

HITACHI

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FOR MESSRS: _____

DATE: Dec.25,2003

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

SX19V009

C O N T E N T S

No.	ITEM	SHEET No.	PAGE
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12	DESIGNATION OF LOT MARK	7B64PS 2712-SX19V009-3	12-1/1

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

ACCEPTED BY: _____

PROPOSED BY: Jimmy Ho

RECORD OF REVISION

DATE	SHEET No.	SUMMARY																																																	
Sep.25,'03	7B64PS 2704 – SX19V009-2 Page 4 - 1/1	4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS Added : vibration and shock value																																																	
	7B64PS 2705 – SX19V009-2 Page 5 - 1/1	5.1 ELECTRICAL CHARACTERISTICS OF LCD Revised : I _{DD} : 10 typ. → 14 typ. I _{LCD} : 12 typ. → 21 typ. 5.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT																																																	
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Item</th> <th>Symbol</th> <th>Min.</th> <th>Typ.</th> <th>Max.</th> <th>Unit</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>Starting Voltage</td> <td>VS</td> <td>-</td> <td>-</td> <td>850</td> <td>Vrms</td> <td>Ta=25°C</td> </tr> <tr> <td>Lamp Current</td> <td>IL</td> <td>(2.5)</td> <td>(4.0)</td> <td>(4.5)</td> <td>mArms</td> <td>Ta=25°C</td> </tr> </tbody> </table> <p style="text-align: center;">↓</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Item</th> <th>Symbol</th> <th>Min.</th> <th>Typ.</th> <th>Max.</th> <th>Unit</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>Starting Voltage</td> <td>VS</td> <td>850</td> <td>-</td> <td>1500</td> <td>Vrms</td> <td>Ta=25°C</td> </tr> <tr> <td>Lamp Current</td> <td>IL</td> <td>3.5</td> <td>4.0</td> <td>4.5</td> <td>mArms</td> <td>Ta=25°C</td> </tr> <tr> <td>CCFL life time</td> <td>-</td> <td>10000</td> <td>20000</td> <td>-</td> <td>Hour</td> <td>Ta=25°C IL=4.0mA</td> </tr> </tbody> </table>		Item	Symbol	Min.	Typ.	Max.	Unit	Remark	Starting Voltage	VS	-	-	850	Vrms	Ta=25°C	Lamp Current	IL	(2.5)	(4.0)	(4.5)	mArms	Ta=25°C	Item	Symbol	Min.	Typ.	Max.	Unit	Remark	Starting Voltage	VS	850	-	1500	Vrms	Ta=25°C	Lamp Current	IL	3.5	4.0	4.5	mArms	Ta=25°C	CCFL life time	-	10000	20000	-	Hour	Ta=25°C IL=4.0mA
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7B64PS 2706 – SX19V009-2 Page 6 - 1/3	6.1 OPTICAL CHARACTERISTICS OF LCD Revised : Viewing Area Range : X axle : 60 min. → 60 typ. Y axle : 35 min. → 35 typ.																																																		
7B64PS 2708 – SX19V009-2 Page 8 - 2/5	8.2 ELECTRICAL CHARACTERISTICS Revised : Ta=+0°C ~ -50°C → Ta=0°C ~ 40°C																																																		
7B64PS 2708 – SX19V009-2 Page 8 - 3/5	8.3 POWER SUPPLY AND SIGNAL SEQUENCE Added : Note 3 and Note 4																																																		
7B64PS 2709 – SX19V009-2 Page 9 - 1/1	9. OUTLINE DIMENSION Added : 17.3 and 10.0 dimension Revised : 20.45±0.5 → (20.45) 12.13±0.5 → (12.13)																																																		
7B64PS 2710 – SX19V009-2 Page 10 - 2/4~4/4	Revised : 10.3 APPEARANCE CRITERION 10.4 RELIABILITY TESTS																																																		
7B64PS 2711 – SX19V009-2 Page 11 - 1/1	Added : 11.3 WARRANTY PERIOD																																																		
7B64PS 2712 – SX19V009-2 Page 12 - 1/1	12.3 LOCATION OF LOT MARK : Revised : On the label attached on the back side of LCM → On the back side of LCM																																																		

RECORD OF REVISION

DATE	SHEET No.	SUMMARY
Dec.25,'03	7B64PS 2703 – SX19V009-3 Page 3 - 1/1	Revised : (6) with glare upper polarizer ↓ with Anti-glare upper polarizer
	7B63PS 2709 – SX19V009-3 Page 9 - 1/1	Added : FFC thickness 0.3±0.05 Delete : the (4.5) size at the Left & Bottom side of the LCM. Revised : Cable connector output position.

3. MECHANICAL DATA

No.	ITEM	CONTENTS	UNIT
(1)	Module Size	197.0(W) x 145.0(H) x 8.0(D)	mm
(2)	Viewing Area	(158.0)(W) x (118.0)(H)	mm
(3)	Dot Number	640 x3 (R.G.B)(W) x 480(H)	dots
(4)	Dot Size	0.064(W) x 0.222(H)	mm
(5)	Dot Pitch	0.079(W) x 0.237(H)	mm
(6)	LCD Type	<ul style="list-style-type: none"> •Color-STN (Negative type) •with Anti-glare upper polarizer and transmissive rear polarizer. •0.7mm thickness glass 	-
(7)	Contrast Ratio	(25)	-
(8)	Duty	1/484	-
(9)	Viewing Direction	6 O'clock	-
(10)	Operating Temperature	+0 ~ +50	°C
(11)	Storage Temperature	-20 ~ +70	°C
(12)	Backlight	Cold Cathode Fluorescent Lamp(CFL) x1	pcs
(13)	Power Supply Voltage	3.3V , 36.6V	-
(14)	Weight	(240)	g

4. ABSOLUTE MAXIMUM RATINGS

4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS. (Vss=0V)

Item	Symbol	Min.	Max.	Unit
Power Supply for Logic	V _{DD} -V _{SS}	-0.3	7.0	V
Power Supply for LCD Driver	V _{LCD} -V _{SS}	0	42.0	V
Input Voltage(Note 1)	V _I	V _{SS} -0.3	V _{DD} +0.3	V

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

Note 2 : Ta=25°C

Note 3 : Please be sure users are grounded when handling LCD module.
VSS=0V

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS.

Item	Operating		Storage		Remark
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	0°C	50°C	-20°C	70°C	(Note1,2,3)
Humidity	(Note 4)		(Note 4)		No Condensation
Vibration	-	2.45 m/s ²	-	11.76 m/s ² (Note 5)	1h max. (Note 6)
Shock	-	29.4 m/s ²	-	490 m/s ² (Note 5)	XYZ directions 11ms

Note 1 : Ta at -20°C-----< 48 h , at 70°C-----< 120 h.

Note 2 : Background color changes slightly depending on ambient temperature.
The phenomenon is reversible.

Note 3 : When LCM is operated at 5°C , the lift time of CFL will be reduced.
Need to make sure of value of IL and characteristics of inverter.
The response time at 5°C will be lower.

Note 4 : Ta ≤ 40°C : 85%RH max.

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

Note 5 : The module should be operated normally after the test is finished.

Note 6 : 5Hz~100Hz (Except resonance frequency)

5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS OF LCD

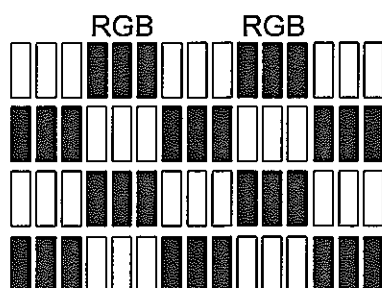
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply for Logic	V _{DD-VSS}	-	3.15	3.3	3.45	V
Power Adjustment Voltage (Note 1)	V _{LCD-VSS}	T _a = 5°C , ϕ=0°	-	-	40	V
		T _a =25°C , ϕ=0°	35.1	36.6	38.1	V
		T _a =40°C , ϕ=0°	32	-	-	V
Input Signal Voltage (Note 2)	V _{IH}	"H" Level	0.8V _{DD}	-	V _{DD}	V
	V _{IL}	"L" Level	0	-	0.2V _{DD}	
Power supply current (Logic) (Note 3)	I _{DD}	V _{DD} =3.3V	-	14	30	mA
Power Supply Current (LCD driver) (Note 3)	I _{LCD}	V _{DD} =3.3V	-	21	50	mA
Frame Frequency (Note 4)	f _{FLM}	-	-	(100)	(120)	Hz

Note 1 : In proportion as the V_{LCD} decrease the brightness will increase.

The value is specified as the voltage at which the optimum contrast is obtained.

Note 2 : FLM , CL1 , CL2 , DOFF , D0~D7.

Note 3 : f_{FLM}=(100)Hz , T_a=25°C , Display pattern is Black/White cross pattern as below.



Note 4 : Need to make sure that there is no flicker and ripple phenomenon when setting the Frame Frequency in your set.

5.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Starting Voltage	V _S	850	-	1500	V _{rms}	T _a =25°C
Lamp Voltage	V _L	-	443	-	V _{rms}	T _a =25°C
Frequency	f _L	40	60	80	kHz	T _a =25°C
Lamp Current	I _L	3.5	4.0	4.5	mArms	T _a =25°C
CCFL life time	-	10000	20000	-	Hour	T _a =25°C I _L =4.0mA

Note 1 : Starting voltage is higher when LCM at lower temperature.

Note 2 : Average life time of CFL will be decreased when LCM is operated at lower Temperature.

6. OPTICAL CHARACTERISTICS

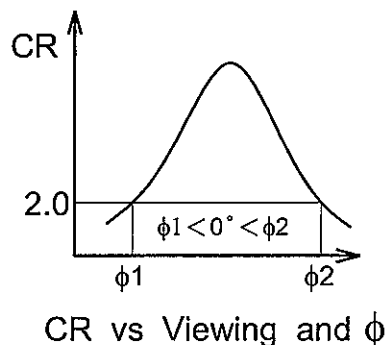
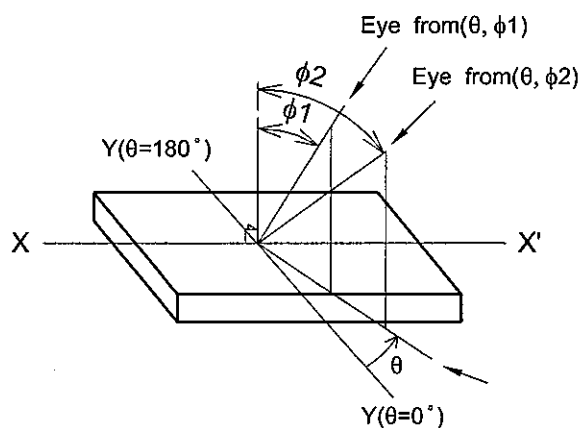
6.1 OPTICAL CHARACTERISTICS OF LCD

Ta=25 °C (Backlight on)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Viewing Area Range	$\phi 1, \phi 2$	$CR \geq 2$	X axle	-	60	-	Deg	Note 1,2
			Y axle	-	35	-		
Contrast Ratio	CR	$\phi = 0^\circ$	-	(25)	-	-	Note 3,4	
Response Time	Rise	tr	$\theta = 0^\circ, \phi = 0^\circ$	-	(340)	-	ms	Note 5
	Fall	tf	$\theta = 0^\circ, \phi = 0^\circ$	-	(100)	-	ms	
Color Tone (CIE Coordinate)	R	x	$\theta = 0^\circ, \phi = 0^\circ$	(0.44)	(0.49)	(0.54)	-	
		y		(0.30)	(0.35)	(0.40)	-	
	G	x		(0.28)	(0.33)	(0.38)	-	
		y		(0.44)	(0.49)	(0.54)	-	
	B	x		(0.15)	(0.20)	(0.25)	-	
		y		(0.16)	(0.21)	(0.26)	-	
	W	x		(0.27)	(0.32)	(0.37)	-	
		y		(0.30)	(0.35)	(0.40)	-	

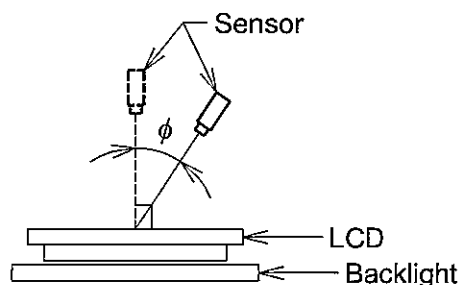
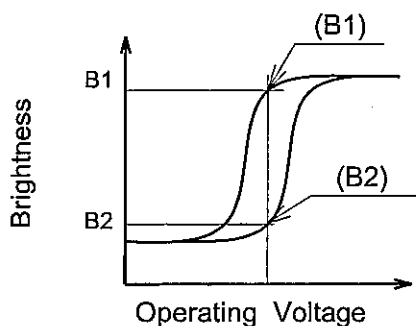
Note 1 : Definition of θ and ϕ

Note 2 : Definition of viewing angle $\phi 1$ and $\phi 2$



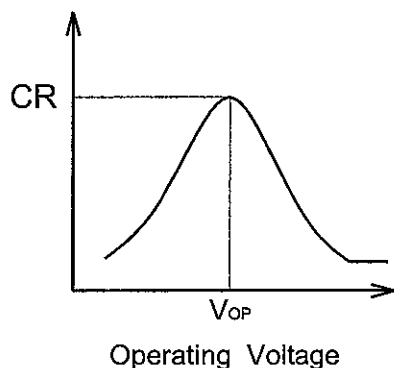
Note 3 : Definition of contrast ratio "CR"

$$CR = \frac{\text{Brightness on selected dot (B1)}}{\text{Brightness on non-selected dot (B2)}}$$

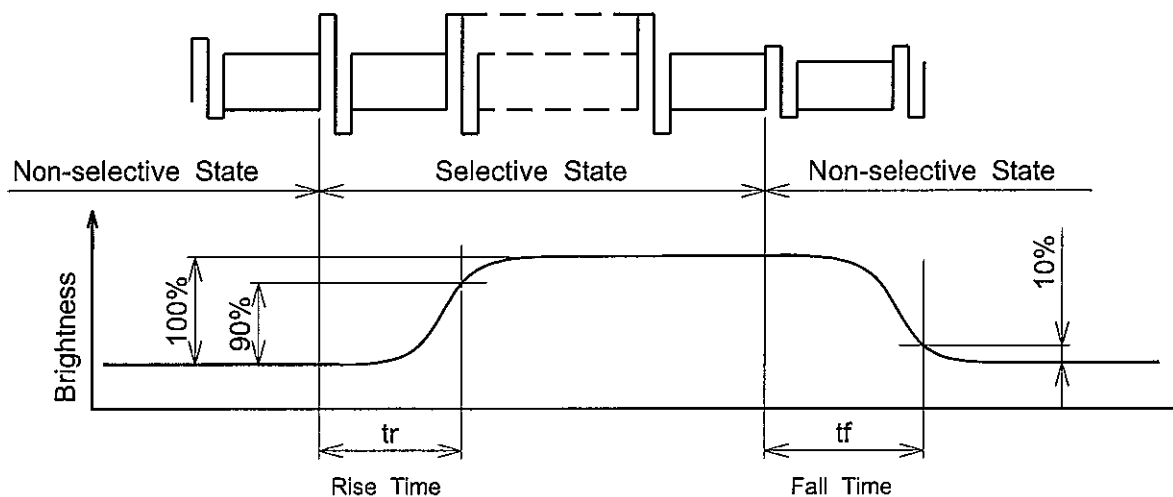


Sensor : BM-7
Aperture : 1°
Distance : 50cm

Note 4 : Definition of "CR" and "V_{OP}"



Note 5 : Definition of optical response time



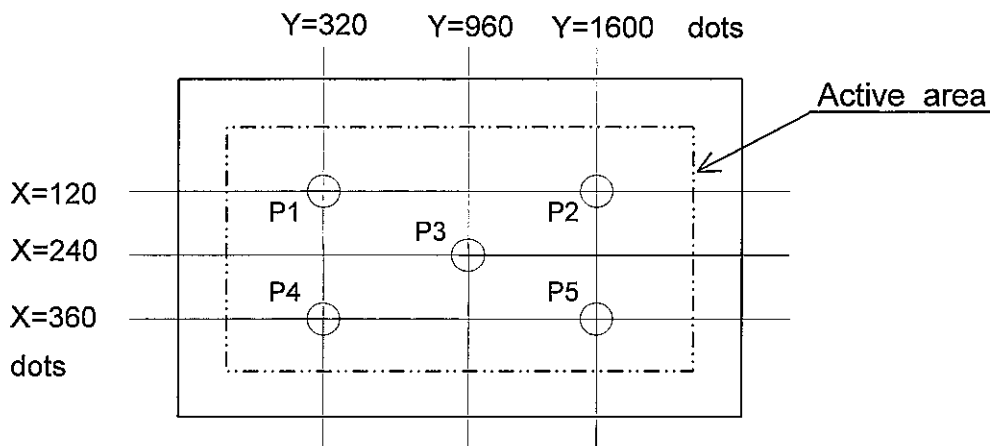
6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT

Item	Min.	Typ.	Max.	Unit	Remark
Brightness	-	(100)	-	cd/m ²	(Note 1,2,3)
Brightness Uniformity	-	-	±30	%	(Note 2,3,4)

Note 1 : Measurement Condition :

- Display data should be all "ON" (D0~D7=HIGH).
- V_{LCD} should be adjusted at the voltage where the peak contrast is obtained.
- Start measuring after CFL working 30 minutes.

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



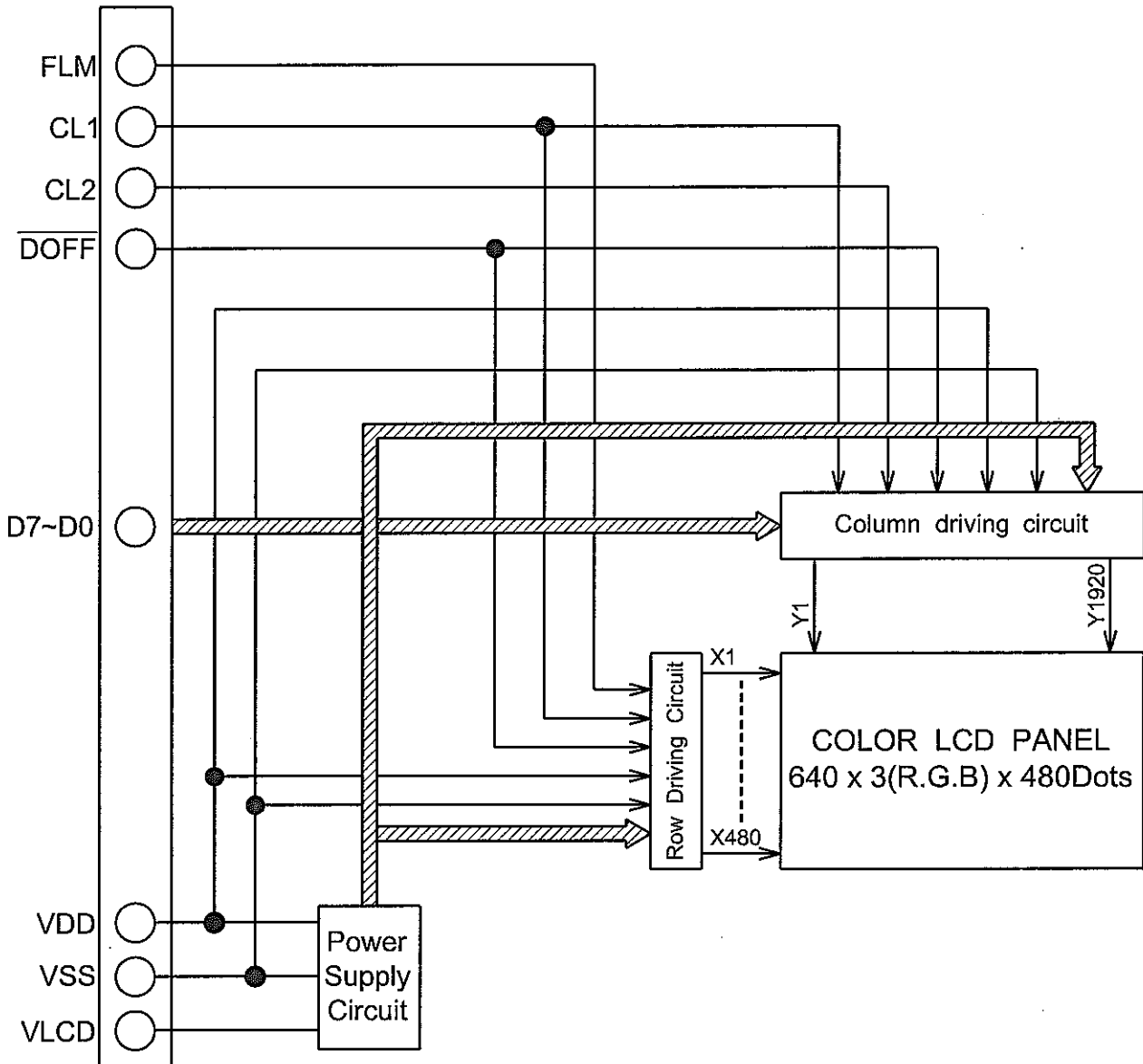
Note 3 :The brightness should be the average of P1~P5 point.

Note 4 : Definition of the brightness uniformity

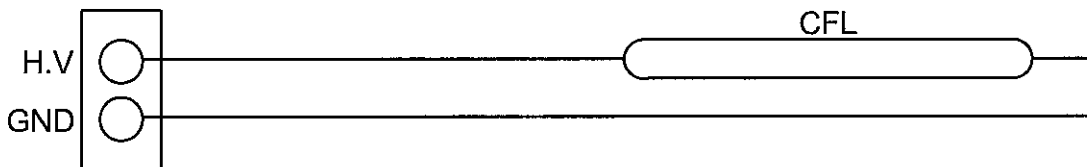
$$\left(\frac{\text{Max. brightness or Min. brogthness} - \text{Average brightness}}{\text{Average brightness}} \right) \times 100\%$$

7. BLOCK DIAGRAM

CN1

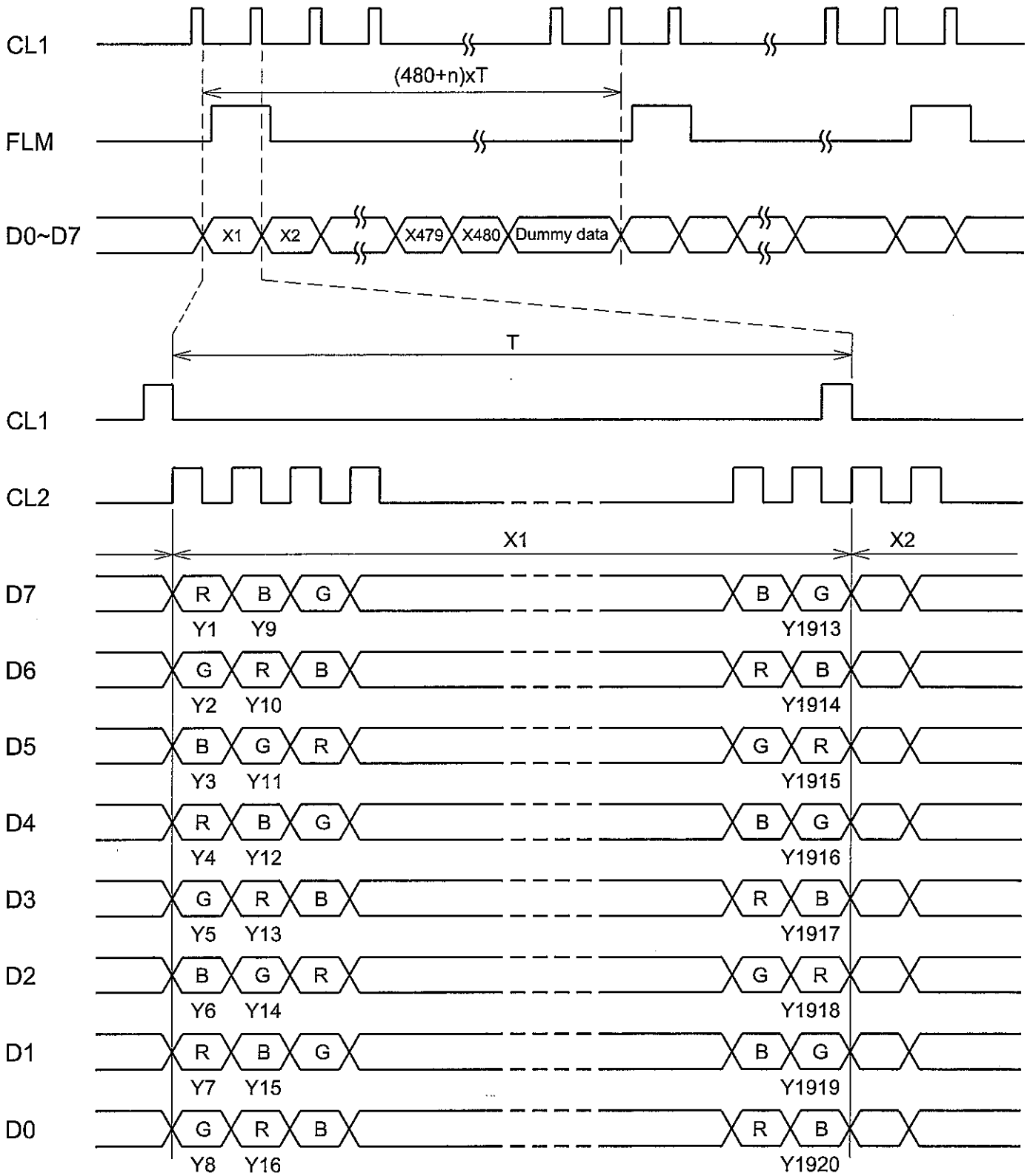


CN2



8. INTERFACE TIMING CHART

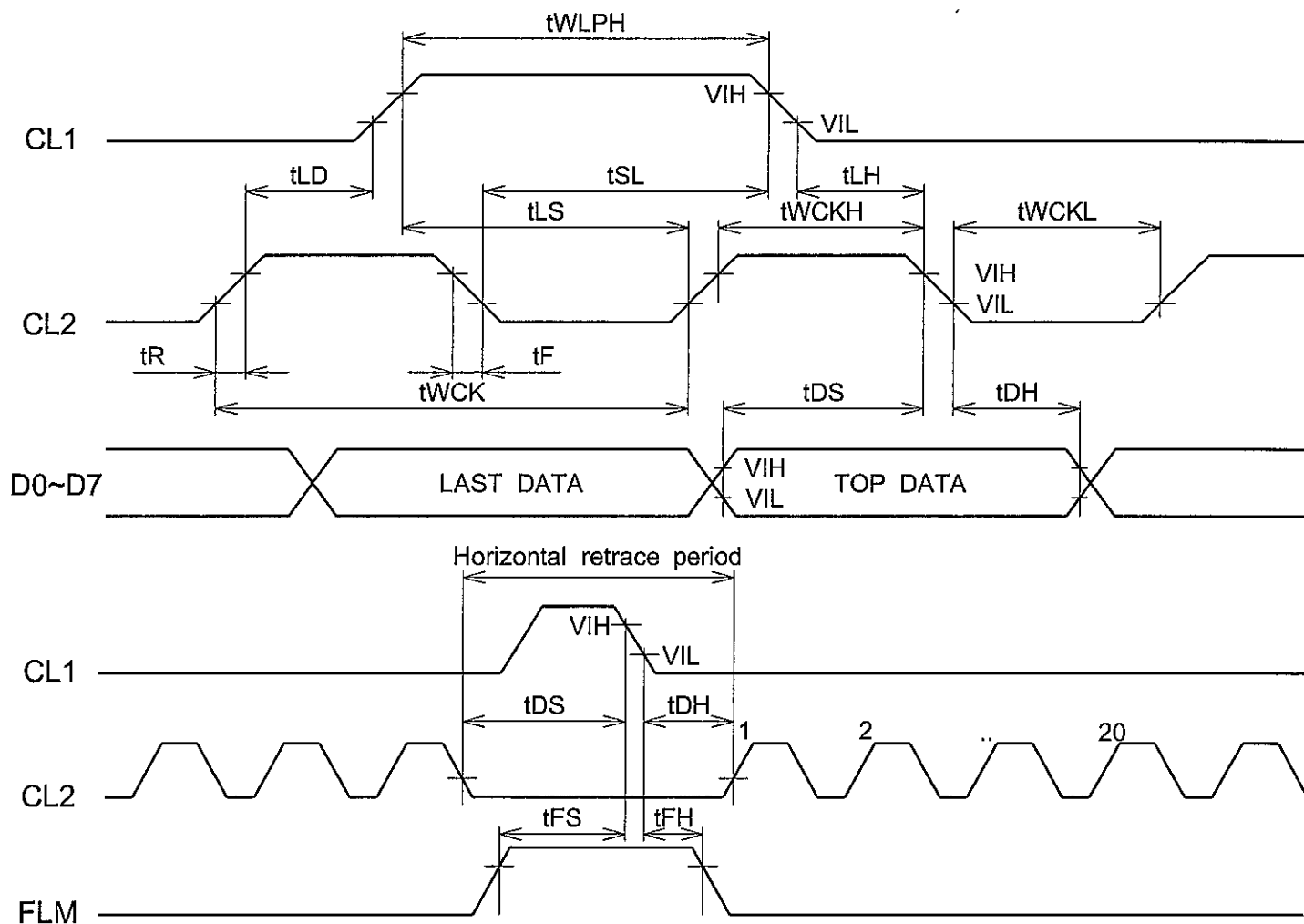
8.1 TIMING CHART



8.2 ELECTRICAL CHARACTERISTICS

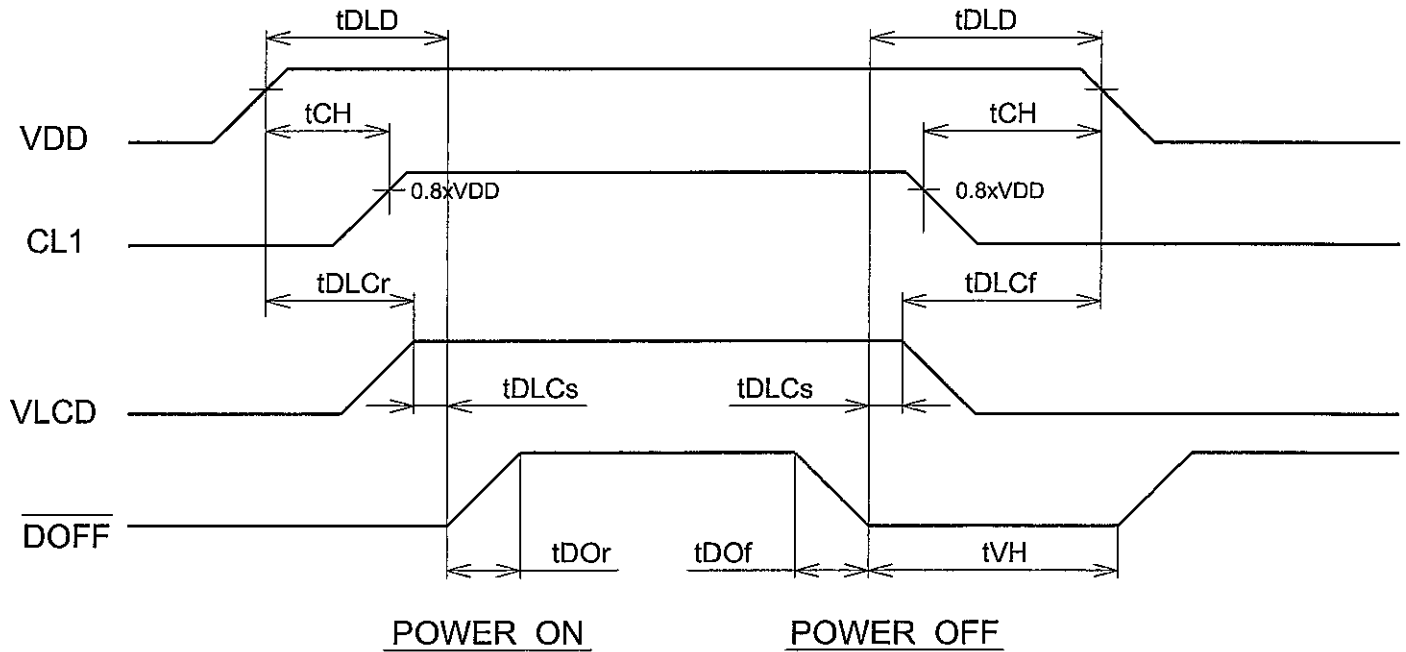
($V_{DD}=3.0\sim 4.5V$, $V_{LCD}=10.0\sim 42.0V$, $T_a=0^{\circ}C \sim 40^{\circ}C$)

Item	Symbol	Min.	Typ.	Max.	Unit
Shift clock period	tWCK	66	-	-	ns
Shift clock "H" pulse wide	tWCKH	23	-	-	ns
Shift clock "L" pulse wide	tWCKL	23	-	-	ns
Data setup time	tDS	10	-	-	ns
Data hold time	tDH	25	-	-	ns
Latch pulse "H" pulse wide	tWLPH	30	-	-	ns
Shift clock rise to latch pulse rise time	tLD	10	-	-	ns
Shift clock fall to latch pulse fall time	tSL	30	-	-	ns
Latch pulse rise to shift clock rise time	tLS	30	-	-	ns
Latch pulse fall to shift clock fall time	tLH	30	-	-	ns
Enable setup time	tTS	12	-	-	ns
Input signal rise time	tR	-	-	50	ns
Input signal fall time	tF	-	-	50	ns
Output delay	tD	-	-	44	ns
FLM setup time	tFS	30	-	-	ns
FLM hold time	tFH	50	-	-	ns



8.3 POWER SUPPLY AND SIGNAL SEQUENCE

Do not apply DC voltage to the LCD panel because that induces the electrochemical reaction and reduces its life time. Please follow the power supply ON/OFF sequence to prevent DC driving of LCD or latch-up of COMS LSI, as shown below.



Symbol	Min.	Max.	Unit	Comment
tDLD	200	—	ms	
tCH	0	—	ms	
tDOr	—	100	ns	
tDOF	—	100	ns	
tDLCr	20	—	ms	
tDLCf	20	—	ms	
tDLCs	20	—	ms	
tVH	200	—	ms	

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

Note 2 : Please use $\overline{\text{DOFF}}$ function to set display off. Switch by others different from the $\overline{\text{DOFF}}$ function may cause display deterioration.

Note 3 : $35.0\text{V} \leq V_{\text{LCD}} \leq 38.1\text{V}$

V_{LCD} voltage should be set up to adjusted voltage before $\overline{\text{DOFF}}$ signal arises. Otherwise, when $\overline{\text{DOFF}}$ signal arises, adjusted contrast image may not be generated.

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

8.4 INPUT DATA ALLOCATION TABLE

Data Signal	D7	D6	D5	D4	D3	D2	D1	D0	D7	D6	D5	D4	-----	D4	D3	D2	D1	D0
X \ Y	1	2	3	4	5	6	7	8	9	10	11	12	-----	196	197	198	199	200
	1	2	3	4	5	6	7	8	9	10	11	12	-----	196	197	198	199	200
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
6	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
7	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
8	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
9	R	G	B	R	G	B	R	G	B	R	G	B	-----	G	B	R	G	B
10	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

8.5 INTERFACE PIN CONNECTION

CN1 FFC : Pitch 1.0mm/Suitable Connector : 52207-2090(MOLEX)

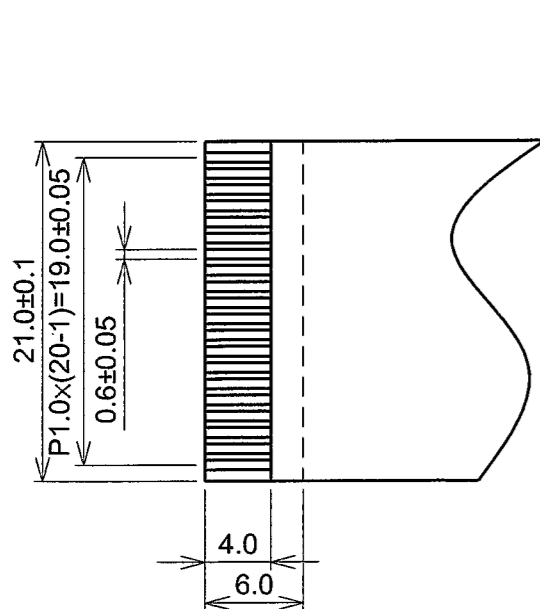
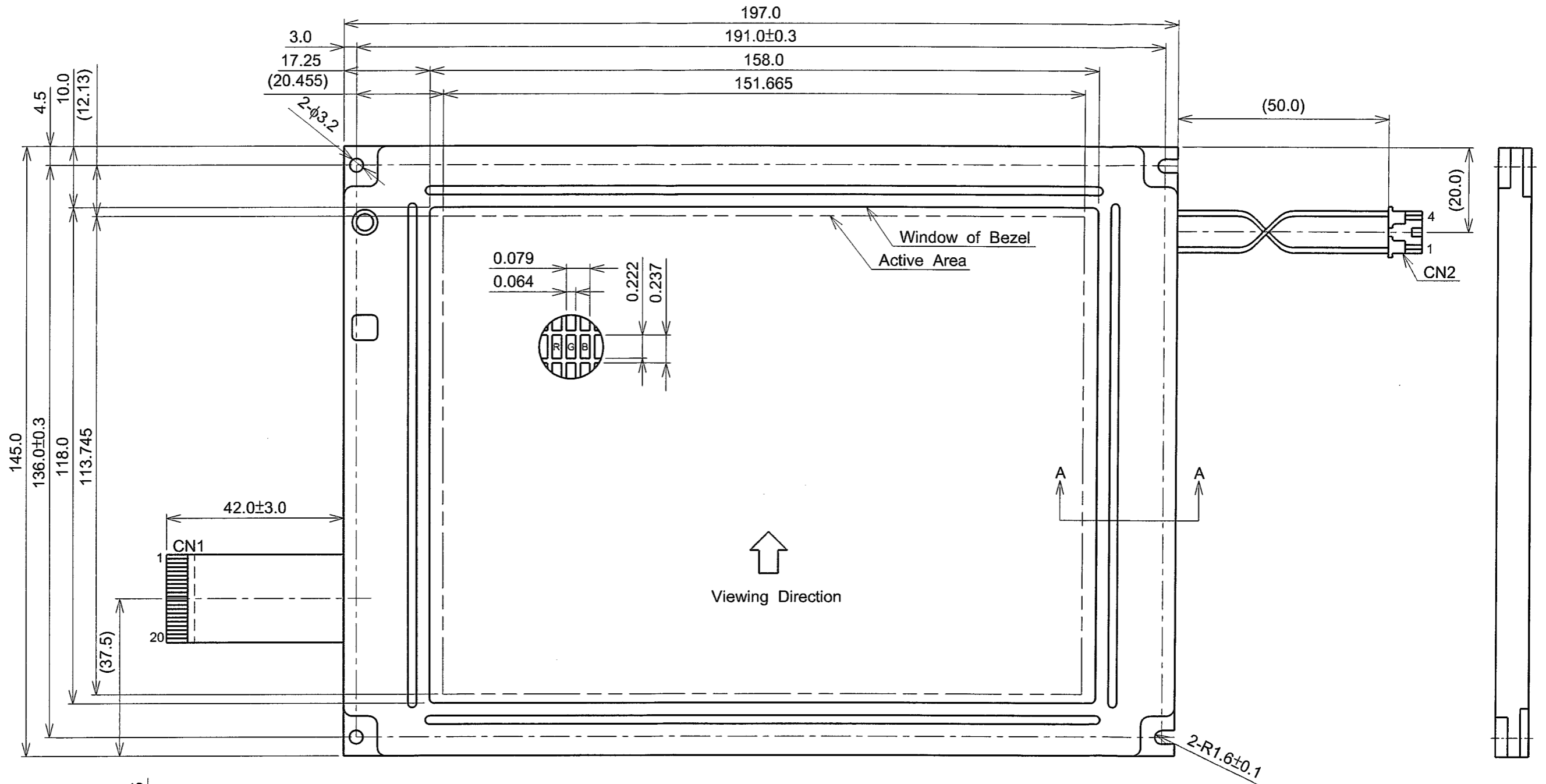
PIN NO.	SIGNAL	PIN FUNCTION
1	FLM	Scan Start-up Signal
2	V _{SS}	GND
3	CL1	Input Data Latch Signal
4	V _{SS}	GND
5	CL2	Data Shift Clock
6	V _{SS}	GND
7	D0	Display Data
8	D1	Display Data
9	D2	Display Data
10	D3	Display Data
11	D4	Display Data
12	D5	Display Data
13	D6	Display Data
14	D7	Display Data
15	$\overline{\text{DOFF}}$	Display Control Signal H : ON , L : OFF
16	V _{DD}	Logic Supply Voltage
17	V _{DD}	Logic Supply Voltage
18	V _{SS}	GND
19	V _{LCD}	Power Supply for LCD
20	V _{SS}	GND

CN2 : M63-M83-04(MITSUMI)

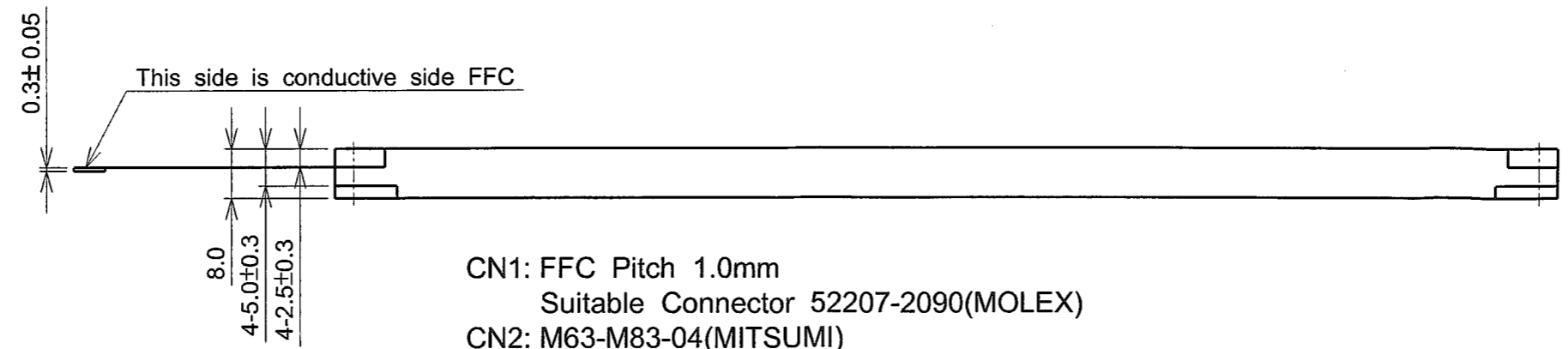
/Suitable connector : M61-M73-04(MITSUMI)<inter connector type>
M60-04-30-114P(MITSUMI)<srtaight type>
M60-04-30-134P(MITSUMI)<angle type>

PIN No.	SIGNAL	PIN FUNCTION
1	H.V	Power Supply Voltage for CFL
2	N.C	-----
3	N.C	-----
4	GND	CFL GND

9. OUTLINE DIMENSION

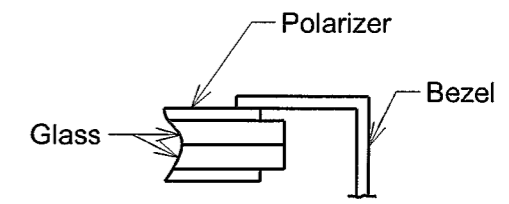


CN1 DETAIL



CN1: FFC Pitch 1.0mm
 Suitable Connector 52207-2090(MOLEX)
 CN2: M63-M83-04(MITSUMI)
 PIN-1: H.V ; PIN-4:GND

Note 1 : All dimensional tolerance unless otherwise specified±0.5
 Note 2 : Scale : NTS , Unit : mm



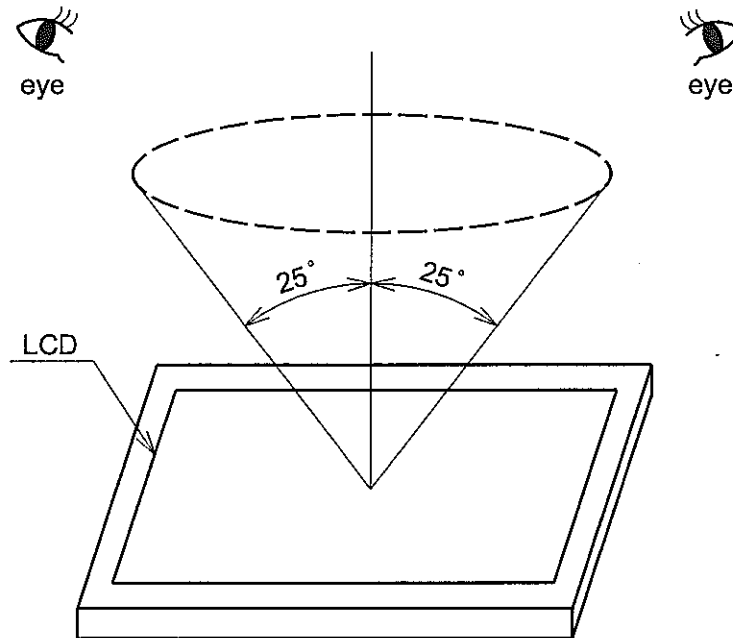
A - A sec.

10. APPEARANCE STANDARD

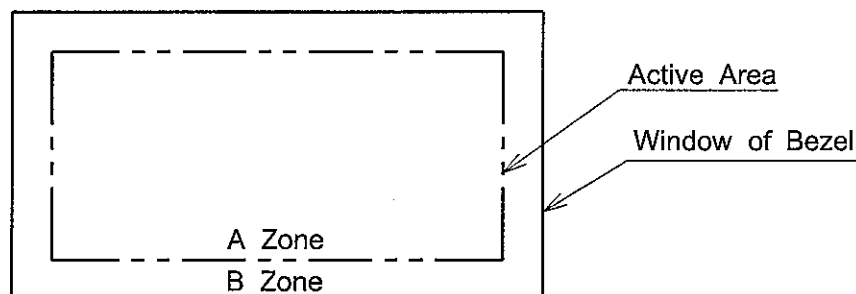
10.1 APPEARANCE INSPECTION

Appearance inspection should be done under the following condition.

- (1) In the dark room. The CFL should be lighted with the prescribed inverter.
- (2) The distance from eyes to LCD must be 25 cm.
- (3) Viewing direction must be within 25 degree to vertical line of LCD center.



10.2 DEFINITION OF A ZONE , B ZONE


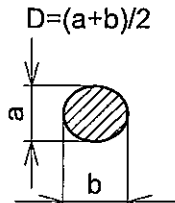


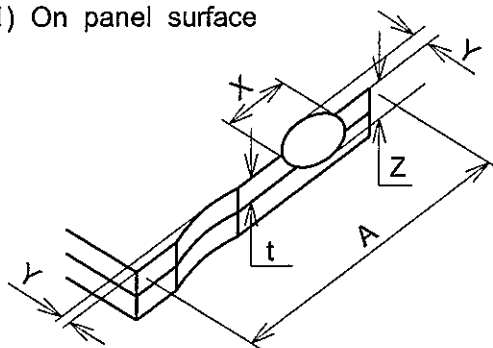
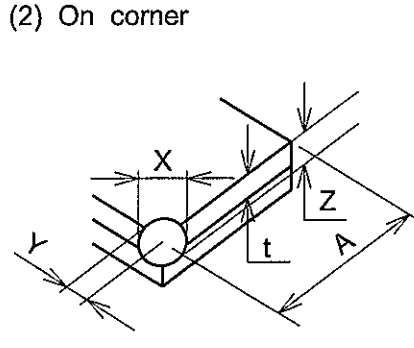
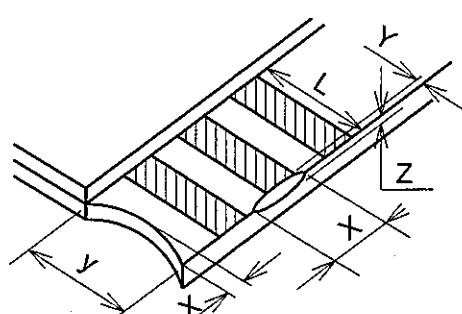
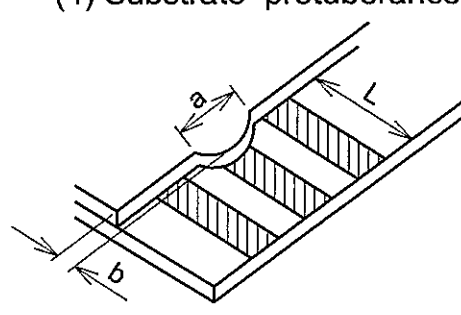
10.3 APPEARANCE CRITERION

Customer and supplier should hold a discussion when there is any problem about standard quality assurance or special quality assurance is needed.

Inspection Standard : MIL-STD-105E normal inspection level II

(1) LCD Appearance

No.	ITEM	CRITERION	Zone	AQL																																						
1	Stains Scratches Black Spots White Spots Foreign Particles	<p>Line Shape :</p> <table border="1"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>$L \leq 2.0$</td> <td>$W \leq 0.03$</td> <td>Disregard</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.03 < W \leq 0.05$</td> <td>6</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.05 < W \leq 0.1$</td> <td>1</td> </tr> <tr> <td>-</td> <td>$0.1 < W$</td> <td>As round shape</td> </tr> </tbody> </table>  <p>Round Shape :</p> <table border="1"> <thead> <tr> <th>Diameter</th> <th>Acceptable Q'ty</th> <th>Minimum Space</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.2$</td> <td>Disregard</td> <td>-</td> </tr> <tr> <td>$0.2 < D \leq 0.3$</td> <td>10</td> <td>10 mm</td> </tr> <tr> <td>$0.3 < D \leq 0.4$</td> <td>5</td> <td>30 mm</td> </tr> <tr> <td>$0.4 < D$</td> <td>0</td> <td>-</td> </tr> </tbody> </table>  <p>The total number of "Line" + "Round" is 10 max. Any defect wiped out easily is acceptable.</p>	Length	Width	Acceptable Q'ty	$L \leq 2.0$	$W \leq 0.03$	Disregard	$L \leq 3.0$	$0.03 < W \leq 0.05$	6	$L \leq 2.5$	$0.05 < W \leq 0.1$	1	-	$0.1 < W$	As round shape	Diameter	Acceptable Q'ty	Minimum Space	$D \leq 0.2$	Disregard	-	$0.2 < D \leq 0.3$	10	10 mm	$0.3 < D \leq 0.4$	5	30 mm	$0.4 < D$	0	-	A,B	2.5								
Length	Width	Acceptable Q'ty																																								
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2	Bubbles	<table border="1"> <thead> <tr> <th>Diameter</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.2$</td> <td>Disregard</td> </tr> <tr> <td>$0.2 < D \leq 0.3$</td> <td>12</td> </tr> <tr> <td>$0.3 < D \leq 0.5$</td> <td>3</td> </tr> <tr> <td>$0.5 < D$</td> <td>0</td> </tr> </tbody> </table>	Diameter	Acceptable Q'ty	$D \leq 0.2$	Disregard	$0.2 < D \leq 0.3$	12	$0.3 < D \leq 0.5$	3	$0.5 < D$	0	A,B	2.5																												
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$0.5 < D$	0																																									
3	Display Quality	<ul style="list-style-type: none"> Viewing angle defect. Missing dots or missing lines. Malfunction. Contrast ratio defect. Power consumption exceeds specification. 	A	0.65																																						
4	Color Tone Color Uniformity	To be judged by HITACHI Display Corporation	A	2.5																																						
5	Contrast Irregularity	<p>(1) Spot (Peak Contrast)</p> <table border="1"> <thead> <tr> <th>Diameter</th> <th>Acceptable Q'ty</th> <th>Minimum Space</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.25$</td> <td>Ignored</td> <td>-</td> </tr> <tr> <td>$0.25 < D \leq 0.35$</td> <td>10</td> <td>20 mm</td> </tr> <tr> <td>$0.35 < D \leq 0.5$</td> <td>4</td> <td>20 mm</td> </tr> <tr> <td>$0.5 < D \leq 0.7$</td> <td>3</td> <td>50 mm</td> </tr> <tr> <td>$0.7 < D$</td> <td>0</td> <td>-</td> </tr> </tbody> </table> <p>(2) Line (Peak contrast)</p> <table border="1"> <thead> <tr> <th>Width</th> <th>Length</th> <th>Acceptable Q'ty</th> <th>Minimum Space</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.10$</td> <td>$L \leq 3.0$</td> <td>4</td> <td>20 mm</td> </tr> <tr> <td>$W \leq 0.15$</td> <td>$L \leq 2.0$</td> <td>3</td> <td>20 mm</td> </tr> <tr> <td>$W \leq 0.20$</td> <td>$L \leq 1.5$</td> <td>3</td> <td>20 mm</td> </tr> <tr> <td>$W \leq 0.25$</td> <td>$L \leq 1.2$</td> <td>2</td> <td>20 mm</td> </tr> </tbody> </table> <p>(1)+(2) The total number of "Spot"+"Line" is 8 max.</p>	Diameter	Acceptable Q'ty	Minimum Space	$D \leq 0.25$	Ignored	-	$0.25 < D \leq 0.35$	10	20 mm	$0.35 < D \leq 0.5$	4	20 mm	$0.5 < D \leq 0.7$	3	50 mm	$0.7 < D$	0	-	Width	Length	Acceptable Q'ty	Minimum Space	$W \leq 0.10$	$L \leq 3.0$	4	20 mm	$W \leq 0.15$	$L \leq 2.0$	3	20 mm	$W \leq 0.20$	$L \leq 1.5$	3	20 mm	$W \leq 0.25$	$L \leq 1.2$	2	20 mm	A	2.5
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No.	ITEM	CRITERION	AQL																							
6	Chips (LCD Panel)	(1) On panel surface 	2.5																							
		(2) On corner 																								
		<table border="1"> <thead> <tr> <th>Z</th> <th>Y</th> <th>X</th> </tr> </thead> <tbody> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$X \leq 1/8A$</td> </tr> <tr> <td>$1/2 < Z \leq 2t$</td> <td>Not exceed 1/3S</td> <td>$X \leq 1/8A$</td> </tr> </tbody> </table> <p>S : Seal area , X is total length if there are 2 or more chips.</p>		Z	Y	X	$Z \leq 1/2t$	Not over viewing area	$X \leq 1/8A$	$1/2 < Z \leq 2t$	Not exceed 1/3S	$X \leq 1/8A$														
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$1/2 < Z \leq 2t$	Not exceed 1/3S	$X \leq 1/8A$																								
(3) On electrode pad 																										
		(4) Substrate protuberance 																								
		<table border="1"> <thead> <tr> <th>Y</th> <th>y</th> <th>X</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$Y \leq 0.5$</td> <td>$y \leq L$</td> <td>$X \leq 1/8A$</td> <td>$0 < Z \leq t$</td> </tr> </tbody> </table> <p>On rear side of electrode pad</p> <table border="1"> <thead> <tr> <th>Y</th> <th>y</th> <th>X</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$Y \leq 1.0$</td> <td>$y \leq L$</td> <td>$X \leq 1/8A$</td> <td>$t/2 < Z \leq t$</td> </tr> <tr> <td>$Y \leq 2.0$</td> <td>$y \leq L$</td> <td>$X \leq 1/8A$</td> <td>$0 < Z \leq t$</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>a</th> <th>b</th> </tr> </thead> <tbody> <tr> <td>$a \leq A$</td> <td>$b \leq 1/3L$</td> </tr> </tbody> </table> <p>Extensive crack is not acceptable.</p>	Y	y	X	Z	$Y \leq 0.5$	$y \leq L$	$X \leq 1/8A$	$0 < Z \leq t$	Y	y	X	Z	$Y \leq 1.0$	$y \leq L$	$X \leq 1/8A$	$t/2 < Z \leq t$	$Y \leq 2.0$	$y \leq L$	$X \leq 1/8A$	$0 < Z \leq t$	a	b	$a \leq A$	$b \leq 1/3L$
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$Y \leq 2.0$	$y \leq L$	$X \leq 1/8A$	$0 < Z \leq t$																							
a	b																									
$a \leq A$	$b \leq 1/3L$																									

(2) CFL Backlight Appearance

No.	ITEM	CRITERION	Zone	AQL		
1	Dark Spots White Spots Foreign Material (Spot)	Average Diameter D(mm)	A	2.5		
		$D \leq 0.4$			Maximum Acceptable Number	
		$0.4 < D$			Ignored	
2	Foreign Materials(Line)	Width W(mm)	A	2.5		
		$W \leq 0.2$			Length L(mm)	Maximum Acceptable Number
		$0.2 < W$			$L \leq 2.5$	1
			$2.5 < L$	None		
			-	None		
3	Scratches	Width W(mm)	A	2.5		
		$W \leq 0.1$			Length L(mm)	Maximum Acceptable Number
		$0.1 < W \leq 0.2$			-	Ignored
		$0.2 < W$			$L \leq 11.0$	1
			$11.0 < L$	None		
			-	None		

10.4 RELIABILITY TESTS

This standard reliability test is done only for the first lot of MP products. Customer and supplier must hold a discussion if other reliability test is requested by customer.

No.	TEST ITEM	TEST CONDITION
1	High Temperature and High Humidity Under Storage	40°C , 90%RH 120hrs
2	High Temperature and High Humidity Under Operation	40°C , 90%RH 72hrs
3	High Temperature Under Storage	70°C , 120hrs
4	Low Temperature Under Storage	-20°C , 120hrs
5	Thermal Shock (Under Storage)	-20°C ← 25°C ← 60°C 30min → 5min → 30min ←—————→ 1 cycle total 5 cycles
6	Drop Test (Packing Box With Full Samples Inside)	(X,Y,Z) x2 total 6 directions drop from 1 meter to ground
7	ESD Test (Electro Staic Discharge Test)	± 2.0 kV 1 time for each terminal

- Operation : Supply 3.3V for logic system and V_{LCD} voltage for LCD module.

11. PRECAUTIONS FOR USE

11.1 PRECAUTIONS FOR OPERATION

- (1) Since LCD panel is made of glass , in order to prevent from glass broken or color tone change , please do not apply any mechanical shock or impact or excessive force to it when installing the LCD module.
- (2) If LCD panel is broken and liquid crystal substance leaks out and contact your skin or clothes , please immediately wash it off by using soap and water.
- (3) The polarizer on the LCD surface is soft and easily scratched. Please be careful when handling.
- (4) If LCD surface becomes contaminated , please wipe it off gently by using moisten soft cloth with normal hexane , do not use acetone , ketone , ethanol , isopropyl alcohol or water. If there is saliva or water on the LCD surface , please wipe it off immediately.
- (5) When handling LCD module , please be sure that the body and the tools are properly grounded. And do not touch I/F pins with bare hands or contaminate I/F pins.
- (6) Do not attempt to disassemble or process the LCD module.
- (7) LCD module should be used under recommended operating conditions shown in chapter 5 and 6.
- (8) Response time will be extremely slower at lower temperature than at specified temperature and LCD will show different color when at higher temperature. The phenomenon will disappear when returning to specified condition.
- (9) Foggy dew , moisture condensation or water droplets deposited on surface and contact terminals will cause polarizer stain or damage , the deteriorated display quality and electrochemical reaction then leads to the shorter life time and permanent damage to the module probably. Please pay attention to the environmental temperature and humidity.

11.2 PRECAUTIONS FOR STORAGE

- (1) Please store LCD module in a dark place , avoid exposure to sunlight , the light of fluorescent lamp or any ultraviolet ray.
- (2) Keep the environment temperature at between 10°C and 30°C and at normal humidity. Avoid high temperature , high humidity or temperature below 0°C.
- (3) That keeps the LCD modules stored in the container shipped from supplier before using them is recommended.
- (4) Do not leave any article on the LCD module surface for an extended period or time.

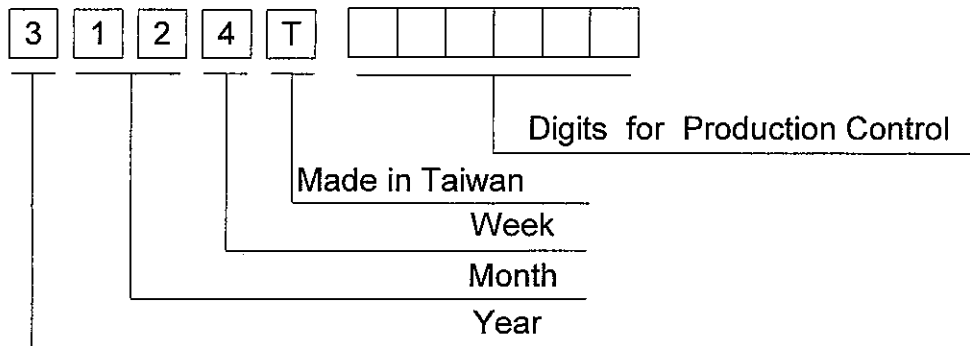
11.3 WARRANTY PERIOD

HITACHI warrants for a period of 12 months from the shipping date when stored or used under normal condition.

12. DESIGNATION OF LOT MARK

12.1 LOT MARK

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



YEAR	FIGURE IN LOT MARK
2003	3
2004	4
2005	5
2006	6

MONTH	FIGURE IN LOT MARK	MONTH	FIGURE IN LOT MARK
Jan.	01	Jul.	07
Feb.	02	Aug.	08
Mar.	03	Sep.	09
Apr.	04	Oct.	10
May	05	Nov.	11
Jun.	06	Dec.	12

WEEK (DAY IN CALENDAR)	FIGURE IN LOT MARK
01~07	1
08~14	2
15~21	3
22~28	4
29~31	5

12.2 REVISION

REV. No.	ITEM	LOT No.
A		000001~

12.3 LOCATION OF LOT MARK : On the back side of LCM

Example:

HITACHI SX19V009 3124T
MADE IN TAIWAN REV. A 000001