HITACHI

KAOHSIUNG HITACHI
ELECTRONICS CO.,LTD
P.O. BOX 26-27
2,13TH EAST ST. K.E.P.Z.
KAOHSIUNG TAIWAN
R.O.C.
TEL:(07) 8211101(10 LINE)
TELEX:81903 KHE
FAX:(07) 841-8211

FOR MESSRS. _____ DATE. SEP.17.'98

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

SX19V001-ZZB

CONTENTS

No.	ITEM	SHEET No.	PAGE
1	COVER	7B64PS 2701-SX19V001-ZZB-2	1-1/1
2	RECORD OF REVISION	7B64PS 2702-SX19V001-ZZB-2	2-1/1
3	MECHANICAL DATA	7B64PS 2703-SX19V001-ZZB-2	3-1/1
4	ABSOLUTE MAXIMUM RATINGS	7B64PS 2704-SX19V001-ZZB-2	4-1/1
5	ELECTRICAL CHARACTERISTICS	7B64PS 2705-SX19V001-ZZB-2	5-1/2~2/2
6	OPTICAL CHARACTERISTICS	7B64PS 2706-SX19V001-ZZB-2	6-1/3~3/3
7	BLOCK DIAGRAM	7B64PS 2707-SX19V001-ZZB-2	7-1/1
8	INTERFACE TIMING CHART	7B64PS 2708-SX19V001-ZZB-2	8-1/4~4/4
9	DIMENSIONAL OUTLINE	7B63PS 2709-SX19V001-ZZB-2	9-1/2
		7B64PS 2709-SX19V001-ZZB-2	9-2/2
10	APPEARANCE STANDARD	7B64PS 2710-SX19V001-ZZB-2	10-1/7~7/7
11	PRECAUTION IN DESIGN	7B64PS 2711-SX19V001-ZZB-2	11-1/3~3/3
12	DESIGNATION OF LOT MARK	7B64PS 2712-SX19V001-ZZB-2	12-1/1
13	PRECAUTION FOR USE	7B64PS 2713-SX19V001-ZZB-2	13-1/1

* WHEN PRODUCT WILL BE DISCONTINUED, CUSTOMER WILL BE INFORMED BY HITACHI WITH TWELVE MONTHS PRIOR ANNOUNCEMENT.

ACCEPTED BY; _____ PROPOSED BY; Y.T.Wang

RECORD OF REVISION

DATE	SHEET No.	SUMMARY
SEP.17.'98	7B64PS 2709-SX19V001-ZZB-2 PAGE 9-1/2	9.1 DIMENSIONAL OUTLINE REVISE CFL CONNECTOR NUMBER.
	7B64PS 2709-SX19V001-ZZB-2 PAGE 9-2/2	9.2 INTERAL PIN CONNECTION REVISE CFL CONNECTOR PIN NO: 1^{ST} PIN GND $\rightarrow$ H.V 4^{th} PIN H.V $\rightarrow$ GND
	7B64PS 2710-SX19V001-ZZB-2 PAGE 10-1/7	10.2 DEFINITION OF ZONE (1) LCD ZONE REVISE A ZONE DEFINITION REVISE B ZONE DEFINITION
	7B64PS 2710-SX19V001-ZZB-2 PAGE 10-2/7	(2) TOUCH PANEL ZONE REVISE THE DEFINITION AND DRAWING.

3. MECHANICAL DATA

(1)	NUMBER OF DOTS	640 * 3 (R,G,B)(W) * 480 (H)DOTS
(2)	DOT SIZE	0.056(W)mm * 0.214(H)mm
(3)	DOT PITCH	0.079(W)mm * 0.237(H)mm
(4)	MODULE SIZE	197.0(W)mm * 145.0(H)mm * 11.0max.(D)mm
(5)	DUTY	1/480
(6)	VIEWING DIRECTION	6 O'CLOCK
(7)	DRIVING VOLTAGE	36.6 TYP (AT25°C)
(8)	CONTRAST	25 TYP. (AT25°C) (INCLUDING TOUCH PANEL)
(9)	RESPONSE TIME (Tr+Tf)	550 ms (AT25°C)
(10)	BRIGHTNESS	60 cd/m^2 TYP.. (ICFL=4.0mA)
(11)	BACKLIGHT POWER	1.0 w (EXCEPT INVERTER)
(12)	LCD	•12 FILM TYPE COLOR (NEGATIVE TYPE) •THE UPPER POLARIZER IS GLARE TYPE. THE BUTTOM POLARIZER IS •TRANSMISSIVE TYPE
(13)	TOUCH SCREEN	•MAKER : SMK •SIZE : 181.0 (W)mm * 143.0(H)mm •SURFACE : ANTI-GLARE HARD COAT,(3H) OPERATING •WITH PEN : 0.05~0.3N : PON; SR 0.8mm •WITH FINGER : 0.05~0.5N : SILICON RUBBER ; ϕ12, SR 0.8mm

4. ABSOLUTE MAXIMUM RATINGS

4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS. VSS=0V:STANDARD

ITEM		SYMBOL	MIN.	MAX.	UNIT	COMMENT
POWER SUPPLY FOR LOGIC		VDD-VSS	0	7.0	V	
POWER SUPPLY FOR LC DRIVE		VLDD-VSS	0	42.0	V	
INPUT VOLTAGE		Vi	-0.3	VDD+0.3	V	NOTE 1
INPUT CURRENT		Ii	0	1	A	
STATIC ELECTRICITY		VESD0	-	+/-100	V	NOTE 2,3,4
		VESD1	-	+/-10	KV	NOTE 2,3,5
TOUCH SCREEN	VOLTAGE	-	-	7	V	DC
	CURRENT	-	-	25	mA	
	OPERATING TEMP	-	0	50	°C	HUMIDITY 20 -90%RH
	STORAGE TEMP	-	-25	70	°C	HUMIDITY 20 -95%RH

NOTE(1):DISP.OFF,FLM,CL1,CL2,D0~D7.
NOTE(2):.MAKE CERTAINS YOU ARE GROUNDED WHEN HANDLING LCM.
NOTE(3):ENERGY STORAGE CAPACITANCE 200PF,DISCHARGE RESISTANCE 250Ω Ta=25°C,60%RH.
NOTE(4):CONTACT DISCHARGE TO I/F CONNECTOR PINS.
NOTE(5):CONTACT DISCHARGE TO FRONT METAL BEZEL.

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS.

I T E M	OPERATING		STORAGE		COMMENT
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	5°C	50°C	-20°C	60°C	NOTE 2,3,7
HUMIDITY	NOTE 1		NOTE 1		WITHOUT CONDENSATION
VIBRATION	-	$2.45m/s^2$ (0.25G)	-	$11.76m/s^2$ (1.2G) NOTE 5	NOTE 4 1 HOUR MAX.
SHOCK	-	$29.4m/s^2$ (3G)	-	$490.0m/s^2$ (50G) NOTE 5	XYZ DIRECTIONS
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1) Ta<=40°C :85%RH max.
Ta > 40°C :ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 85%RH AT 40°C.
NOTE (2) Ta AT -20°C------< 48HRS,AT 60°C------< 168HRS.
NOTE (3) BACKGROUND COLOR CHANGES SLIGTLY DEPENDING ON AMBIENT TEMPERATURE.THIS PHENOMENON IS REVERSIBLE.
NOTE (4) 5Hz~100Hz(EXCEPT RESONANCE FREQUENCY)
NOTE (5) THIS MODULE SHOULD BE OPERATED NORMALLY AFTER FINISH THE TEST.
NOTE (6) WHEN LCM WILL BE OPERATED AT 5°C,THE LIFE TIME OF CFL WILL BE REDUCED. NEED TO MAKE SURE OF VALUE OF IL AND CHARACTERISTICS OF INVERTER. ALSO THE RESPONSE TIME AT 5°C WILL BE SLOWER.
NOTE (7) THERE ARE POSSIBILITY THAT COLOR UN-UNIFORMITY HAPPENED WHILE OPERATION AT 50°C.

5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS OF LCD

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD-VSS	-	3.15	3.3	5.15	V
POWER SUPPLY VOLTAGE FOR LC DRIVING	VLCD-VSS	-	-	-	40	V
INPUT VOLTAGE NOTE 1	VI	H LEVEL	0.8VDD	-	VDD	V
		L LEVEL	0	-	0.2VDD	V
INPUT LEAK CURRENT NOTE 2	Iih	VIN=VCC or GND Ta=25°C	-	-	+/-0.1	μA
POWER SUPPLY CIRCUIT FOR LC DRIVING NOTE 2	ILCD	VDD-VSS=3.3V VLCD-VSS=36.6V	10	20	30	mA
POWER SUPPLY CIRCUIT FOR LOGIC CURRENT NOTE 2	IDD	VDD-VSS=3.3V VLCD-VSS=36.6V	8	16	25	mA
RECOMMENDED LC DRIVING VOLTAGE NOTE 3	VLCD-VSS	Ta= 5°C , ϕ=0°	-	37.6	-	V
		Ta=25°C , ϕ=0°	-	36.6	-	V
		Ta=40°C ,. ϕ=0°	-	35.6	-	V
FRAME FREQUENCY NOTE 4	fFLM	VDD>3.15V	70	120	(140)	Hz

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

NOTE 2 fFLM=75HZ , TEST PATTERN IS ALL “Q” .
VLCD-VSS=36.6V,Ta=25°C.

NOTE 3 RECOMMENDED LC DRIVING VOLTAGE FLUCTUATE ABOUT +/-1.0V BY EACH MODULE..
TEST PATTERN IS ALL “Q”.

NOTE 4 NEED TO MAKE SURE OF FLICKERING AND RIPPLING OF DISPLAY WHEN SETTING THE FRAME FREQUENCY IN YOUR SET.

5.1-1TOUCH SCREEN

ITEM	SPECIFICATIONS	REMARKS
VOLTAGE	5VDC	
CURRENT	<10 mA	
LEAD TO LEAD RESISTANCE	X : 400Ω~900Ω	
	Y : 250Ω~700Ω	
INSULATION RESISTANCE	>25MΩ@25VDC	
CONTACT BOUNCE	<10 ms	NOTE (1)

NOTE (1) : HIT ANY POINT WITHIN THE EFFECTIVE AREA INA NORMAL MANNER (2 TO 3 HITS A SECDND WITH A FORCE OF ABOUT 2N)

5.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
LAMP VOLTAGE	VL	-	(450)	-	Vrms	Ta=25°C
FREQUENCY	fL	(60)	(70)	(85)	KHz	
LAMP CURRENT	IL	(3.5)	(4.0)	(5.0)	mA	Ta=25°C
STARTING DISCHARGE VOLTAGE	VS NOTE 2	(1400)	-	-	Vrms	Ta=5°C

NOTE 1 PLEASE DESIGN YOUN LAMP DRIVING CIRCUIT(INVERTER) ACCORDING TO THE ABOVE SPECIFICATIONS,AND INFORM HITACHI OF IT.

NOTE 2 STARTING DISCHARGE VOLTAGE IS INCREASED WHEN LCM IS OPERATING AT LOWER TEMPERATURE.
PELASE CHECK THE CHARACTERISTICS OF YOUT INVERTER BEFORE APPLING TO YOUR SET.

NOTE 3 AVERAGE LIFE TIME OF CFL WILL BE DECREASED WHEN LCM IS OPERATING AT LOWER TEMPERATURE.

NOTE 4 UNDER LOWER DRIVING FREQUENCY OF AN INVERTER, A CERTAIN BACKLIGHT SYSTEM (CFL & CFL REFLECTION SHEET) MAY GENERATE A SOUND NOISE BEFORE DESIGNING THE INVERTER.

NOTE 5 WHEN ICFL IS USED OVER 5.0mA, IT MAY CAUSE UNEVEN CONTRAST NEAR CFL LOCATION, DUE TO HEAT DISPERSION FROM CFL.

NOTE 6 SUITABLE INVERTE INVC445.

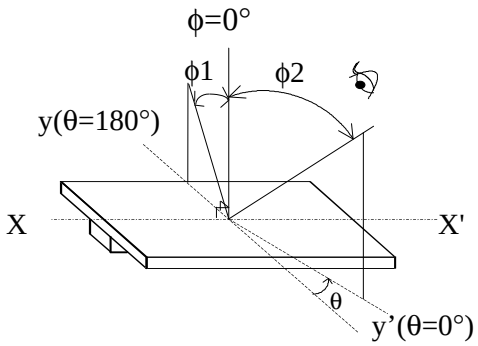
6. OPTICAL CHARACTERISTICS

6.1 OPTICAL CHARACTERISTICS OF LCD Ta=25 (BACKLIGHT ON)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA		$\phi 2-\phi 1$	$\theta=0°$,K>=2.0	-	40	-	deg	1,2
CONTRAST RATIO		K	$\phi=0°$ $\theta=0°$	-	25	-	-	3,5,6
RESPONSE TIME (RISE)		tr	$\phi=0°$ $\theta=0°$	-	350	-	ms	4
RESPONSE TIME (FALL)		tf	$\phi=0°$ $\theta=0°$	-	200	-	ms	4
COLOR TONE (PRIMARY COLOR)	RED	x	$\phi=0°$ $\theta=0°$	-	(0.57)	-	-	7
		y		-	(0.33)	-	-	
	GREEN	x		-	(0.29)	-	-	
		y		-	(0.55)	-	-	
	BLUE	x		-	(0.17)	-	-	
		y		-	(0.14)	-	-	
	WHITE	x		-	(0.29)	-	-	
		y		-	(0.30)	-	-	

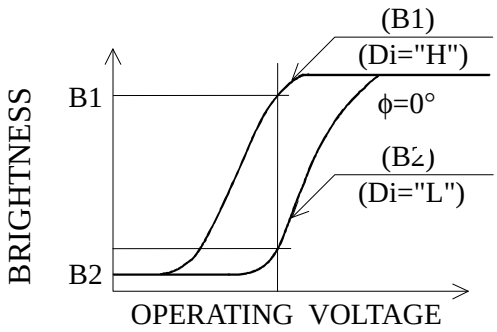
(MEASUREMENT CONDITION ; HITACHI STANDARD)

NOTE 1.DEFINITION OF θ AND ϕ (NORMAL)
VIEWING DIRECTION 2

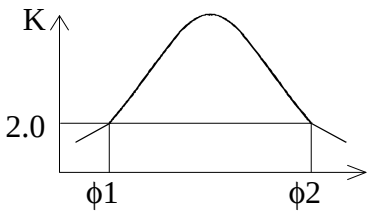


NOTE 3.DEFINITION OF CONTRAST "K"

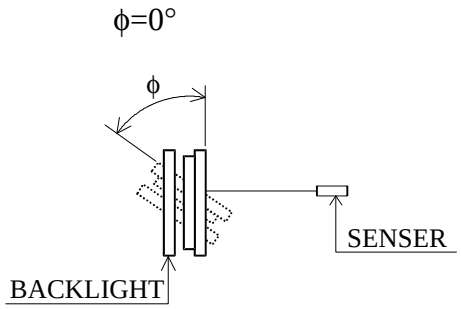
$$K=\frac{\text{BRIGHTNESS ON SELECTED DOT (B1)}}{\text{BRIGHTNESS ON NON-SELECTED DOT (B2)}}$$



NOTE 2.DEFINITION OF VIEWING ANGLE
ϕ1 AND ϕ2
(-40°)<ϕ1<0°<ϕ2<(40°)

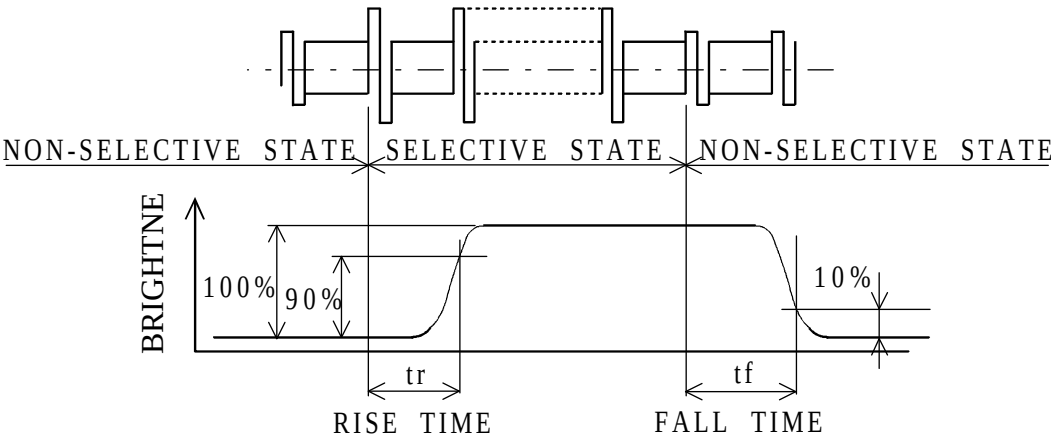


CONTRAST RATIO K VS VIEWING ANGLE ϕ



CONTRAST : PRICHARD 1980A-PL
APERTURE : 0.2°
DISTANCE : 0.4m
BRIGHTNESS : BM-7
APERTURE : 1°
DISTANCE : 0.4m
CONTRAST & BRIGHTNESS : BM-7
APERTURE : 1°
DISTANCE : 0.4m

NOTE 4.DEFINITION OF OPTICAL RESPONSE TIME



NOTE5. HITACHI WILL NOT DO 100% INSPECTION FOR MINIMUM VALUE. MINIMUM VALUE IS FOR REFERENCE.
NOTE6. HITACHI WILL DO SAMPLING INSPECTION FOR MINIMUM VALUE.
NOTE7. THE LCD DRIVING VOLTAGE SHOULD BE ADJUSTED AT THE VOLTAGE WHERE THE PEAK CONTRAST IS OBTAINED.

6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT

ITEM	MIN.	TYP.	MAX.	UNIT	NOTE
BRIGHTNESS	-	60	-	cd/m^2	IL=4.0Ma NOTE 1,2
RISE TIME	-	3	-	MINUTE	IL=4.0mA BRIGHTNESS 80%
BRIGHTNESS UNIFORMITY	-	-	+/-30	%	UNDERMENTIONED NOTE 1,3

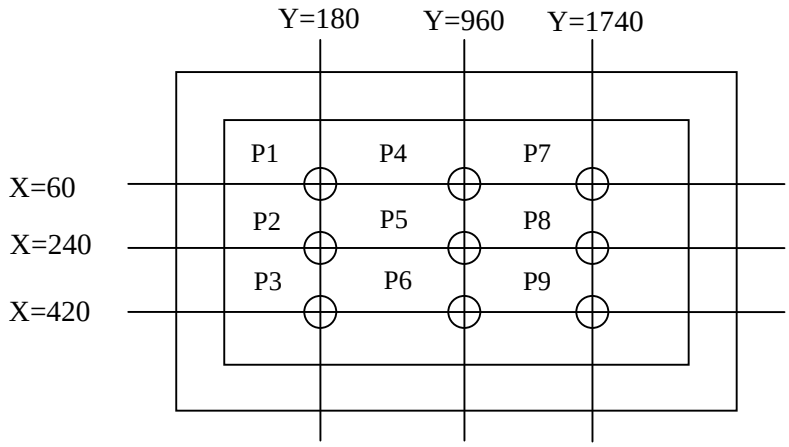
(MEASUREMENT CONDITION:HITACHI STANDARD)

CFL : INITIAL, Ta=25°C, THE LCD DRIVING SHOULD BE ADJUSTED AT VOLTAGE WHERE THE PEAK CONTRAST IS OBTAINED, WHEN SET PATTERN IS ALL "Q" DISPLAY DATA SHOULD BE ALL "ON".

NOTE 1 MEASUREMENT AFTER 10 MINUTES OF CFL OPERATING.
MEASUREMENT CONDITION : SEE NOTE3 ON PAGE 6-1/2.

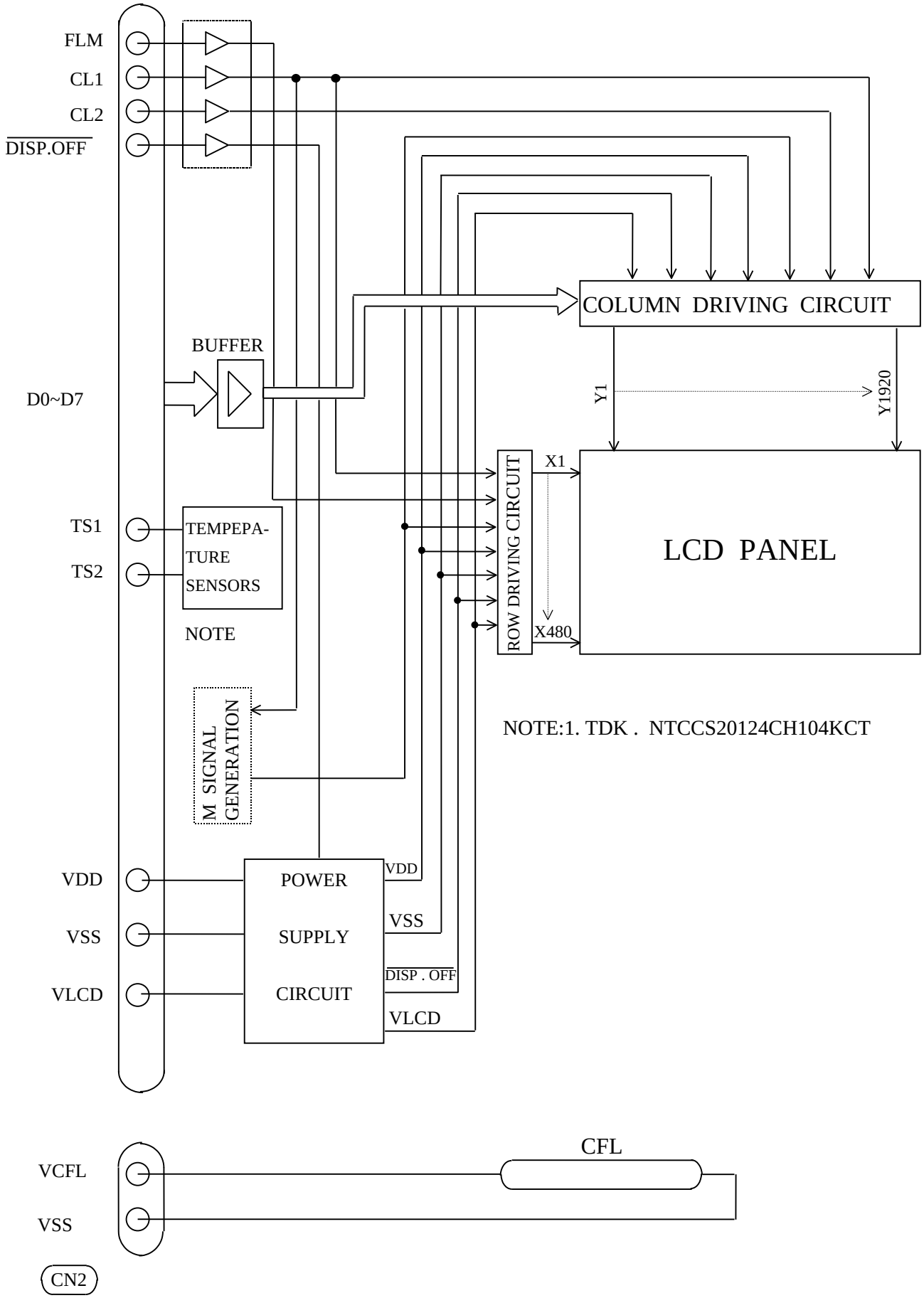
NOTE 2 BRIGHTNESS CONTROL : 100%.

NOTE 3 MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.
DEFINITION OF THE BRIGHTNESS TOLERANCE.



$$\left(\frac{\text{MAX BRIGHTNESS OR MIN BROGHTNESS - AVERAGE BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}}\right) *100$$

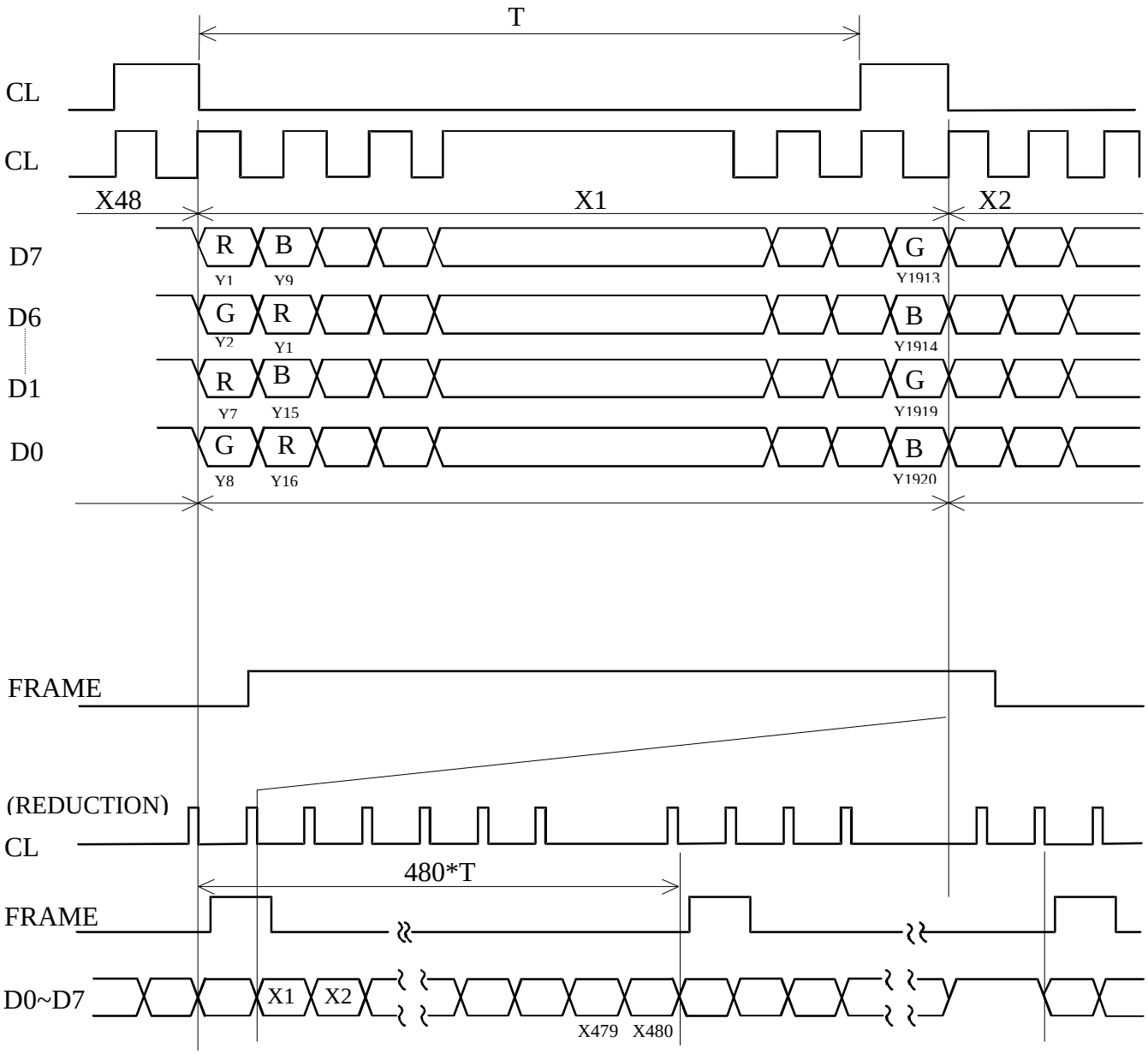
7. BLOCK DIAGRAM



KAOHSIUNG HITACHI ELECTRONICS CO.,LTD.	DATE	SEP.17.'98	Sh. No.	7B64PS 2707-SX19V001-ZZB-2	PAGE	7-1/1

8. INTERFACE TIMING CHART

8.1 TIMING CHART

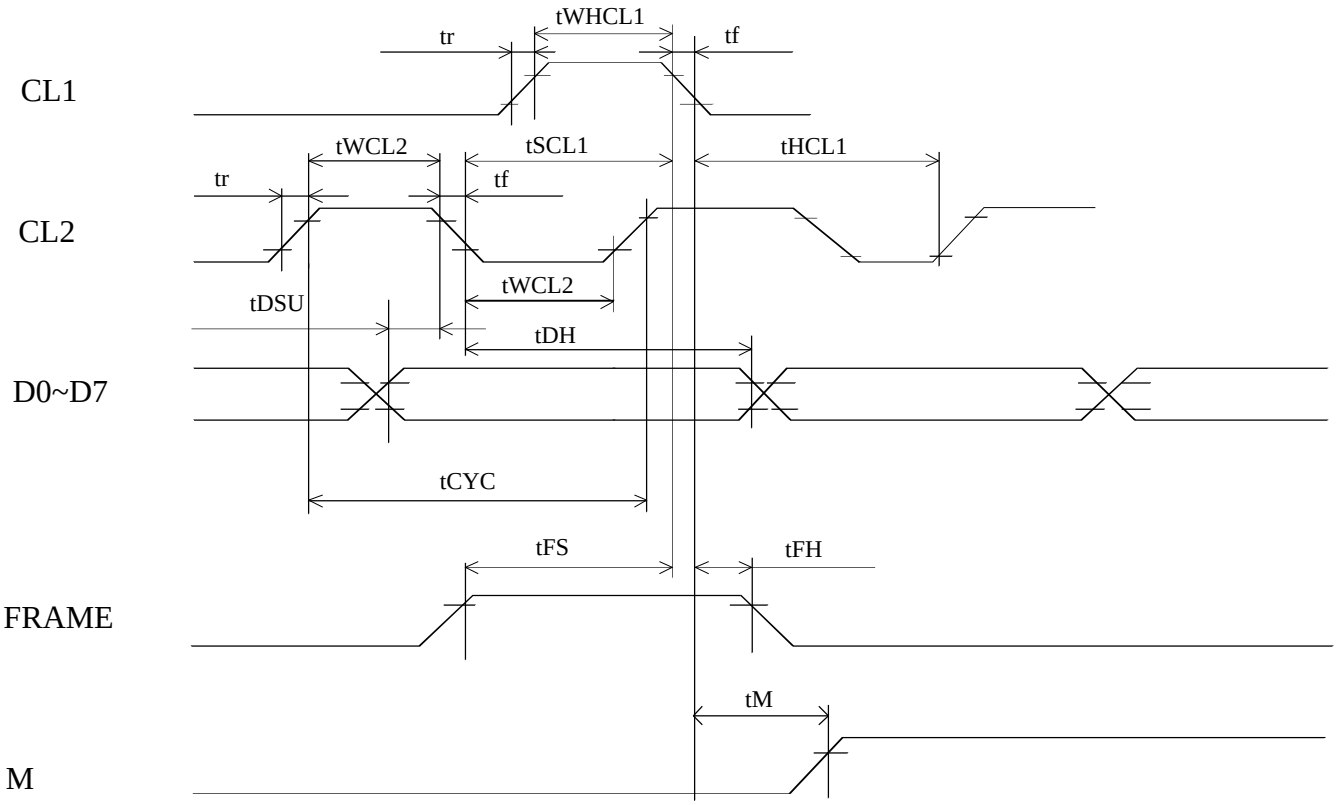


8.2 INTERFACE TIMING SPECIFICATION

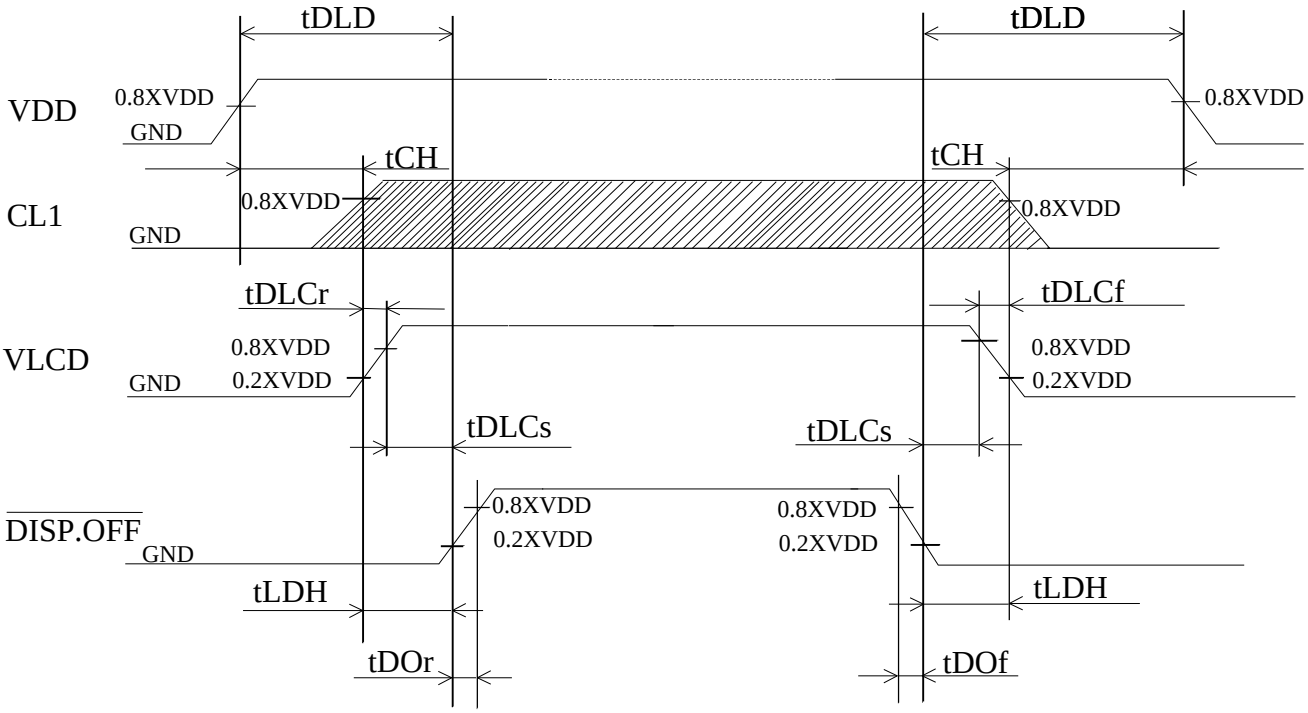
(VDD=3.15~5.5V)

ITEM	SYMBOL		MIN.	TYP.	MAX.	UNIT
CL1 PULSE WIDTH "H"	tWHCL1		30	-	-	ns
CLOCK FREQUENCY	fcp	VDD=3.15~5.5V	-	-	16.6	MHz
CL2 PULSE WIDTH	tWCL2		25	-	-	ns
CLOCK SET UP TIME	tSCL1		100	-	-	ns
CLOCK HOLD TIME	tHCL1		100	-	-	ns
CLOCK RISE UP TIME	tr,tf		-	-	50 NOTE(1)	ns
DATA SET UP TIME	tDSU		20	-	-	ns
DATA HOLD TIME	tDH		25	-	-	ns
"FRAME" SET UP TIME	tFS		100	-	-	ns
"FRAME" HOLD TIME	tFH		30	-	-	ns
"M" DELAY TIME	tM		-	-	300	ns

NOTE 1 : (1) $tr.tf \frac{1/fcp-2tWCL2}{2}$ (2)tr,tf<=50ns



8.3 POWER ON/OFF SEQUENCE

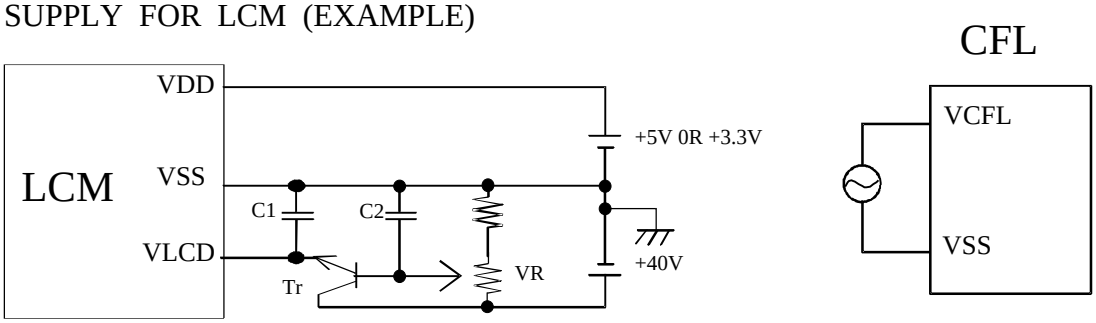


SYMBOL	MIN	MAX	UNIT	COMMENT
tDLD	200	-	ms	(NOTE 1)
tCH	0	200	ms	
tLDH	0	-	ms	
tDOr	-	100	ns	(NOTE 2)
tDOf	-	100	ns	
tDLCr	0	-	ms	
tDLCf	0	-	ms	
tDLCs	100	-	ms	

(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 $\overline{\text{DISP.OFF}}$ FUNCTION. DISPLAY QUALITY MAY DETERIORATE IF YOU DON'T USE $\overline{\text{DISP.OFF}}$ FUNCTION.

8.4 POWER SUPPLY FOR LCM (EXAMPLE)



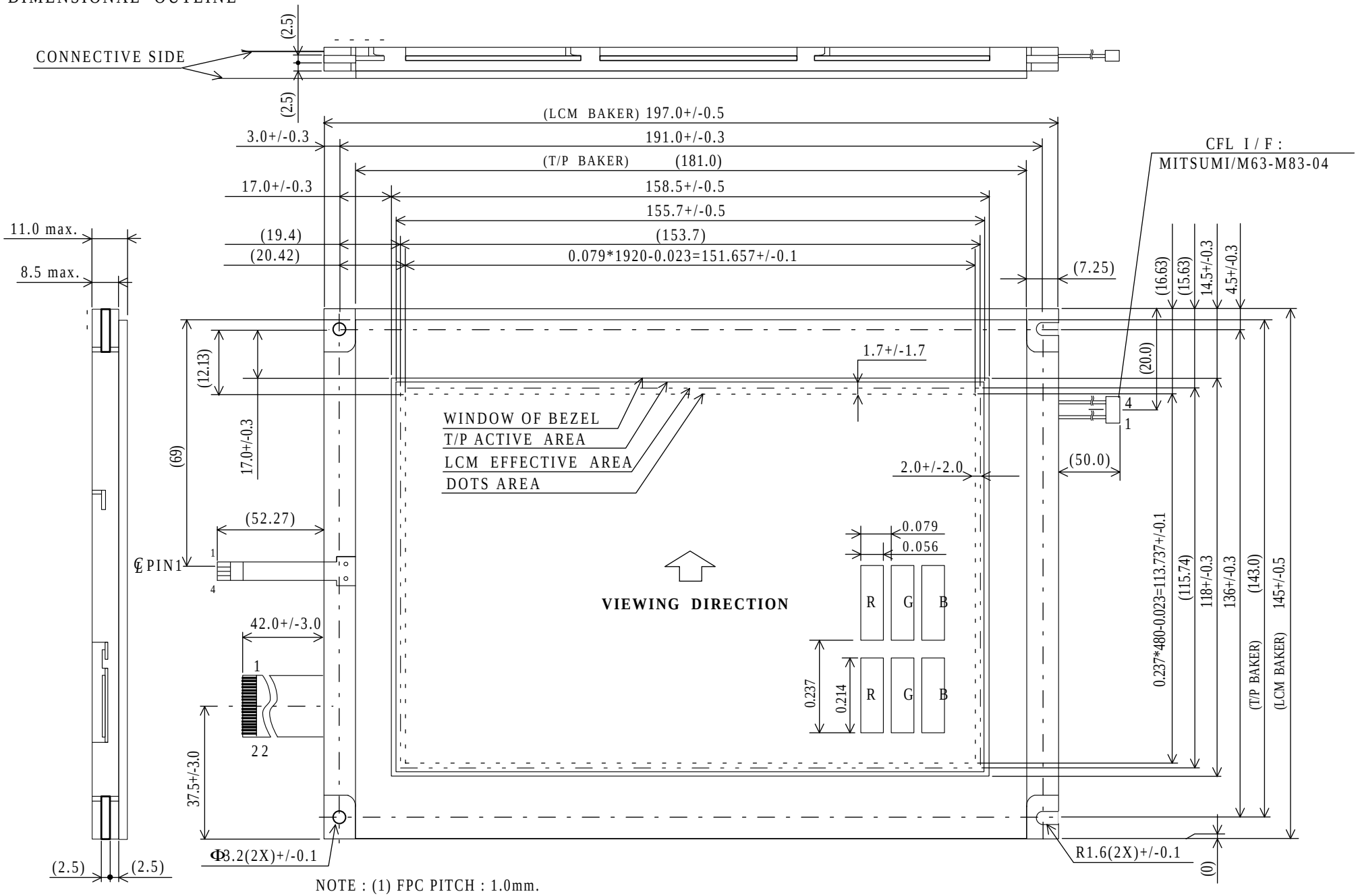
NOTE 1 VR : 10kΩ
C1 : 10 μ μF
C2 : 3.3μF
Tr : Ic(PEEK)SHOULD BE LARGER THAN 1A(PEEK)*25ms

8.5 DATA RESPOND

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 / 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
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .		. . .	. . .	. . .	. . .	. . .
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
241	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
242	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
243	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
244	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
245	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

9.1 DIMENSIONAL OUTLINE



NOTE : (1) FPC PITCH : 1.0mm.
(2) SUITABLE CONNECTOR : IL-402-22S-S1L-SA (MAKER:JAE)
(3) TOUCH PANEL : (SMK)

KAOSHIUNG HITACHI ELECTRONICS CO., LTD	Date	SEP.17.'98	Sh. No.	7B63PS 2709-SX19V001-ZZB-2	Page	9-1/2

9.2 INTERNAL PIN CONNECTION

FPC : PITCH 1.0mm

SUITABLE CONNECTOR : IL-402-22S-S1L-SA(MAKER:JAE)

PIN No.	SIGNAL	LEVEL	FUNCTION
1	FLM	H	FIRST LINE MARKER
2	VSS	-	GND
3	CL1	H→L	DATA LATCH
4	VSS	-	GND
5	CL2	H→L	DATA SHIFT
6	VSS	-	GND
7	D0	H/L	DISPLAY DATA
8	D1		
9	D2		
10	D3		
11	D4		
12	D5		
13	D6		
14	D7		
15	DISP.OFF	H/L	H:ON/L:OFF
16	VDD	-	POWER SUPPLY FOR LOGIC
17	VDD	-	POWER SUPPLY FOR LOGIC
18	VSS	-	GND
19	VLCD	-	POWER SUPPLY FOR LC
20	VSS	-	GND
21	TS1	-	TEMPERATURE SENSOR PIN1
22	TS2	-	TEMPERATURE SENSOR PIN2

CFL I/F : MITSUMI M63-M83-04

SUITABLE CONNECTOR :MITSUMI M61M73-04

MITSUMI M60-04-30-114P(STRAIGHT)

MITSUMI M60-04-30-134P(ANGLE)

PIN No.	SIGNAL	LEVEL	FUNCTION
1	HV	-	POWER SUPPLY FOR CFL
2	N.C	-	-
3	N.C	-	-
4	GND	-	CFL GND

TOUCH PANEL I/F

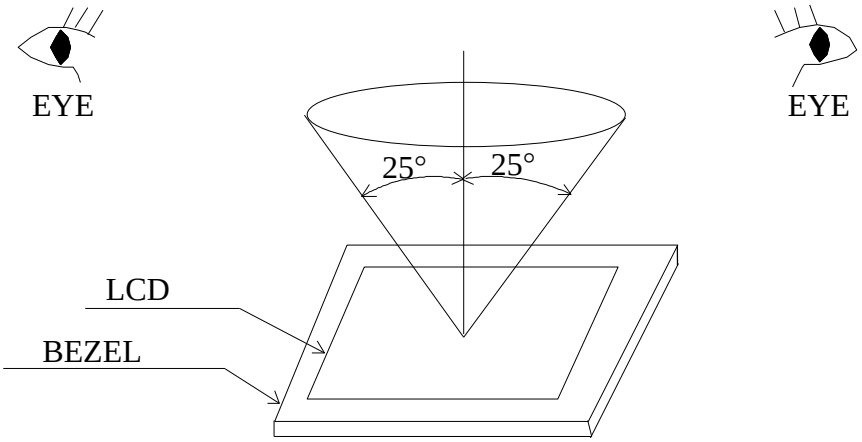
PIN No.	SIGNAL	LEVEL	FUNCTION
1	Y(-)	-	TOP
2	X(-)	-	LEFT
3	Y(+)	-	BOTTOM
4	X(+)	-	RIGHT

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 PRESCRIBED INVERTER.
(3) THE DISTANCE BETWEEN EYES OF AN INSPECTOR AND THE LCD MODULE IS 25cm.
(4) THE VIEWING ZONE IS SHOWN THE FIGURE.
VIEWING ANGLE<=25°.

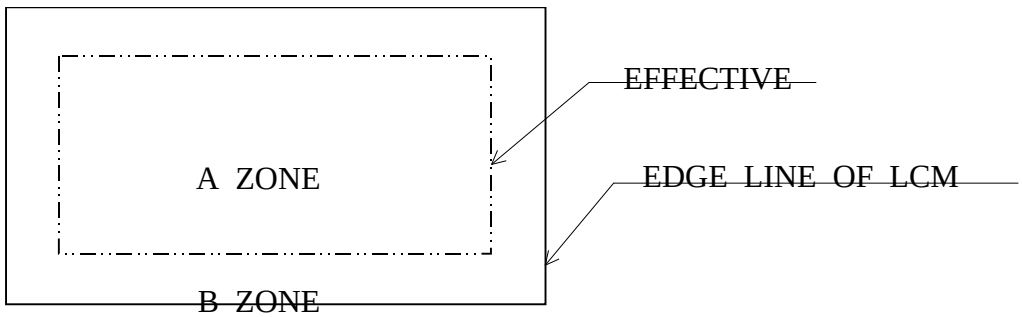


10.2 DEFINITION OF ZONE

(1) LCD ZONE

A ZONE : WITHIN THE EFFECTIVE AREA SPECIFIED AT PAGE 9-1/1 OF THIS DOCUMENT.

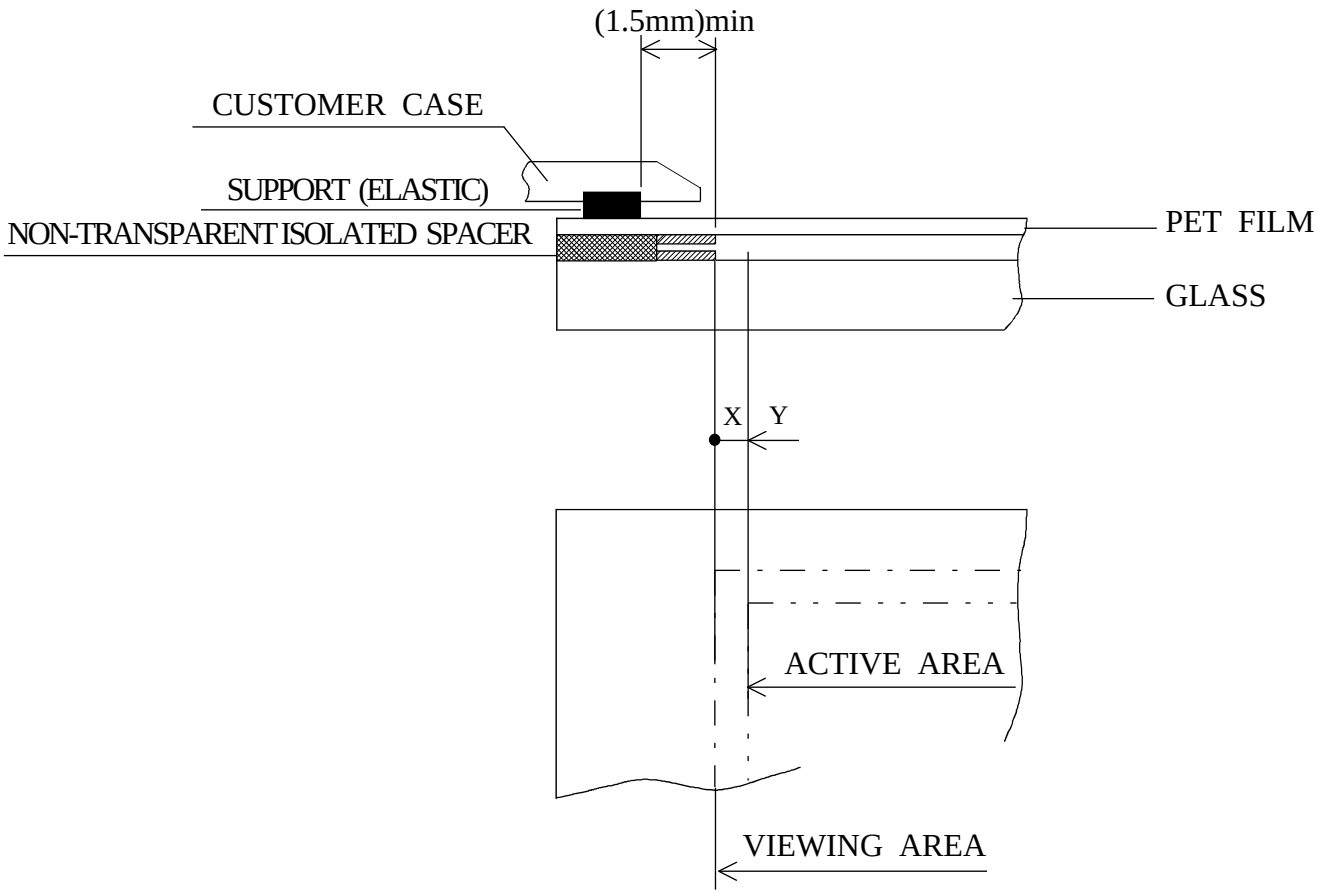
B ZONE : AREA BETWEEN THE EDGE LINE OF LCD CELL AND THE EFFECTIVE DISPLAY AREA (A ZONE) LINE SPECIFIED AT PAGE9-1/1 OF THIS DOCUMENT.



(2) TOUCH PANEL ZONE

VIEWING AREA : THIS IS INSIDE ISOLATED ZONE AND IT MUST KEEP 1.5mm OR ABOVE FORM THE AREA TO SUPPANT EDGE.

ACTIVE AREA : THIS AREA TO BE GUARANTEED ALL CHARACTERISTICS STATED ON THIS SPEC.



10.3 APPEARENCE SPECIFICATION

(1) LCD APPEARANCE

* IF THE PROBLEM OCCURESS,ABOUT THIS ITEM THE RESPONSIBLE PERSON OF BOTH PARTY (CUSTOMER AND HITACHI) WILL DISCUSS MORE DETAIL.

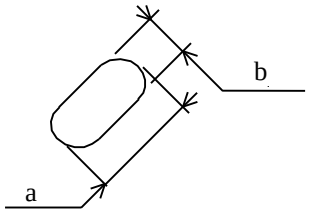
No.	ITEM	CRITERIA			APPLIED ZONE
LCD & TOUCH PANEL	SCRATCHES	DISTINGUISHED ONE IS NOT ACCEPTABLE (TO BE JUDGE BY HITACHI LIMIT SAMPLE)			A
	DENT	SAME AS ABOVE			A
	WRINKLES IN POLARIZER	SAME AS ABOVE			A
	BUBBLES	AVERAGE DIAMETER D(mm)	MAXIMUM ACCEPTABLE NUMBER		A
		D<=0.2	IGNORE		
		0.2<D<=0.3	12		
		0.3<D<=0.5	3		
		0.5<D	NONE		
	STAINS, FOREIGN MATERIALS DARK SPOT	FILAMENTOUS			A,B
		LENGTH L(mm)	WIDTH W(mm)	MAXIMUM ACCEPTABLE NUMBER	
		L<=2.0	W<=0.03	IGNORE	
		L<=3.0	0.03<W<=0.05	6	
		L<=2.5	0.05<W<=0.1	1	
		ROUND(DOT SHAPE)			A,B
		AVERAGE DIAMETER D(mm)	MAXIMUM ACCEPTABLE NUMBER	MINIMUM SPACE	
		D<0.2	IGNORE	-	
		0.2<=D<0.3	10	10 mm	
		0.3<=D<0.4	5	30 mm	
		0.4<=D	NONE	-	
		THE TOTAL NUMBER	FILAMENTOUS + ROUND = 10		
		THOSE WIPED OUT EASILY ARE ACCEPTABLE			A,B
	COLOR TONE	TO BE JUDGE BY HITACHI STANDARD			A
	COLOR UNIFORMITY	SAME AS ABOVE			A

No.	ITEM	CRITERIA				APPLIED ZONE
LCD & TOUCH PANEL	CONTRAST IRREGULARITY (SPOT)	AVERAGE DIAMETER D(mm)	CONTRAST	MAXIMUM ACCEPTABLE NUMBER	MINIMUM SPACE	A
		D<=0.25	TO BE JUDGED BY HITACHI STANDARD	IGNORE	-	
		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 SCRATCH)	WIDTH W(mm)	LENGTH L(mm)	MAXIMUM ACCEPTABLE NUMBER	MINIMUM SPACE	A
		W<=0.25	L<=1.2	2	20mm	
		W<=0.2	L<=1.5	3	20mm	
		W<=0.15	L<=2.0	3	20mm	
		W<=0.1	L<=3.0	4	20mm	
	NOTE(3)	THE WHOLE NUMBER		6		
	RUBBING SCRATCH	TO BE JUDGED BY HITACHI LIMITSTANDARD				

(2) CFL BACKLIGHT APPEARANCE

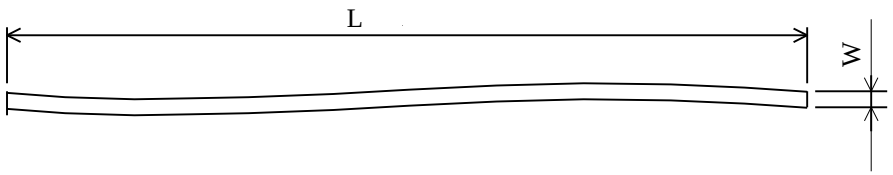
No.	ITEM	CRITERIA			APPLIED ZONE
CFL BACKLIGHT	DARK SPOTS WHITE SPOTS FOREIGN MATERIALS (SPOT)	AVERAGE DIAMETER D(mm)		MAXIMUM ACCEPTABLE NUMBER	A
		D<=0.4		IGNORED	
		0.4<D		NONE	
	FOREIGN MATERIALS (LINE)	WIDTH W(mm)	LENGTH L(mm)	MAXIMUM ACCEPTABLE NUMBER	A
		W<=0.2	L<=25	1	
			2.5<L	NONE	
		0.2<W	-	NONE	
	SCRATCHES	WIDTH W(mm)	LENGTH L(mm)	MAXIMUM ACCEPTABLE NUMBER	A
		W<=0.1	-	IGNORED	
		0.1<W<=0.2	L<=11	1	
			11<L	NONE	
		0.2<W	-	NONE	

NOTE 1 DEFINITION OF AVERAGE DOIAMETER (D)



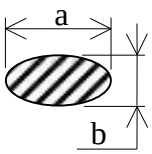
$$D=\frac{a+b}{2}$$

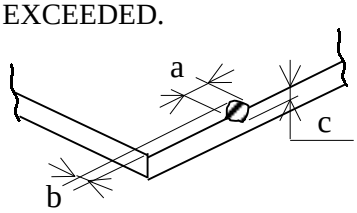
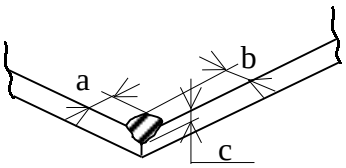
2 DEFINITION OF LENGTH L AND WIDTH (W)



(3) TOUCH PANEL APPEARANCE

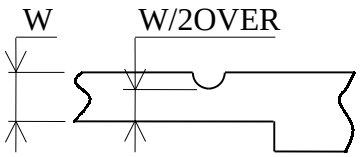
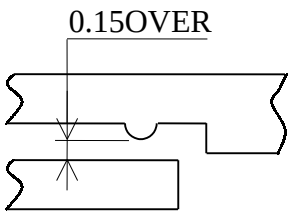
(1) EXTERNAL APPEARANCE

<table>
<tr><th colspan="2">ITEM</th><th>RATINGS</th></tr>
<tr><td>1</td><td>DOT FOREIGN PARTICLES</td><td>
<table>
<tr><th>AVERAGE DIAMETER(D)</th><th>SPECIFICATION</th></tr>
<tr><td>D<=0.2mm</td><td>NOT COUNTED</td></tr>
<tr><td>0.2mm<D<=0.3mm</td><td>2 OR LESS (WITHIN ϕ50mm)</td></tr>
<tr><td>0.3mm<D</td><td>0</td></tr>
</table>


$D=\frac{a+b}{2}$
</td></tr>
<tr><td>2</td><td>LINEAR FOREIGN PARTICLES , SCRATCHES</td><td>
<table>
<tr><th>BREADTH (W)</th><th>SPECIFICATION</th></tr>
<tr><td>W<0.05mm</td><td>NOT COUNTED</td></tr>
<tr><td rowspan="2">0.05 mm<=W<0.1mm</td><td>L>=5mm : NG</td></tr>
<tr><td>L<5mm : 2 OR LESS (WITHIN ϕ50mm)</td></tr>
<tr><td>0.1mm<=W</td><td>DOT</td></tr>
</table>
</td></tr>
<tr><td>3</td><td>UNCLEANNESS</td><td>NO CONSPICUOUS DIRT</td></tr>
<tr><td>4</td><td>GLASS CHIPPING</td><td>a<=5 , b<=2 , c<=t (t = GLASS SICKNESS)
NONE OF THE ABOVE FIGURES MAY BE EXCEEDED.
THE NUMBER OF CHIPPED AREAS DOES NOT NEED TO BE CONSIDERED.
(SAME AS CORNER)
  </td></tr>
<tr><td>5</td><td>CORNER CHIPPING</td><td>a<=5 , b<=2 , c<=t (t=GLASS SICKNESS)
  </td></tr>
<tr><td>6</td><td>GLASS CRACK</td><td>NO CRACKS ARE ALLOWED . NO CHIPPING TO TOUCH WITH CIRCUIT.</td></tr>
<tr><td>7</td><td>WAVINESS OF TOP SHEET SURFACE</td><td>FLUORESCENT LAMPS MUST NOT APPEAR DISTORTED.</td></tr>
<tr><td>8</td><td>NEWTON RING</td><td>NO UNUSUAL INTERFERENCE FRINGE MUST SHOW WHEN SEEN THROUGH THE TOP SURFACE SHEET.</td></tr>
</table>

THE SPECIFICATIONS MENTIONED ABOVE APPLY TO TRANSPARENT AREA ONLY. APPLICATION TO OTHER AREAS ARE WAIVED UNLESS CONCERN FOR MECHANICAL OR ELECTRICAL PERFORMANCE DEVELOPS. (GLASS CHIPPING IS EXCEPTED)

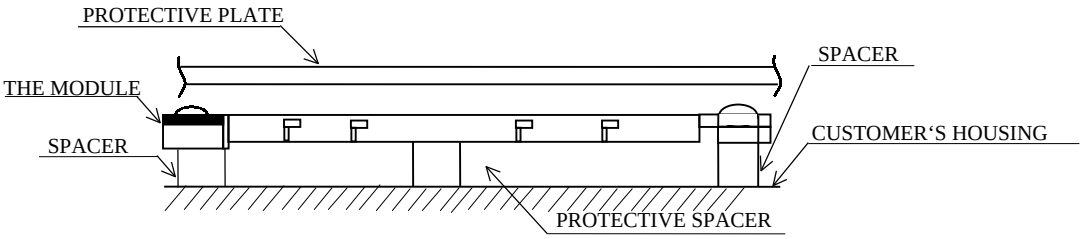
(2) CIRCUIT PATTERN

ITEM	RATINGS
MINIMUM CIRCUIT PATTERN WIDTH	
MINIMUM CIRCUIT PATTERN GAP	

11. PRECAUTION IN DESIGN

11.1 MOUNTING METHOD

SINCE THE MODULE IS SO CONSTRUCTED AS TO BE FIXED BY UTILIZING FITTING HOLES IN THE PRINTED CIRCUIT BOARD AS SHOWN BELOW, IT IS NECESSARY TO TAKE CONSIDERATION THE FOLLOWING ITEMS ON ATTACHMENT TO A FRAME.



(1) USE OF PROTECTIVE PLATE,MADE OF AN ACRYLIC PLATE, ETC, IN ORDER TO PROTECT A POLARIZER AND LC CELL.

(2) TO PREVENT THE MODULE COVER FROM BEING PRESSED, THE SPACERS BETWEEN THE MODULE AND THE FITTING PLATES SHOUD BE LONGER THAN 0.5mm.

(3) WE RECOMMEND YOU TO USE PROTECTIVE SPACER AS FIGURE FOR PROTECTING LCD MODULE FROM ANY KIND OF SHOCK TO YOUR SET.

11.2 LC DRIVING VOLTAGE (VEE) AND VIEWING ANGLE RANGE.

SETTING V0 OUT OF THE RECOMMENDED CONDITION WILL BE A CAUSE FOR A CHANGE OF VIEWING ANGLE RANGE.

11.3 CAUTION AGAINST STATIC CHARGE

AS THIS MODULE IS PROVIDED WITH C-MOS LSI, THE CARE TO TAKE SUCH A PRECAUTION AS TO GROUNDING THE OPERATOR,S BODY IS REQUIRED WHEN HANDLING IT.

11.4 POWER ON SEQUENCE

INPUT SIGNALS SHOULD NOT BE APPLIED TO LCD MODULE BEFORE POWER SUPPLY VOLTAGE IS APPLIED AND REACHES TO SPECIFIED VOLTAGE (VDD).

IF ABOVE SEQUENCE IS NOT KEPT, C-MOS LSIS OF LCD MODULES MAY BE DAMAGED DUE TO LATCH UP PROBLEM.

11.5 PACKAGING

(1) NO. LEAVING PRODUCTS IS PREFERABLE IN THE PLACE OF HIGH HUMIDITY FOR A LONG PERIOD OF TIME. FOR THEIR STORAGE IN THE PLACE WHERE TEMPERATURE IS 35 OF HIGHER, SPECIAL CARE TO PREVENT THEM FROM HIGH HUMIDITY IS REQUIRED. A COMBINATION OF HIGH TEMPERATURE AND HIGH HUMIDITY MAY CAUSE THEM POLARIZATION DEGRADATION AS WELL AS BUBBLE GENERATION AND POLARIZER PEEL-OFF. PLEASE KEEP THE TEMPERATURE AND HUMIDITY WITHIN THE SPECIFIED RANGE FOR USE AND STORING.

(2) SINCE UPPER POLARIZERS AND LOWER ALUMINUM PLATES TEND TO BE EASILY DAMAGED, THEY SHOULD BE HANDLED WITH FULL CARE SO AS NOT TO GET THEM TOUCHED, PUSHED OR RUBBED BY A PIECE OF GLASS. TWEEZERS AND ANYTHING ELSE WHICH ARE HARDER THAN A PENCIL LEAD 3H.

(3) AS THE ADHESIVES USED FOR ADHERING UPPER/LOWER POLARIZERS AND ALUMINUM PLATES ARE MADE OF ORGANIC SUBSTANCES WHICH WILL BE DETERIORATED BY A CHEMICAL REACTION WITH SUCH CHEMICALS AS ACETONE, TULUENE ETHANOLE AND ISOPROPYLALCOHOL. THE FOLLOWING SOLVENTS ARE RECOMMENDED FOR USE:

NORMAL HEXANE

PLEASE CONTACT US WHEN IT IS NECESSARY FOR YOU TO USE CHEMICALS OTHER THAN THE ABOVE.

(4) LIGHTLY WIPE TO CLEAN THE DIRTY SURFACE WITH ABSORBENT COTTON WASTE OR OTHER SOFT MATERIAL LIKE CHAMOIS,SOAKED IN THE CHEMICALS RECOMMENDED WITHOUT SCRUBBING IT HARDLY.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.

(5) IMMEDIATELY WIPE OFF SALIVA OR WATER DROP ATTACHED ON THE DISPLAY AREA BECAUSE ITS LONG PERIOD ADHERENCE MAY CAUSE DEFORMATION OR FADED COLOR ON THE SPOT.

(6) FOGY DEW DEPOSITED ON THE SURFACE AND CONTACT TERMINALS DUE TO COLDNESS WILL BE A CAUSE FOR POLARIZER, DAMAGE STAIN AND DIRT ON PRODUCT.WHEN NECESSARY TO TAKE OUT THE PRODUCTS FORM SOME PLACE AT LOW TEMPERATURE FOR TEST, ETC. IT IS REQUIRED FOR THEM TO BE WARMED UP IN A CONTAINER ONCE AT THE TEMPERATURE HIGHER THAN THAT OF ROOM.

(7) TOUCHING THE DISPLAY AREA AND CONTACT TERMINALS WITH BARE HANDS AND CONTAMINATING THEM ARE PROHIBITED, BECAUSE THE STAIN ON THE DISPLAY AREA AND POOR INSULATION BETWEEN TERMINALS ARE OFTEN CAUSED BY BEING TOUCHED BY BARE HANDS. (THERE ARE SOME COSMETICS DETRIMENTAL TO POLARIZERS.)

(8) IN GENERAL THE QUALITY OF GLASS IS FRAGILE SO THAT IT TENDS TO BE CRACKED OR CHIPPED IN HANDLING, SPECIALLY ON ITS PERIPHERY.PLEASE BE CAREFUL NOT TO GIVE IT SHARP SHOCK CAUSED BY DROPPING DOWN,ETC.

11.6 CAUTION FOR OPERATION

(1) IT IS AN INDISPENSABLE CONDITION TO DRIVE LCD‘S WITHIN THE SPECIFIED VOLTAGE LIMIT SINCE THE HIGHER VOLTAGE THAN THE LIMIT CAUSES THE SHORTER LCD LIFE.AN ELECTROCHEMICAL REACTION DUE TO DIRECT CURRENT CAUSES LCD’S UNDESIRABLE DETERIORATION, SO THAT THE USE OF DIRECT CURRENT DRIVER SHOULD BE AVOIDED.

(2) RESPONSE TIME WILL BE EXTREMELY DELAYED AT LOWER TEMPERATURE THAN THE OPERATING TEMPERATURE RANGE AND ON THE OTHER HAND AT HIGHER TEMPERATURE LCD‘S SHOW DARK BLUE COLOR IN THEM.HOWEVER THOSE PHENOMENA DO NOT MEAN MALFUNCTION OR OUT OF ORDER WITH LCD’S WHICH WILL COME BACK IN THE SPECIFIED OPERATING TEMPERATURE RANGE.

(3) IF THE DISPLAY AREA IS PUSHED HARD DURING OPERATION,SOME FONT WILL BE ABNORMALLY DISPLAY BUT IT RESUMES NORMAL CONDITION AFTER TURNING OFF ONCE.

(4) A SLIGHT DEW DEPOSITING ON TERMINALS IS A CAUSE FOR ELECTROCHEMICAL REACTION RESULTING IN TERMINAL OPEN CIRCUIT. USAGE UNDER THE RELATIVE CONDITION OF 40°C 50%RH OR LESS IS REQUIRED.

(5) SINCE STN-LCD IS SENSITIVE FOR HEAT.PLEASE CONSIDER THE HEAT PROFECTION FROM ANY HEAT SOURCES LIKE INVERTER,DC/DC CONVERTER, CPU AND SO ON.

11.7 STORAGE

IN CASE OF STORING FOR A LONG PERIOD OF TIME (FOR INSTANCE, FOR YEARS) FOR THE PURPOSE OF REPLACEMENT USE,THE FOLLOWING WAYS ARE RECOMMENDED.

(1) STORAGE IN A POLYETHYLENE BAG WITH THE OPENING SEALED SO AS NOT TO ENTER FRESH AIR OUTSIDE IN IT,AND WITH NO DESICCANT.

(2) PLACING IN A DARK PLACE WHERE NEITHER EXPOSURE TO DIRECT SUNLIGHT NOR LIGHT IS, KEEPING TEMPERATURE IN THE RANGE FROM 0°C TO 35°C.

(3) STORING WITH NO TOUCH ON POLARIZER SURFACE BY ANYTHING ELSE. (IT IS RECOMMENDED TO STORE THEM AS THEY HAVE BEEN CONTAINED IN THE INNER CONTAINER AT THE TIME OF DELIVERY FROM US.)

11.8 SAFETY

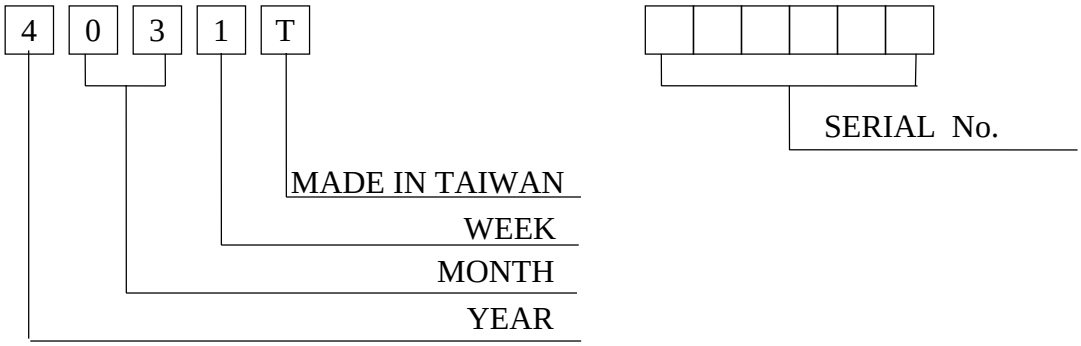
(1) IT IS RECOMMENDABLE TO CRASH DAMAGED OR UNNECESSARY LCD,S INTO PIECES AND WASH OFF LIQUID CRYSTAL BY EITHER OF SOLVENTS SUCH AS ACETONE AND ETHANOL, WHICH SHOUD BE BURNED UP LATER.

(2) WHEN ANY LIQUID LEAKED OUT OF A DAMAGED GLASS GELL COMES IN CONTACT WITH YOUR HANDS, PLEASE WASH IT OFF WELL WITH SOAP AND WATER.

12. DESIGNATION OF LOT MARK

LOT MARK

LOT MARK IS CONSISTED OF 4 LIGHT FOR PRODUCTION LOT 6 OR 7 DIGITS FOR PRODUCTION CONTROL.



YEAR	FIGURE IN LOT MARK
1995	5
1996	6
1997	7
1998	8
1999	9

MONTH	FIGURE IN LOT MARK	MONTH	FIGURE IN LOT MARK
JAN.	01	JULY.	07
FEB.	02	AUG.	08
MAR.	03	SEPT.	09
APR.	04	OCT.	10
MAY.	05	NOV.	11
JUNE.	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

LOCATION OF LOT MARK : ON THE LABEL ATTACHED ON THE BACK SIDE OF LCM

5 0 3 1 T * * * * * *

13. PRECIPITIN FOR USE

(1) A LIMIT SAMPLE SHOULD BE PROVIDED BY THE BOTH PARTIES ON AN OCCASION WHEN THE BOTH PARTIES AGREED 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 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 REPAORING,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 EXPLAIND ABOVE. IF ANY POINTS ARE UNCLEAR OR IF YOU HAVE ANY REQUESTS,PLEASE CONTACT HITACHI.