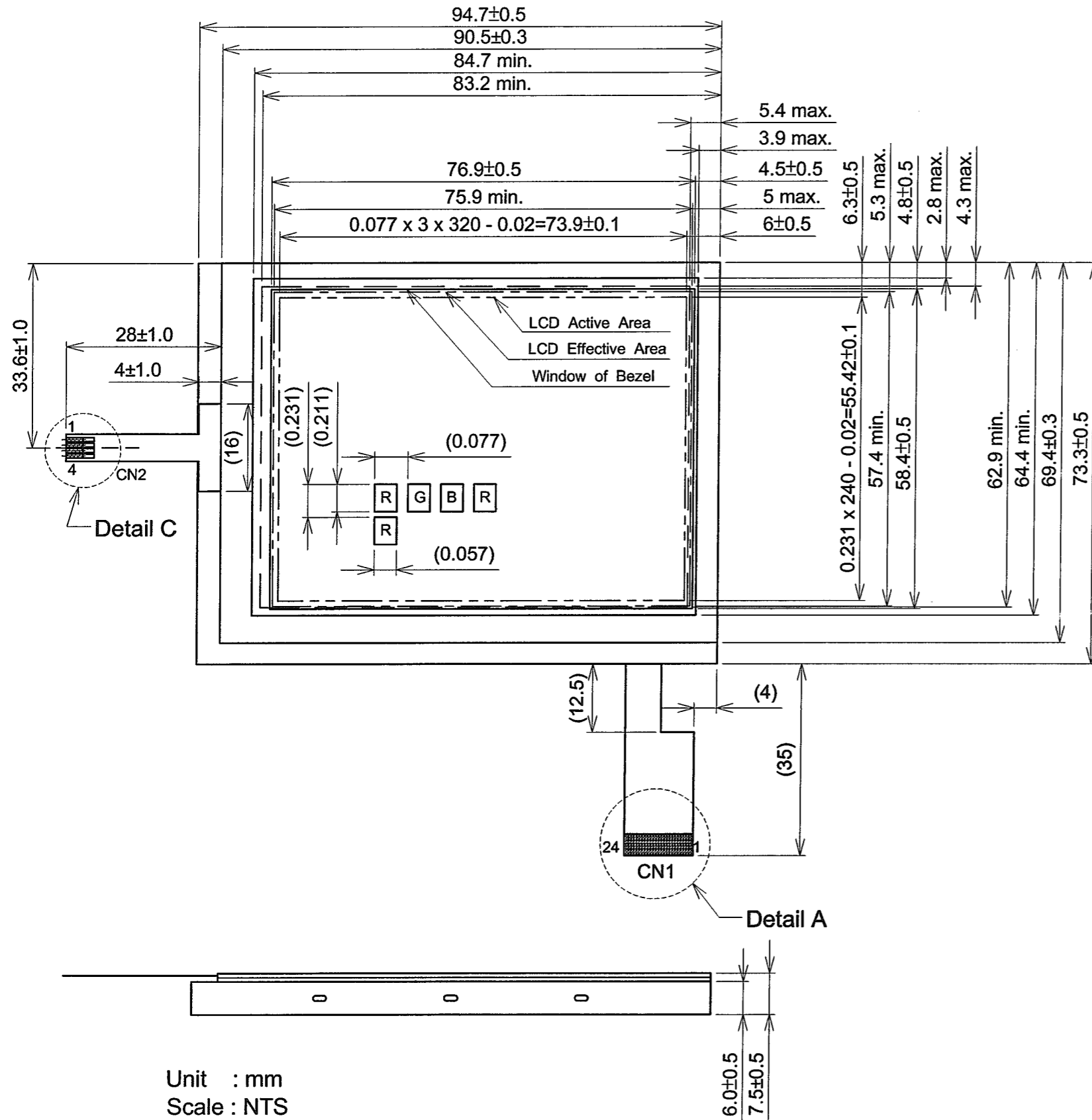
CN1 : FPC 0.5mm pitch

PIN No.	SIGNAL	LEVEL	FUNCTION
1	VLED(+)	-	Power Supply for LED Backlight.
2	VLED(+)	-	Power Supply for LED Backlight.
3	VLED(-)	-	GND
4	VLED(-)	-	GND
5	VSS	-	GND
6	D0	H/L	Display Data
7	D1		
8	D2		
9	D3		
10	D4		
11	D5		
12	D6		
13	D7		
14	VDD	-	Power Supply for Logic
15	VEE	-	Power Supply for LCD
16	V6	-	Bias Voltage for non-select (Common driver)
17	V3	-	Bias Voltage for non-select (Segment driver)
18	V4	-	Bias Voltage for non-select (Segment driver)
19	V5	-	Bias Voltage for non-select (Common driver)
20	$\overline{\text{DOFF}}$	H/L	H : ON / L : OFF
21	CL2	H→L	Data Shift
22	M	H/L	AC Signal Input for LCD Drive Waveform
23	CL1	H→L	Data Latch
24	FLM	H	First Line Marker

CN2 : FPC

PIN No.	SIGNAL	LEVEL	FUNCTION
1	Y1	-	Analog Signal from Digitizer Top
2	X1	-	Analog Signal from Digitizer Left
3	Y2	-	Analog Signal from Digitizer Bottom
4	X2	-	Analog Signal from Digitizer Right

9. DIMENSIONAL OUTLINE



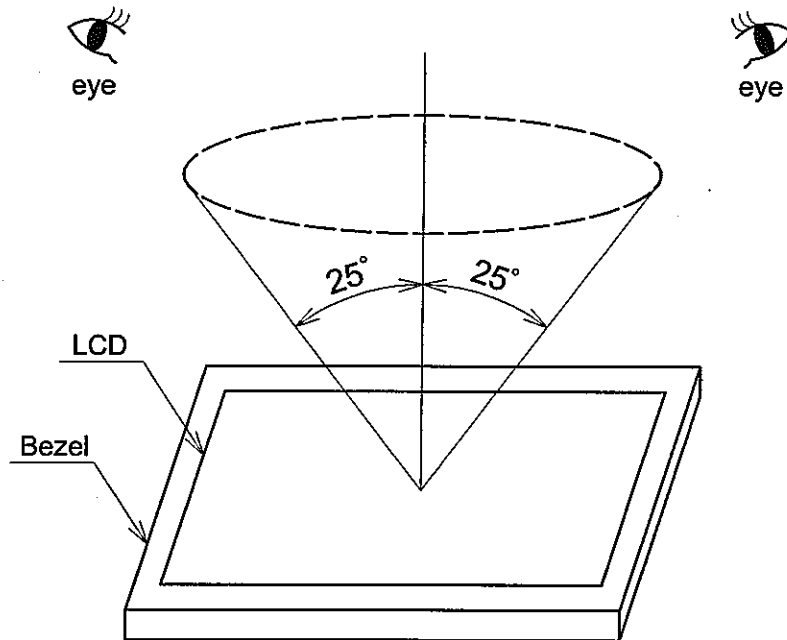
Unit : mm
 Scale : NTS
 (): Reference only
 Suitable Connector : Molex 52437-2491 (CN1)
 Molex 52103-0417 (CN2)

10. APPEARANCE STANDARD

10.1 APPEARANCE INSPECTION CONDITION

Visual inspection should be done under the following condition.

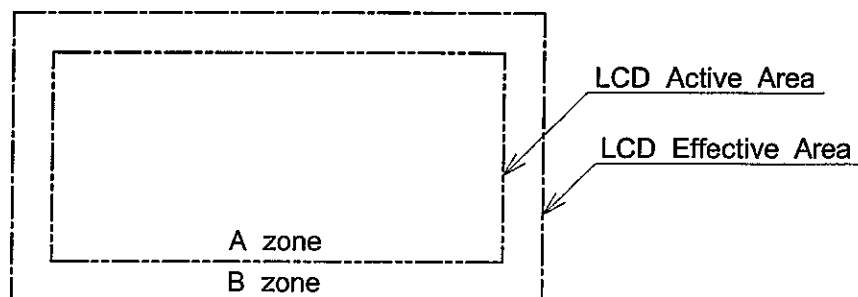
- (1) The inspection should be done in a dark room.
- (2) The distance between eyes of an inspector and the LCD module is 25cm.
- (3) The viewing zone is shown the figure.
Viewing angle $\leq 25^\circ$.



10.2 DEFINITION OF ZONE

A zone : The LCD active area line specified at page 9-1/1 of this document.

B zone : Area between the LCD effective area line and the LCD active area line specified at page 9-1/1 of this document.



10.3 APPEARANCE SPECIFICATION

(1) LCD APPEARANCE

* : If the problem related to this section occurs about this item, the responsible persons of both party (Customer and HITACHI) will discuss the matter in detail.

No.	ITEM	CRITERIA		A	B	
L C D	Scratches	Distinguished one is not acceptable (to be judged by HITACHI standard)		*	-	
	Dent	Same as above		*	-	
	Wrinkles in Polarizer	Same as above		*	-	
	Bubbles	Average Diameter D(mm)		Maximum Number Acceptable		
		$D \leq 0.2$		Ignored		
		$0.2 < D \leq 0.3$		12		
		$0.3 < D \leq 0.5$		3		
		$0.5 < D$		None		
	Stains, Foreign Materials, Dark Spot	Filamentous (Line shape)			○	*
		Length L(mm)	Width W(mm)	Maximum Number Acceptable		
		$L \leq 2.0$	$W \leq 0.03$	Ignored		
		$L \leq 3.0$	$0.03 < W \leq 0.05$	6		
		$L \leq 2.5$	$0.05 < W \leq 0.1$	1		
		Round(Dot shape)			○	*
		Average Diameter D(mm)	Maximum Number Acceptable	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 wiped out easily are acceptable						
Color Tone	To be judged by HITACHI standard		○	-		
Color Uniformity	Same as above		○	-		

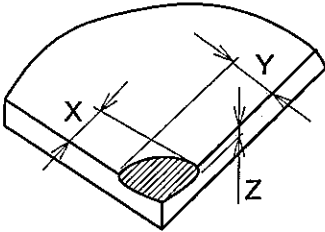
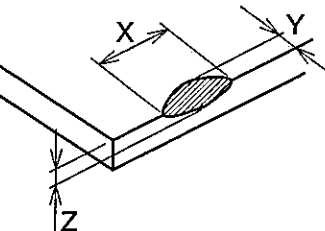
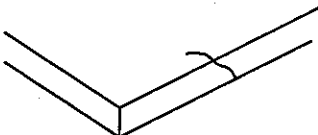
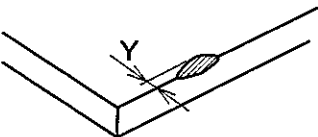
No.	ITEM	CRITERIA				A	B	
L C	Contrast Irregularity (Spot)	Average diameter D(mm)	Contrast	Maximum Number Acceptable	Minimum Space	○	-	
		$D \leq 0.25$		Ignored	-			
		$0.25 < D \leq 0.35$		To be Judged by HITACHI standard	10			20mm
		$0.35 < D \leq 0.5$			4			20mm
		$0.5 < D \leq 0.7$			3			50mm
		$0.7 < D$			None			-
D	Contrast Irregularity (Line) (A pair of scratches)	Width W(mm)	Length L(mm)	Maximum Number Acceptable	Minimum Space	○	-	
		$W \leq 0.25$	$L \leq 1.2$	2	20mm			
		$W \leq 0.2$	$L \leq 1.5$	3	20mm			
		$W \leq 0.15$	$L \leq 2.0$	3	20mm			
		$W \leq 0.1$	$L \leq 3.0$	4	20mm			
		The whole number		6				
	Rubbing Scratch	To be judged by HITACHI standard				○	-	

(3) TOUCH PANEL APPEARANCE

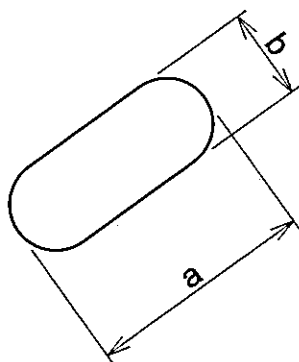
ITEM	CRITERIA		
Scratch	Width W(mm)	Length L(mm)	Maximum Number Acceptable
	$W \geq 0.10$	$L \geq 10$	None
	$0.10 > W \geq 0.05$	$10 > L$	4
	$0.05 > W$	$10 > L$	ignored
Dust (Linear)	Width W(mm)	Length L(mm)	Maximum Number Acceptable
	$W > 0.10$	-	Dust (Circular)
	$0.10 \geq W > 0.05$	$L > 3$	None
	$0.05 \geq W$	$3 \geq L$	ignored
Dust (Circular)	Average diameter D(mm)		Maximum Number Acceptable
	$D > 0.35$		None
	$0.35 \geq D > 0.25$		6pcs(Dust to Dust > 20mm)
	$0.25 \geq D$		ignored

Applied only in the active area. Scratches or dusts in the outside of the active area are acceptable unless the electrical characteristics are affected.

- Dirt
Acceptable if not noticeable on a black mat.
- Tip, crack (applicable to glass only).

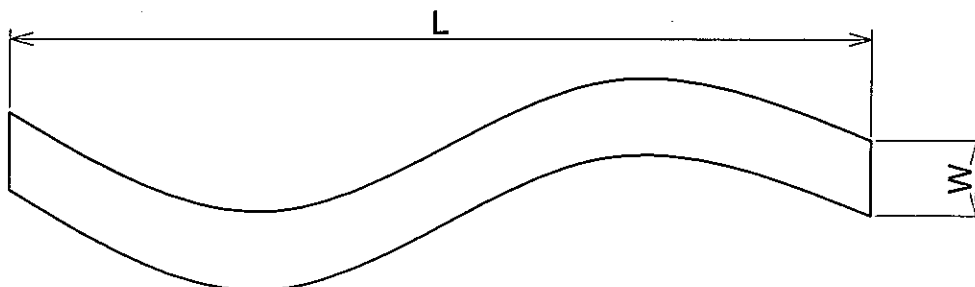
ITEM	CRITERIA			
Tip Corner		X	≤ 3	Not acceptable if the film is damaged
		Y	≤ 3	
		Z	≤ 0.95	
Tip Side		X	≤ 5	Not acceptable if the film is damaged
		Y	≤ 3	
		Z	≤ 0.95	
Crack				None
Other				Not acceptable if the electrical Characteristics is affected $Y \leq 1$

Note 1: Definition of average diameter (D)



$$\frac{a+b}{2} = D \dots \text{Average Diameter}$$

Note 2: Definition of length (L) and width (W)



11. PRECAUTION IN DESIGN

11.1 PRECAUTIONS AGAINST ELECTROSTATIC DISCHARGE

As this module contains C-MOS LSIs, it is not strong against electrostatic discharge. Make certain that the operator's body is connected to the ground through a wrist band, etc. and don't touch I/F pins directly.

11.2 POWER ON SEQUENCE

Input signals should not be applied to LCD module before power supply voltage is applied and reaches to specified voltage.

If the above sequence is not kept, C-MOS LSIs of LCD module may be damaged due to latch up phenomenon.

11.3 HANDLING PRECAUTIONS

(1) Since the polarizer on the top, and the aluminum plate on the bottom tend to be easily damaged, they should be with full care so as not to get them touched, pushed or rubbed by a piece on glass, tweezers and anything else which are harder a pencil lead 3H.

(2) As the adhesives used for adhering upper/lower polarizers and aluminum plate are made of organic substances which will be deteriorated by a chemical reaction with such chemicals as acetone, toluene, ethanol and isopropylalcohol. The following are recommended for use :
normal hexane
Please contact with us when it is necessary for you to use chemicals other than the above.

(3) Lightly wipe to clean 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 give a wipe in a circle. To prevent the display surface from damage and keep the appearance in good state, it is sufficient, in general, to wipe it with absorbent cotton.

(4) Immediately wipe off saliva or water drop attached on the display area because it may cause deformation or faded color.

(5) Foggy dew deposited on the surface may cause a damage, stain or dirt to the polarizer.

When you need to take out the LCD module from some place at low temperature for test, etc.

It is required to be warmed them up to temperature higher than room temperature before taking them out.

- (6) Touching the display area or I/F pins with bare hands or contaminating them are prohibited, because the stain on the display area and poor insulation between terminals are often caused by being touched with bare hands.
(Some cosmetics are detrimental to polarizers.)
- (7) In general, the glass is fragile so that, especially on its periphery, tends to be cracked or chipped in handling. Please not give the LCD module sharp shocks by falling, etc.
- (8) Maximum pressure to the surface must be less than 1.96×10^4 Pa.
And if the pressure area is less than 1cm^2 , maximum pressure must be less than 1.96N.
- (9) Since the metal width is narrow on these locations (see page 9-1/1), please careful with handling.
- (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.

11.4 OPERATION PRECAUTION

- (1) Using a LCD module beyond its maximum ratings may result in its permanent destruction.
LCD 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) Response time will be extremely delayed at lower temperature than the specified operating temperature range and on the other hand LCD's shows dark blue at higher temperature.
However those phenomena do not main defects of the LCD module. Those phenomena will disappear in the specified operating temperature range.
- (3) If the display area is pushed hard during operation, some display patterns will be abnormally display.
- (4) A slight dew depositing on terminals may cause electrochemical reaction which leads to terminal open circuit. Please operate the LCD module under the relative condition of $40^\circ\text{C}85\%\text{RH}$.
- (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.

11.5 STORAGE

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

- (1) Store the LCD modules in a dark place; do not expose them to sunlight or ultraviolet rays.
- (2) Keep the temperature between 10°C and 35°C at normal humidity.
- (3) Store the LCD modules in the container which is used for shipping from us.
- (4) No articles shall be left on the surface over an extended period of time.

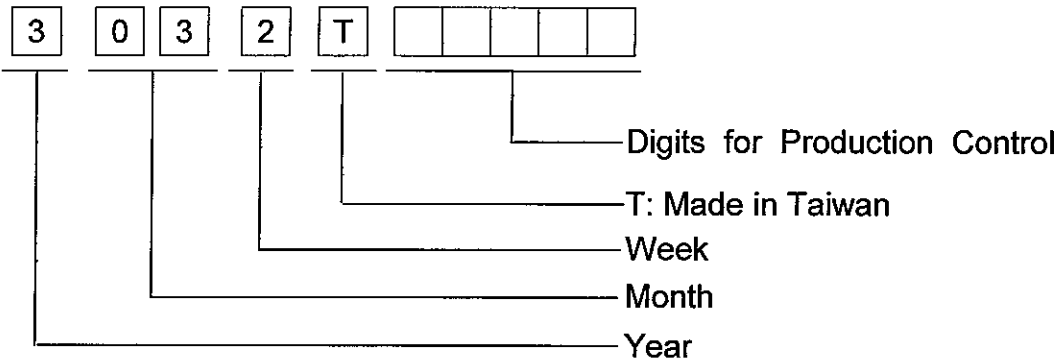
11.6 SAFETY

When any liquid leaked out of a damaged glass cell comes in contact with your hands. Please wash it off well with soap and water.

12. DESIGNATION OF LOT MARK

12.1 LOT MARK

Lot mark is consisted of 4 digits for production lot and 5 digits for production control.



Year	Figure in lot mark	Month	Figure in lot mark	Month	Figure in lot mark	Week (day in calendar)	Figure in lot mark
2003	3	Jan.	01	Jul.	07	1~7	1
2004	4	Feb.	02	Aug.	08	8~14	2
2005	5	Mar.	03	Sep.	09	15~21	3
2006	6	Apr.	04	Oct.	10	22~28	4
2007	7	May	05	Nov.	11	29~31	5
		Jun.	06	Dec.	12		

12.2 REVISION

REV No.	ITEM	LOT No.	PRODUCTION CONTROL No.
A			00001~

12.3 LOCATION OF LOT MARK

On the back side of LCM.

13. PRECAUTION FOR USE

(1) A limit sample should be provided by the both parties on an occasion when the both parties agree to its necessity.

Judgement 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 this specifications.

(3) When an inspection specifications change or operating condition change in customer is reported to HITACHI, and some problem is arisen in this specification due to the change.

(4) When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

(3) Regarding the treatment for maintenance and repairing, both parties will discuss it in six months 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 with HITACHI.