HITACHI

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FOR MESSRS :

DATA : JUL.07.'99

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

LMG7420PLFC-X

CONTENTS

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

ACCEPTED BY: _____

PROPOSED BY: H.H.Shen

RECORD OF REVISION

<table>
<tr><th>DATA</th><th>SHEET No.</th><th>SUMMARY</th></tr>
<tr><td>FEB.10.'95</td><td>7B64PS 2704-
LMG7420PLFC-X-2
PAGE 4-1/1</td><td>CHANGED:
<table>
<tr><th rowspan="2">ITEM</th><th colspan="2">OPERATING</th></tr>
<tr><th>MIN.</th><th>MAX.</th></tr>
<tr><td>AMBIENT TEMPERATURE</td><td>0°C</td><td>40°C</td></tr>
</table>
↓
<table>
<tr><th rowspan="2">ITEM</th><th colspan="2">OPERATING</th><th></th></tr>
<tr><th>MIN.</th><th>MAX.</th><th></th></tr>
<tr><td>AMBIENT TEMPERATURE</td><td>0°C</td><td>50°C</td><td></td></tr>
</table></td></tr>
<tr><td></td><td>7B64PS 2705-
LMG7420PLFC-X-2
PAGE 5-1/2</td><td>CHANGED:
<table>
<tr><th></th><th>CONDITION</th><th>TYP.</th></tr>
<tr><td>VDD-V0</td><td>Ta=40°C , ϕ=10°C</td><td>15.4</td></tr>
</table>
↓
<table>
<tr><th></th><th>CONDITION</th><th>TYP.</th></tr>
<tr><td>VDD-V0</td><td>Ta=50°C , ϕ=10°C</td><td>15.2</td></tr>
</table></td></tr>
<tr><td>MAR.30.'99</td><td>7B64PS 2709-
LMG7420PLFC-X-3
PAGE 9-1/3</td><td>CHANGED:
CABLE'S LENGTH & LOCATION</td></tr>
<tr><td>JUL.07.'99</td><td>7B64PS 2706-
LMG7420PLFC-X-4
PAGE 6-2/2</td><td>6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT
BRIGHTNESS (TYP.) CHANGED
40 → 90 (TYPING ERROR REV.3)
RISE TIME (TYP.) CHANGED
20 → 5 (TYPING ERROR REV.3)</td></tr>
<tr><td></td><td>7B64PS 2707-
LMG7420PLFC-X-4
PAGE 7-1/1</td><td>7. BLOCK DIAGRAM
ALL PAGE CHANGED (TYPING ERROR REV.3)</td></tr>
</table>

3. MECHANICAL DATA

(1)	PART NAME	LMG7420PLFC-X
(2)	MODULE SIZE	159.4(W)mm * 101.0(H)mm * 11.0(D)mm max.
(3)	DOT SIZE	0.47 (W)mm * 0.47 (H)mm
(4)	DOT PITCH	0.50 (W)mm * 0.50 (H)mm
(5)	NUMBER OF DOTS	240 (W) * 128 (H)
(6)	DUTY	1/128
(7)	LCD	FILM TYPE BLACK/WHITE (NEGATIVE TYPE) THE UPPER POLARIZER IS ANT-GLARE. (HARDNESS.3H) THE BOTTOM POLARIZER IS TRANSMISSIVE TYPE.
(8)	VIEWING DIRECTION	6 O'CLOCK
(9)	BACK LIGHT	COLD CATHODE FLUORESCENT LAMP

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	6.5	V	
POWER SUPPLY FOR LC DRIVE	VDD-VEE	0	20.5	V	
INPUT VOLTAGE	Vi	-0.3	VDD+0.3	V	
INPUT CURRENT	Ii	0	1	A	
STATIC ELECTRICITY	-	-	-	-	NOTE 1

NOTE 1 MAKE CERTAINS YOU ARE GROUNED WHEN HAND HANDLING LCM.

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		COMMENT
	MIN,	MAX.	MIN,	MAX.	
AMBIENT TEMPERATURE	0°C	50°C	-20°C	60°C	NOTE 2,3
HUMIDITY	NOTE 1		NOTE 1		WITHOUT CONDENSATION
VIBRATION	-	4.9 m/s^2 (0.5G)	-	19.6 m/s^2 2G NOTE 5	NOTE 4
SHOCK	-	29.4 m/s^2 (3G)	-	490.0 m/s^2 (50G)	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 HUNIDITY OF 85%RH AT 40°C

NOTE 2 Ta AT -20°C ----- <48HRS, AT 60°C ----- <168HRS

NOTE 3 BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE. THIS PHENOMENON IS REVERSIBLE.
HIGHER STARTING VOLTAGE OF CFL AND HIGHER LCD DRIVING VOLTAGE ARE NEEDED WHILE OPERATING AT 0°C.
THE LIFE TIME OF CFL WILL BE REDUCED WHILE OPERATING AT 0°C NEED TO MAKE SURE OF VALUE OF IL AND CHARACTERISTICS OF INVERTER.
ALSO THE RESPONSE TIME AT 0°C WILL BE SLOWER.

NOTE 4 5Hz~100Hz (EXCEPT RESONANCE FREQUENCY)

NOTE 5 THIS MODULE SHOULD BE OPERATED NORMALLY AFTER FINISH THE TEST.

5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS OF LCM

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD-VSS	-	4.75	5.0	5.25	V
LC DRIVER CIRCUIT POWER SUPPLY VOLTAGE	VEE-VSS	-	-15.5	-15.0	-14.5	V
INPUT VOLTAGE	VI	H LEVEL	0.8VDD	-	VDD	V
		L LEVEL	0	-	0.2VDD	V
POWER SUPPLY CURRENT FOR LOGIC NOTE 1	IDD	VDD-VSS=5.0V	-	11.7	14.0	mA
POWER SUPPLY CURRENT FOR LCD RIVING NOTE 1	IEE	VDD-VSS=5.0V	-	2.5	4.0	mA
RECOMMENDED LC DRIVING VOLTAGE NOTE 2	VDD-V0	Ta= 0°C , ϕ=10°	-	16.9	-	V
		Ta=25°C , ϕ=10°	-	15.8	-	V
		Ta=50°C , ϕ=10°	-	15.2	-	V

NOTE 1 VDD-V0=15.8V , Ta=25°C

NOTE 2 RECOMMENDED LC DRIVING VOLTAGE FLUCTATE ABOUT +/-1.0V BY EACH MODULE.
TEST PATTERN IS ALL “Q”.

5.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
LAMP VOLTAGE	VL	-	360	-	V	Ta=25°C
FREQUENCY	fL	30	70	85	KHz	Ta=25°C
LAMP CURRENT	IL	2.5	5	5.5	mA	Ta=25°C
STARTI DISCHARGE VOLTAGE	VS NOTE 2	(1000)	-	-	V	Ta=25°C

NOTE 1 PLEASE CERTAINLY INFORM HITACHI BEFORE DESIGNING.
LAMP DRIVE CIRCUIT ACCORDING TO THE ABOVE SPECIFICATIONS.

NOTE 2 STARTING DISCHARGE VOLTAGE IS INCREASED WHEN LCM IS OPERATING AT IOWER TRMPERATURE.
PLEASE CHECK THE CHARACTERISTICS OF INVERTER BEFORE APPLING.

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

6. OPTICAL CHARACTERISTICS

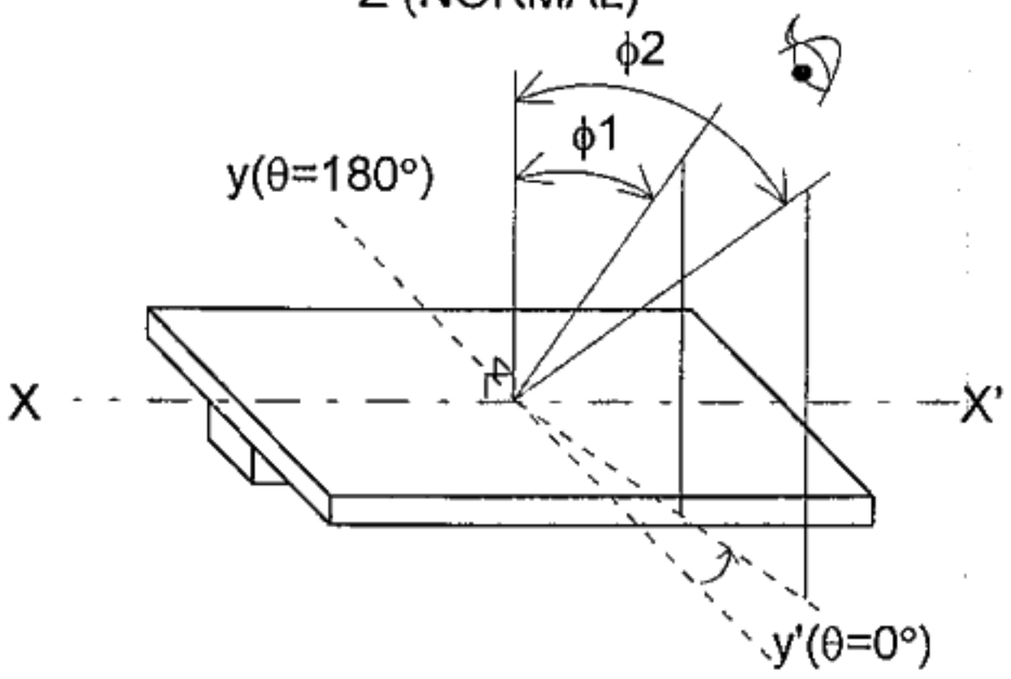
6.1 OPTICAL CHARACTERISTICS

Ta=25°C (BACKLIGHT)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	$\phi 2-\phi 1$	K>=2.0	30	40	-	deg	1,2
CONTRAST RATIO	K	ϕ=10° θ=0°	-	20	-	-	3
RESPONES TIME (RISE)	tr	ϕ=10° θ=0°	-	(160)	-	ms	4
RESPONES TIME (FALL)	tf	ϕ=10° θ=0°	-	(110)	-	ms	4

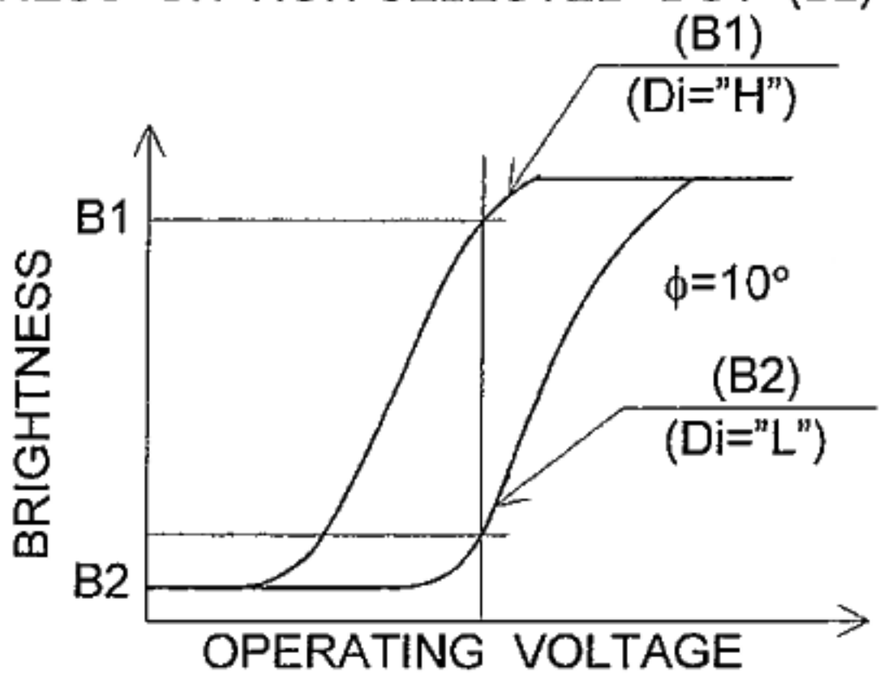
(MEASURE CONDITION BY HITACHI)

NOTE1. DEFINITION OF θ AND ϕ

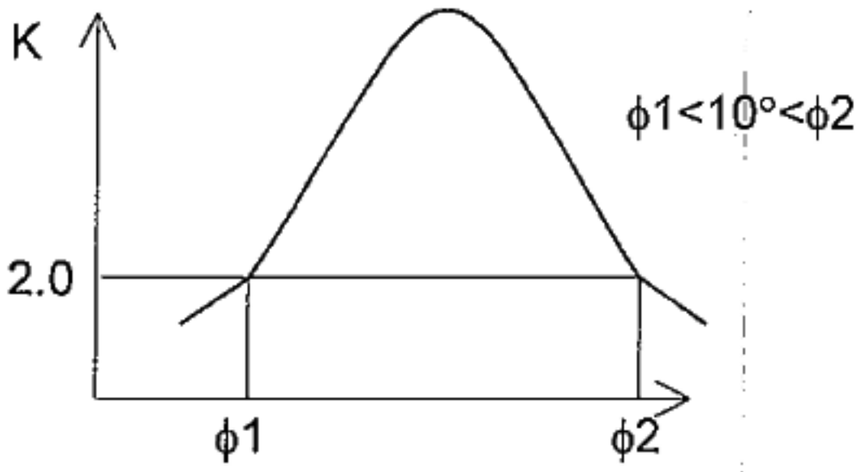


NOTE3. DEFINITION OF CONTRAST "K"

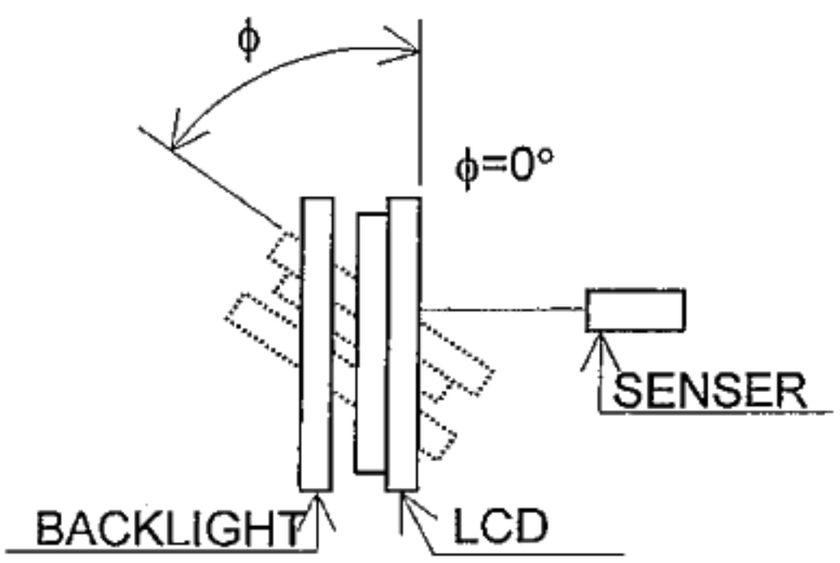
$$K=\frac{\text{BRIGHTNESS ON SELECTED DOT (B1)}}{\text{BRIGHTNESS ON NON-SELECTED DOT (B2)}}$$



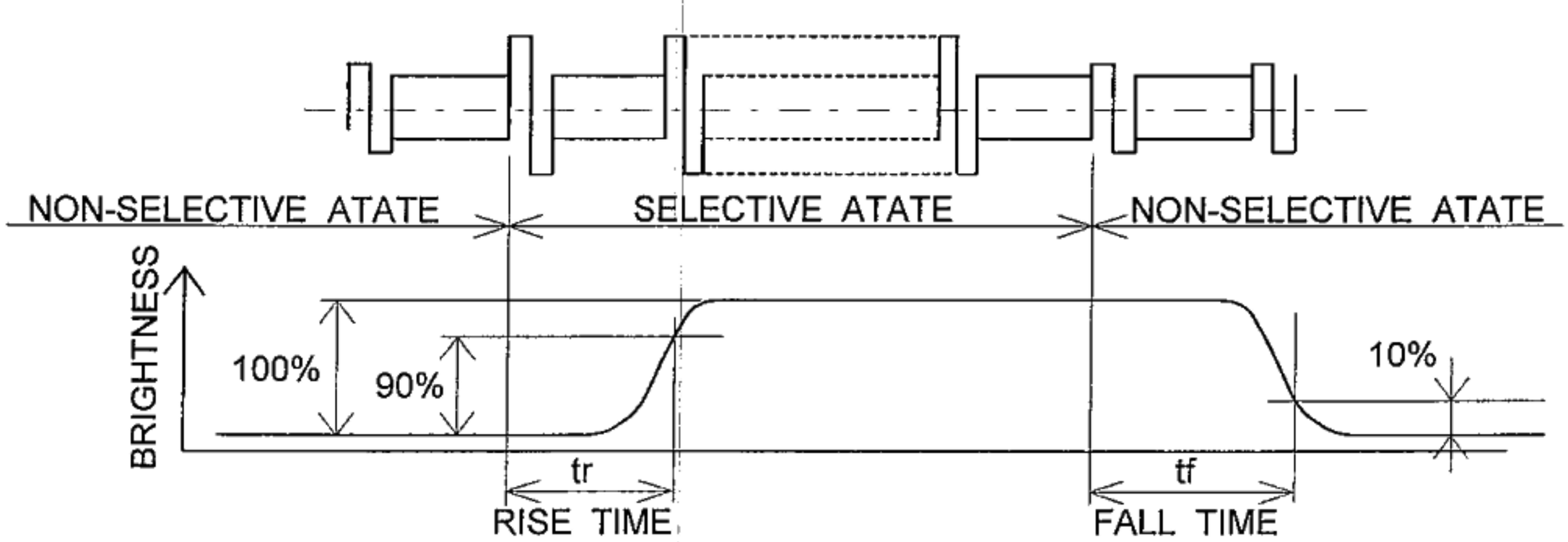
NOTE2. DEFINITION OF VIEWING ANGLE $\phi 1$ AND $\phi 2$



CONTRAST RATIO K VS VIEWING ANGLE ϕ



NOTE4. DEFINITION OF OPTICAL RESPONSE



6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT

(LCM , BACKLIGHT ON , Ta=25°C)

ITEM	MIN.	TYP.	MAX.	UNIT	NOTE
BRIGHTNESS	70.0	90.0	-	cd/㎡	IL=5mA NOTE 1 , 2
RISE TIME	-	5	-	MINUTE	IL=5mA BRIGHTNESS 80 %
BRIGHTNESS UNIFOMITY	-	-	±30	%	UNDERMENTIONED NOTE 1 , 3

CFL : INITIAL , Ta=25℃ , VDD-V0=15.8V

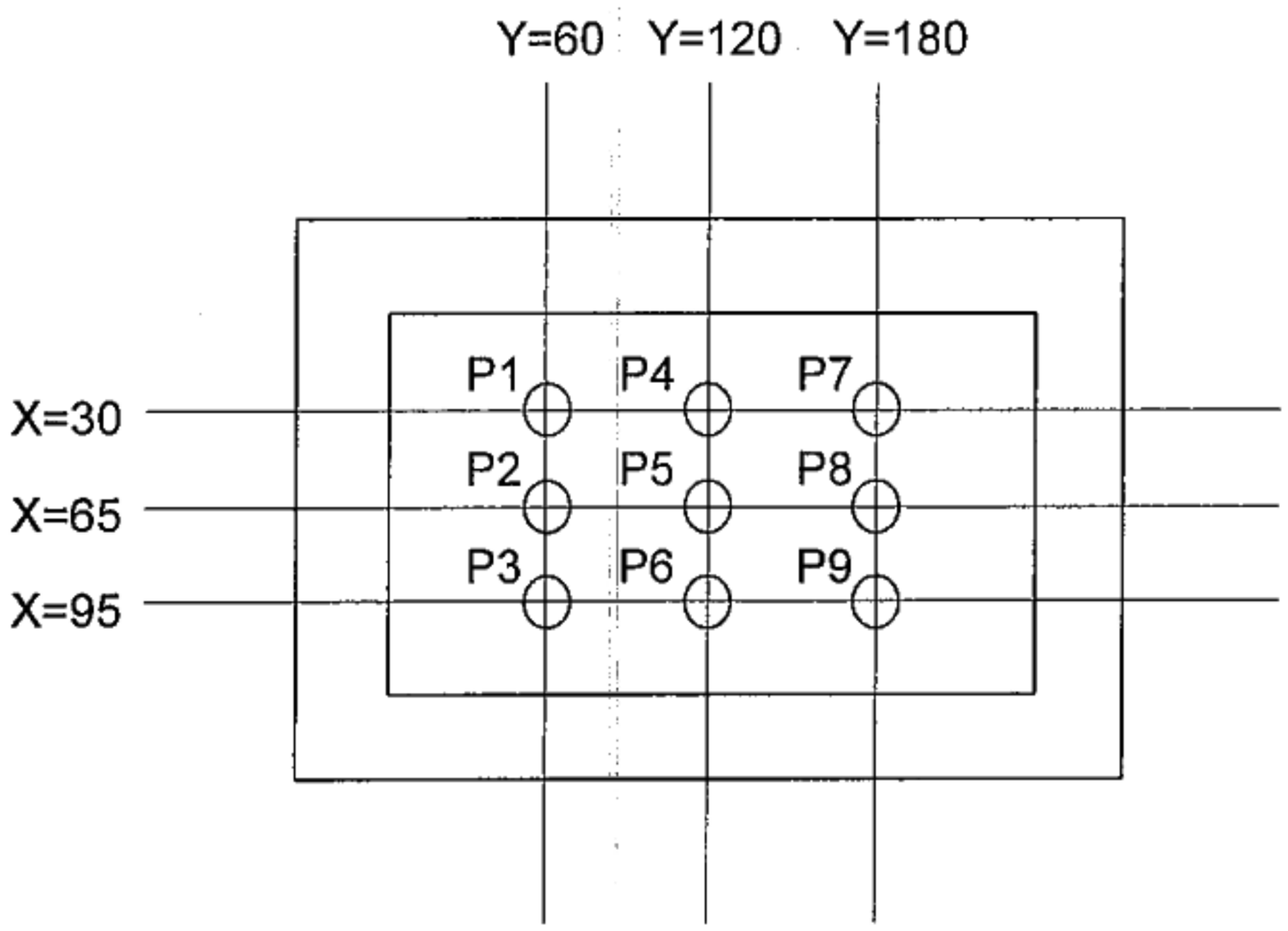
DISPLAY DATA SHOULD BE ALL "ON".

NOTE 1 MEASUREMENT AFTER 10 MINUTES OF CFL OPERATING.

NOTE 2 BRIGHTNESS CONTROL : 100 %

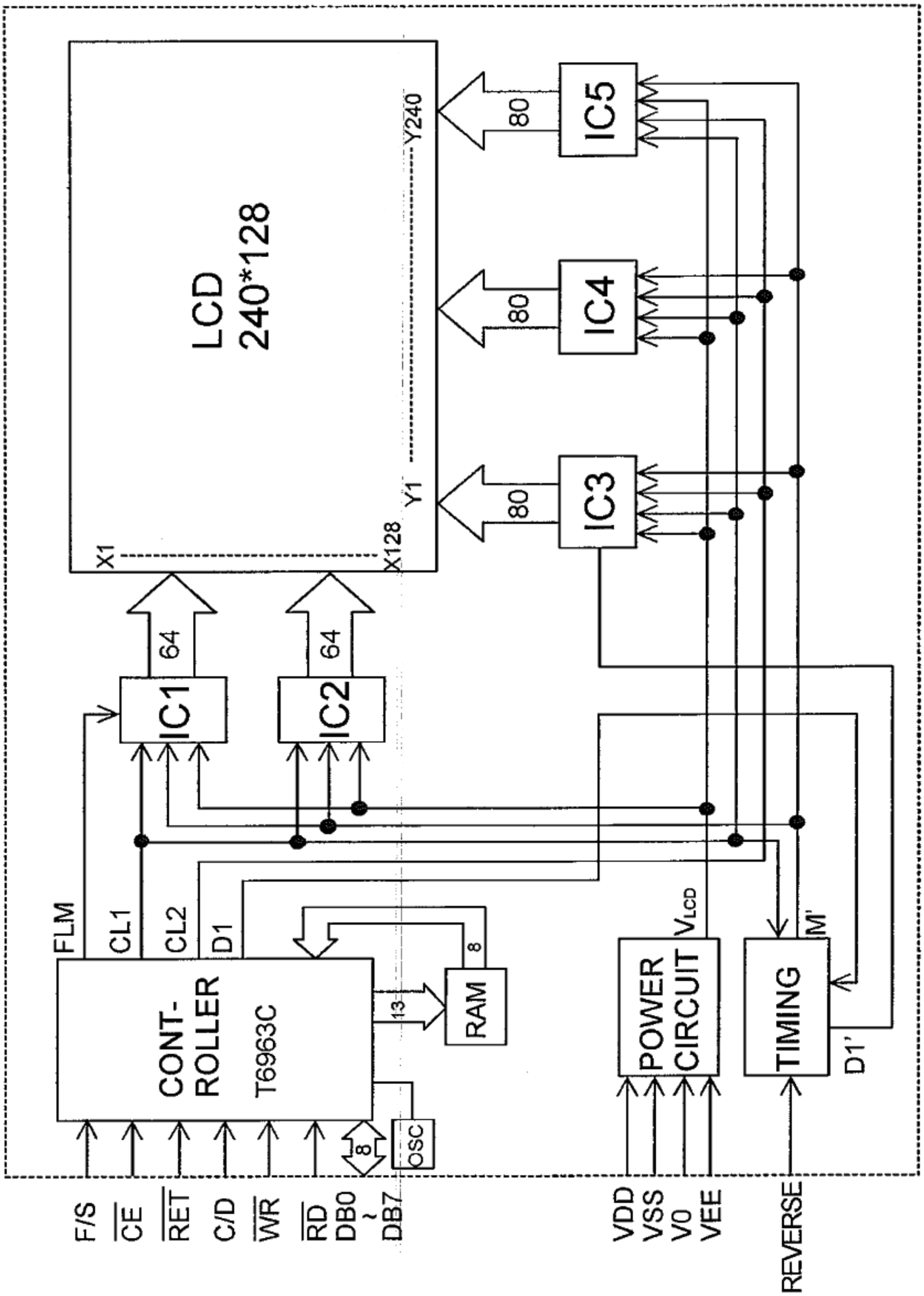
NOTE 3 MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.

DEFINITON OF THE BRIGHTNESS TOLERANCE.



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

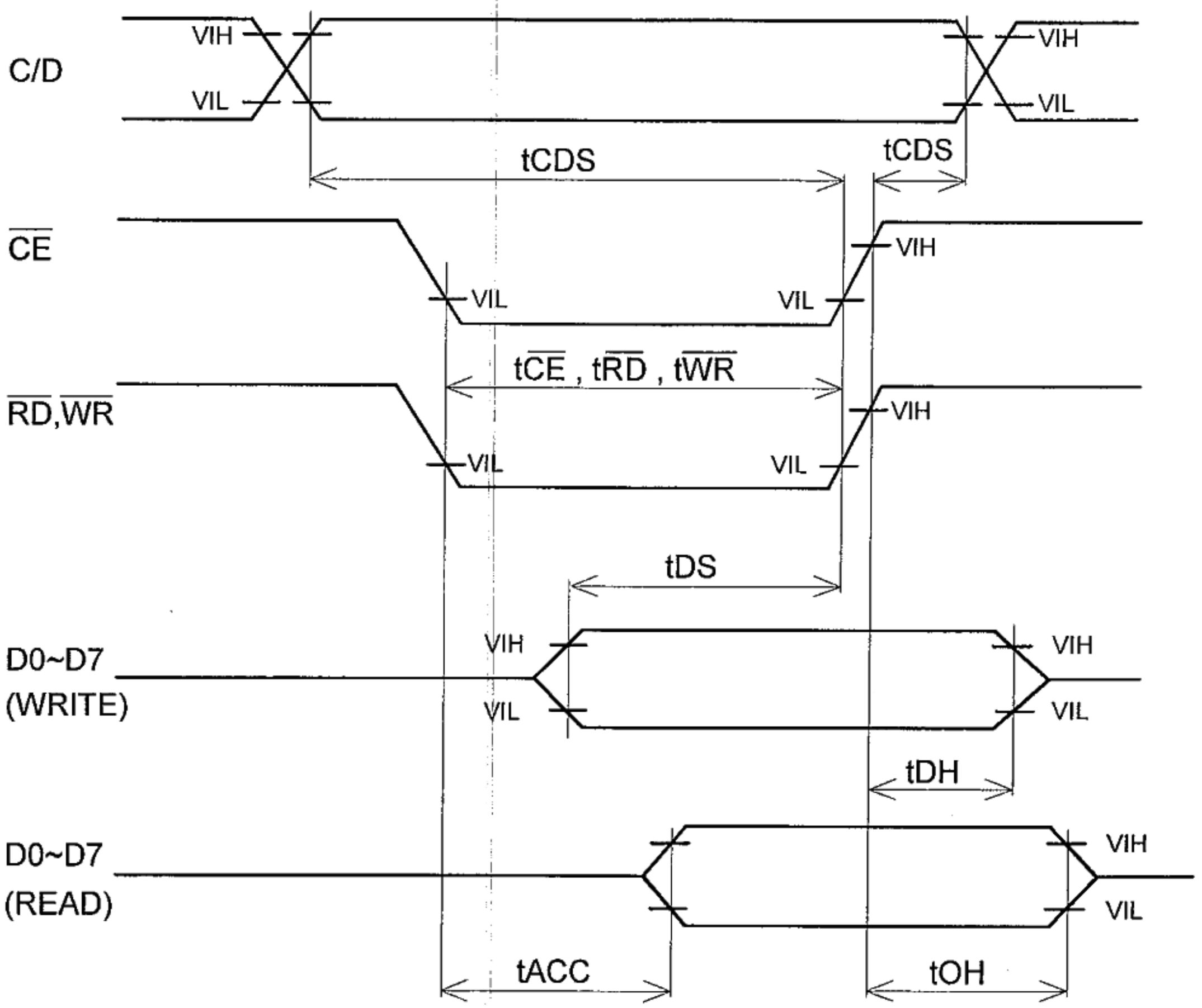
7. BLOCK DIAGRAM



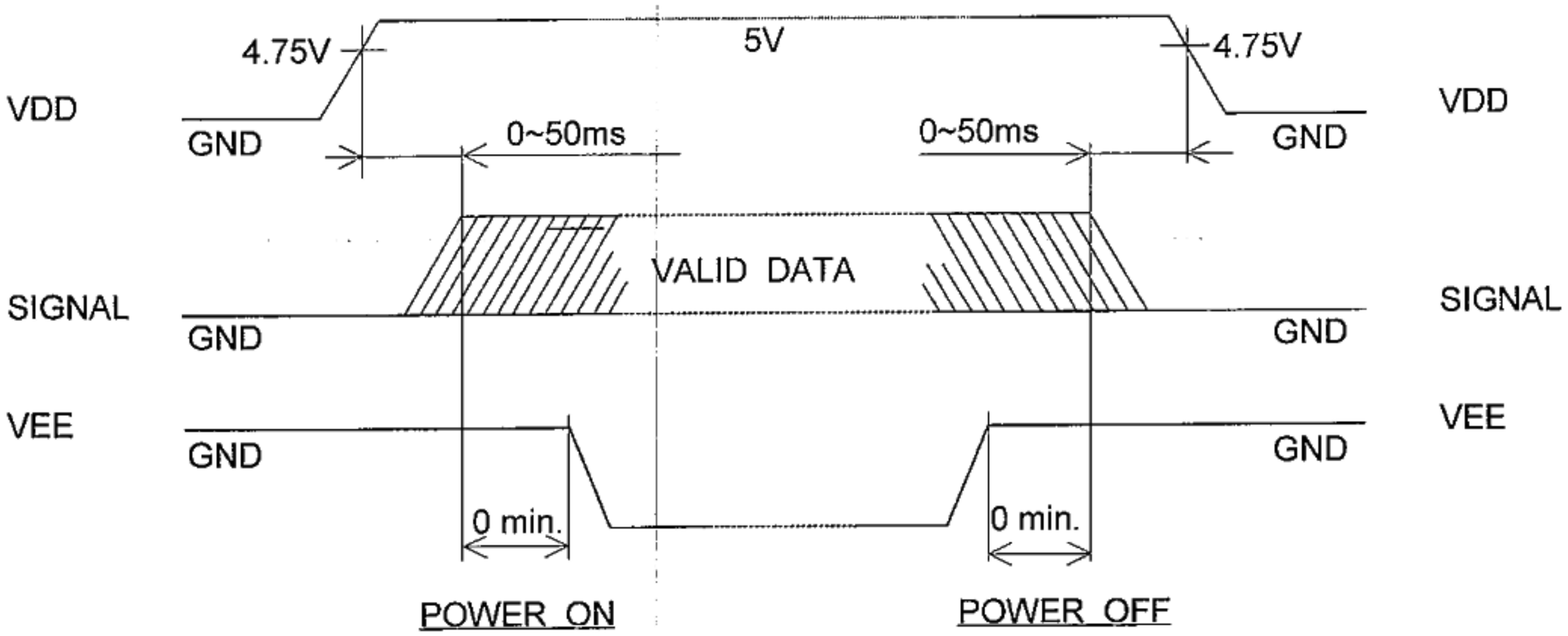
KAOHSIUNG HITACHI ELECTRONICS CO.,LTD.	DATA	JUL.07.'99	SH. No.	7B64PS 2707-LMG7420PLFC-X-4	PAGE	7-1/1

8.1 INTERFACE TIMING CHART

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
C/D SETUP TIME	tCDS	100	-	-	ns
C/D HOLD TIME	tCHD	10	-	-	ns
$\overline{CE}$, $\overline{RD}$, $\overline{WR}$ PULSE WIDTH	$t\overline{CE}$, $t\overline{RD}$, $t\overline{WR}$	80	-	-	ns
DATA SETUP TIME	tDS	80	-	-	ns
DATA HOLD TIME	tDH	40	-	-	ns
ACCES TIME	tACC	-	-	150	ns
OUTPUT HOLD TIME	tOH	10	-	50	ns

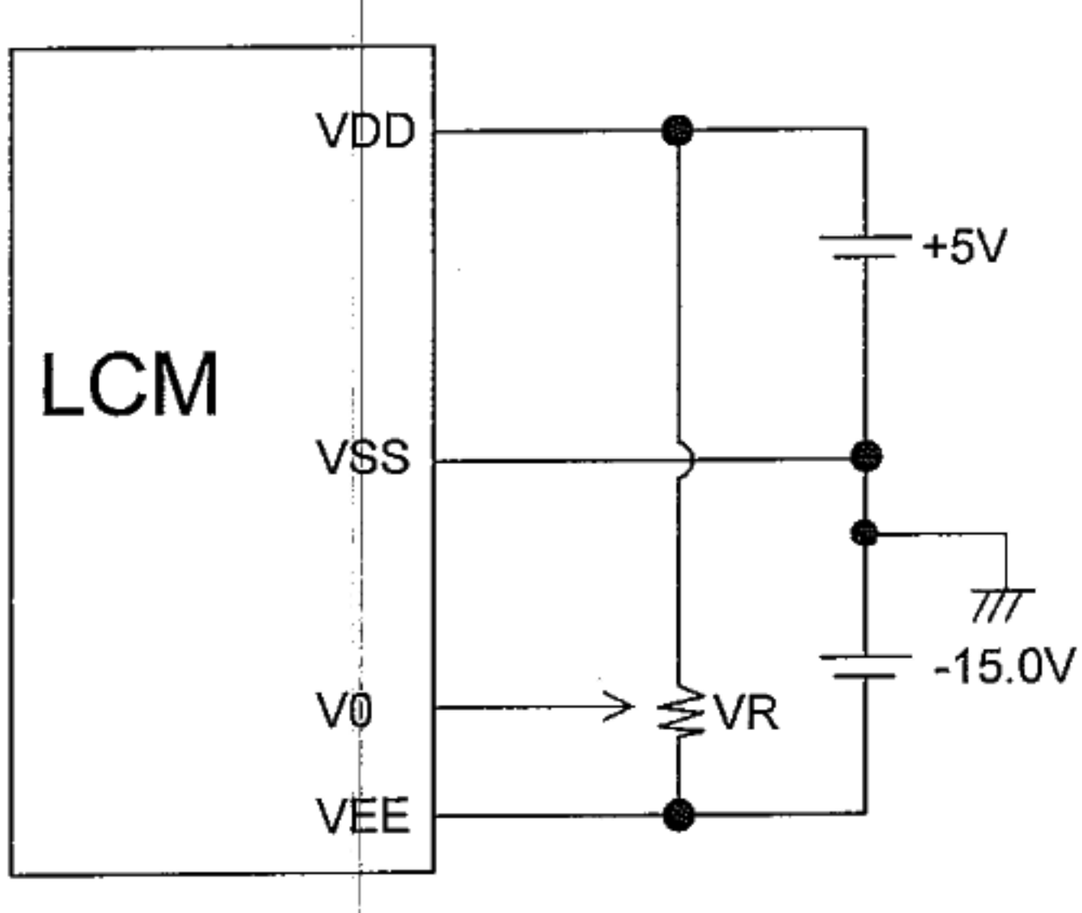


8.2 TIMGING OF POWER SUPPLY AND INTERFACE SIGNAL



THE MISSING PIXELS MAY OCCUR WHEN THE LCM IS DRIVEN BEYOND ABOVE POWER INTERFACE TIMING SEQUENCE.

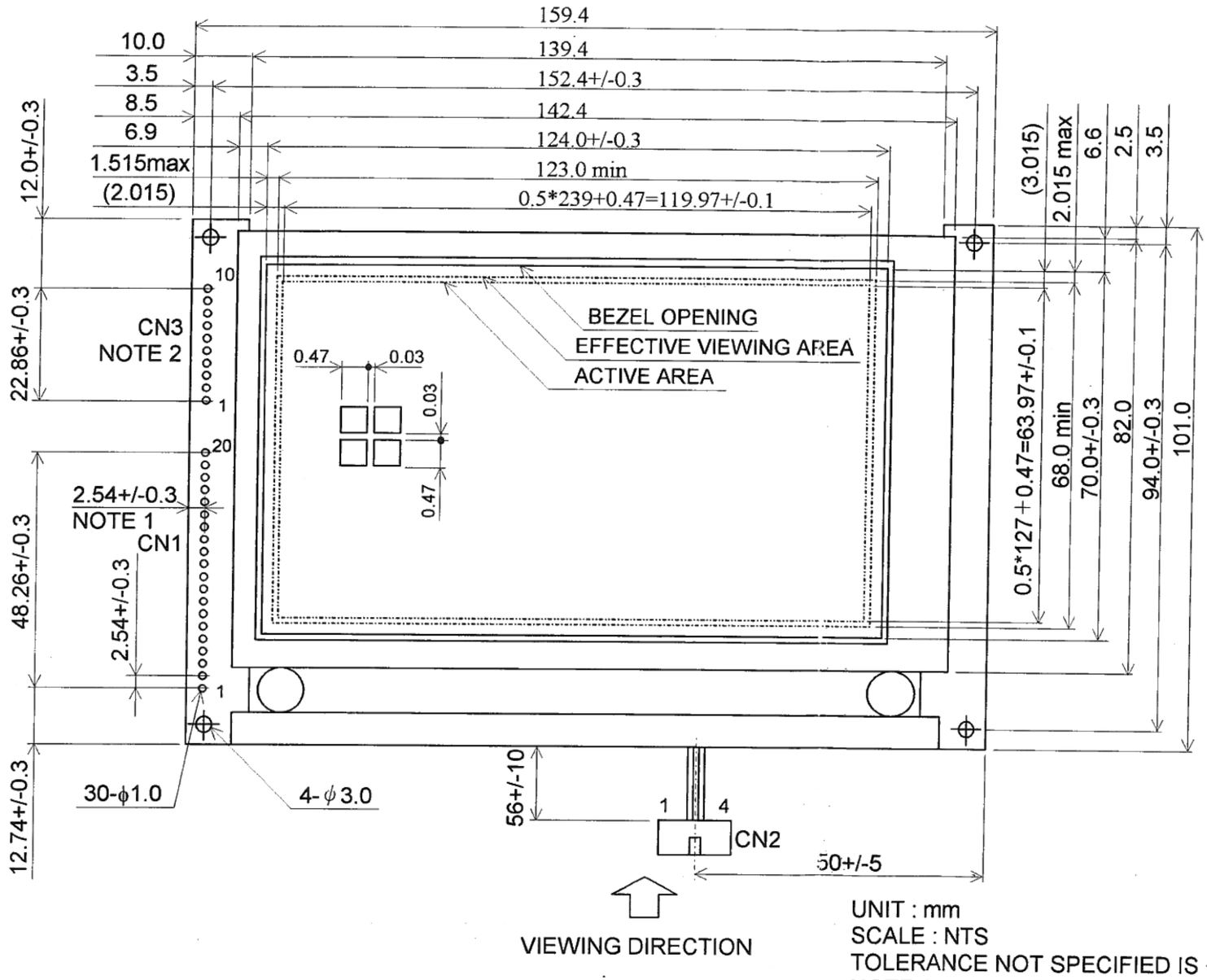
8.3 POWER SUPPLY FOR LCM (EXAMPLE)

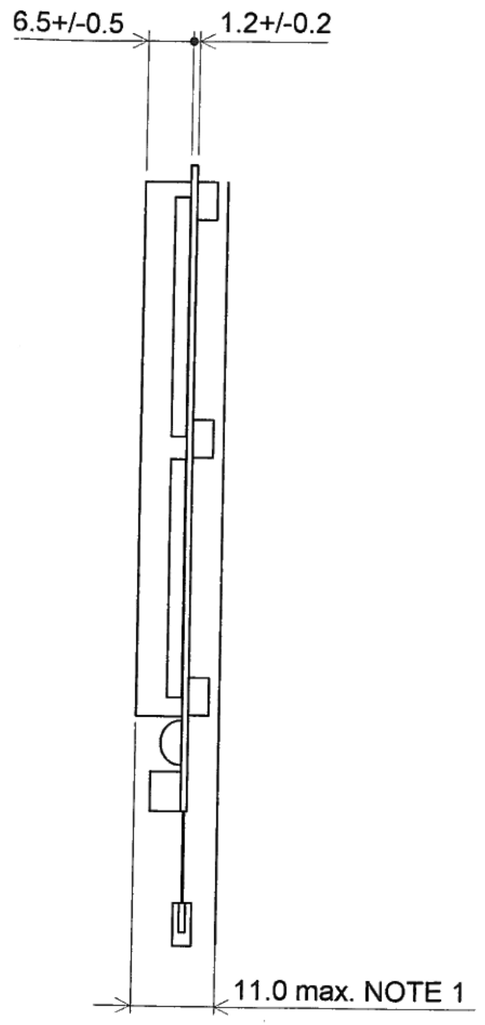


VR : 10~20K Ω
VDD-V0 : LCD DRIVING VOLTAGE

9. DIMENSIONAL OUTLINE

9.1 DIMENSIONAL OUTLINE

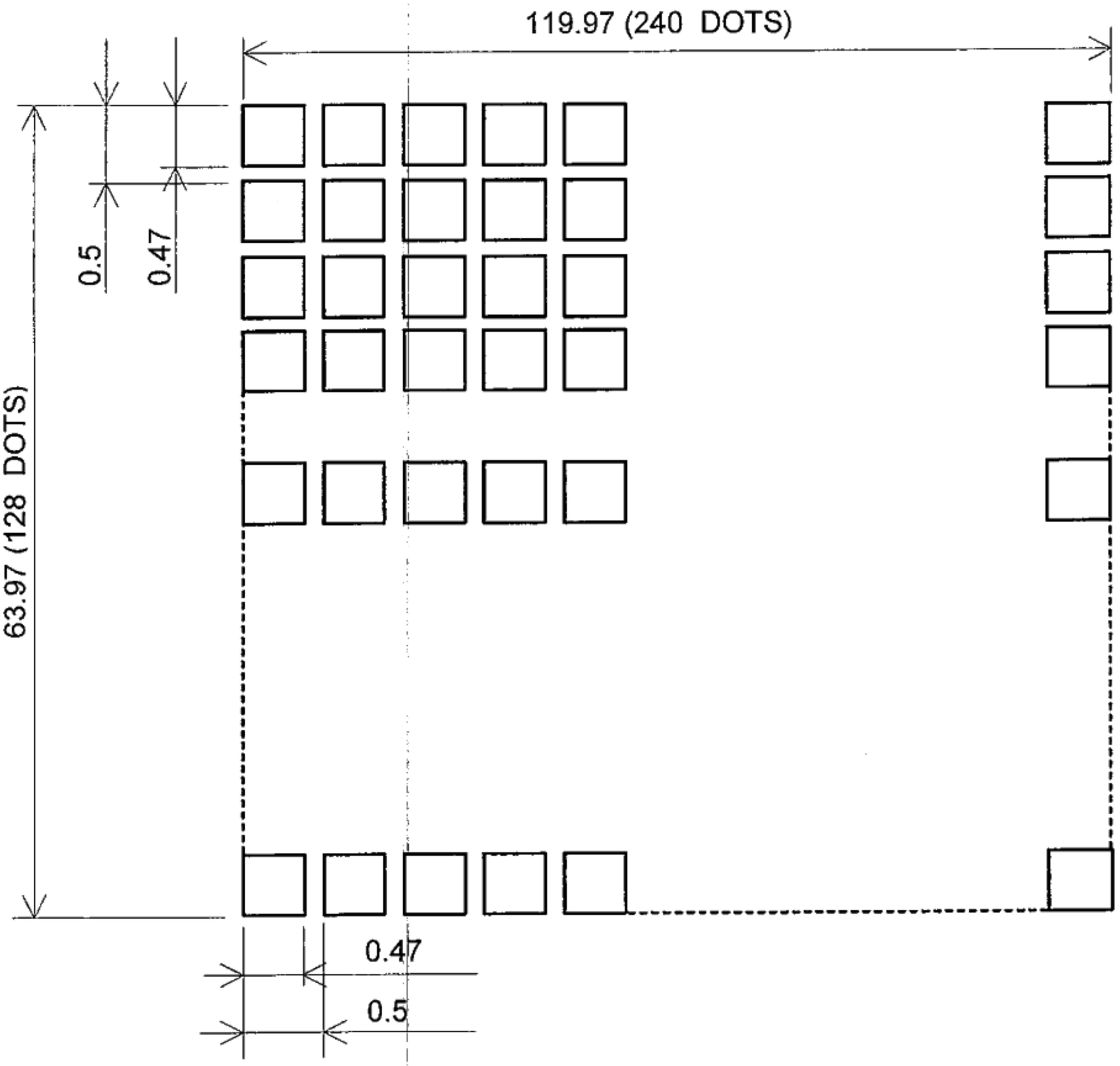




UNIT : mm
SCALE : NTS
TOLERANCE NOT SPECIFIED IS +/-0.5 mm
NOTE 1 : MEASUREMENT WHEN ADDING $9.8*10^{4}$ PA
(1.0Kgf/cm) AT THE MEASURING POING
NOTE 2 : DO NOT CONNECT ANY SIGNAL TO CN3
USE CN1 AS INTERFACE

Kaohsiung Hitachi Electronics Co.,Ltd.	Date	JUL.07.'99	Sh. No.	7B63PS 2709-LMG7420PLFC-X-4	Page	9-1/3

9.2 DISPLAY PATTERN



SCAL : NTS

UNIT : mm

MEASUREMENT TOLERANCE : +/-0.1

KAOHSIUNG HITACHI ELECTRONICS CO.,LTD.	DATA	JUL.07.'99	SH. No.	7B64PS 2709-LMG7420PLFC-X-4	PAGE	9-2/3

9.3 INTERNAL PIN CONNECTION

CN1

PIN No.	SYMBOL	FUNCTION
A1	VSS(0V)	GROUND
A2	VDD(+5V)	POWER SUPPLY FOR LOGIC CIRCUIT
A3	V0	POWER SUPPLY FOR LCD DRIVE
A4	C/D	$\overline{WR}$="L":C/D="H" COMMAND WRITE C/D="L" DATA WRITE $\overline{RD}$ ="L":C/D="H" STATUS READ C/D="L" DATA READ
A5	$\overline{WR}$	DATA WRITE (DATA WRITE AT "L")
A6	$\overline{RD}$	DATA READ (READ DATA AT "L")
A7~14	DB0~DB7	DATA BUS
A15	$\overline{CE}$	CHIP ENABLE ($\overline{CE}$ MUST BE "L")
A16	$\overline{RET}$	RESET
A17	VEE(-15V)	POWER SUPPLY FOR LCD DRIVE
A18	$\overline{D.OFF}$	NC/DISPLAY GND/DISPLAY OFF
A19	F/S	CHARACTER FONT SELECT : F/S="H" 6*8FONT F/S="L" 8*8FONT
A20	REVERSE	DISPLAY MODE REVERSE.

CN2

INTERFACE		PIN No.	SYMBOL	LEVEL	FUNCTION
CFL	CFL I/F	1	GND	-	CFL GND
		2	N.C	-	-
		3	N.C	-	-
		4	H.V	-	POWER SUPPLY FOR CFL

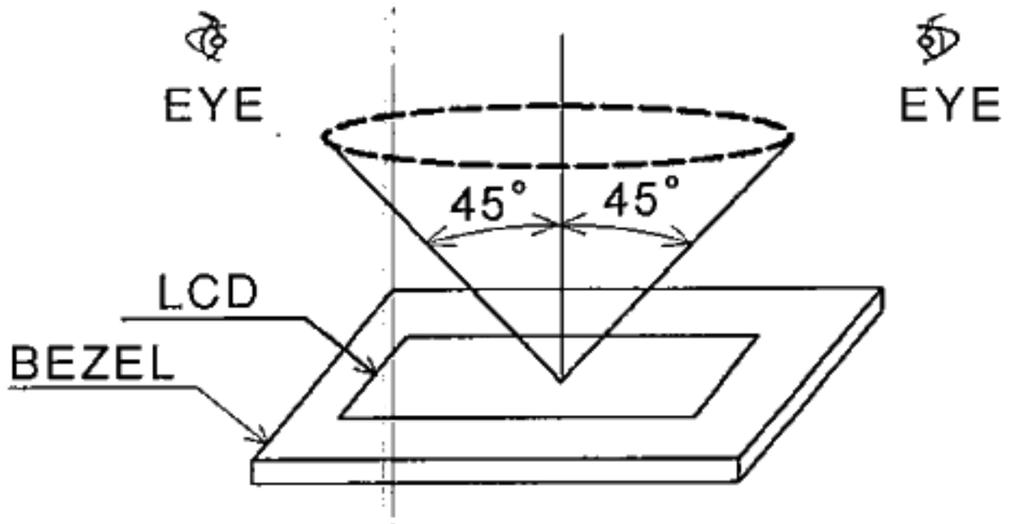
CFL I/F : MITSUMI M63M83-04
SUITABLE CONNECTOR : MITSUMI M61M73-04
MITSUMI M60-04-30-114P (STRAIGHT)
MITSUMI M60-04-30-134P (ANGLE)
SUITABLE INVERTER : HARISON INVC191

10. APPEARANCE STANDARD

10.1 APPEARANCE INSPECTION CONDITION

VISUAL INSPECTION SHOULD BE DONE UNDER THE FOLLOWING CONDITION.

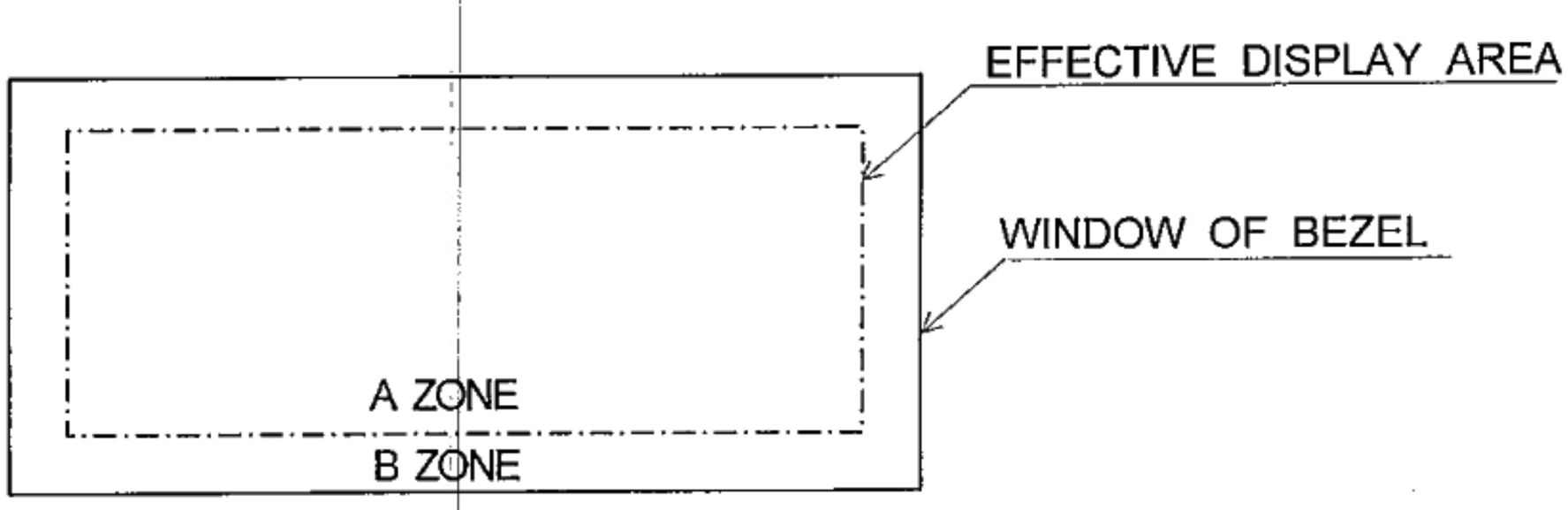
(1) IN THE DARK ROOM
(2) WITH CFL PANEL LIGHTED WITH PRESCRIBED INVERTER CIRCUIT.
(3) WITH EYES 25cm DISTANCE FROM LCM.
(4) VIEWING ANGLE WITHIN 45 DEGREES FROM THE VERTICAL LINE TO THE CENTER OF LCD.



10.2 DEFINITION OF EACH ZONE

A ZONE : WITHIN THE EFFECTIVE DISPLAY AREA SPECIFIED AT PAGR 9-1/3 OF THIS DOCUMENT.

B ZONE : AREA BETWEEN THE WINDOW OF BEZEI LINE AND THE EFFECTIVE DISPLAY AREA LINE SPECIFIED AT AT PAGE 9-1/3 OF THIS DOCUMENT.



10.3 APPEARANCE SPRCIFICATION

(1) LCD APPEARANCE

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

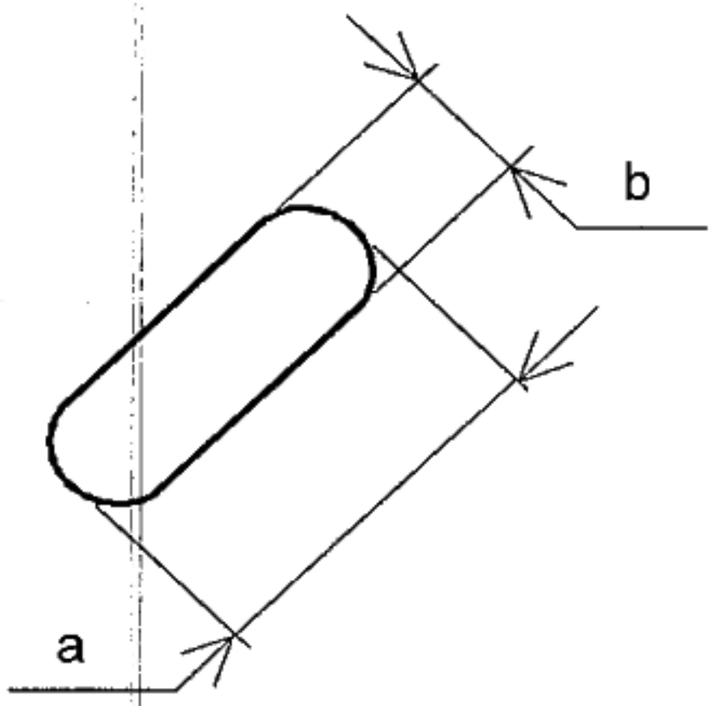
No.	ITEM	CRITERIA			A	B
L C D	SCRATCHES	DISTINQUISHED ONE IS NOT ACCEPTABLE (TO BE JUDGED BY HITACHI STANDARD)			*	-
	DENT	SAME AS ABOVE			*	-
	WRINKLES IN POLARIZER	SAME AS ABOVE			*	-
	BUBBLES	AVERAGE DIAMETER D(mm)		MAXINUM NUMBER ACCEPTABLE	O	-
		D<=0.2		IGNORE		
		0.2<D<=0.3		12		
		0.3<D<=0.5		3		
		0.5<D		NONE		
	STAINS, FOREIGN MATERIALS DARK SPOT	FILAMENTOUS			O	*
		LENGTH L(mm)	WIDTH W(mm)	MAXIMUM NUMBER ACCEPTABLE		
		L<=2.0	T<=0.03	IGNORE		
		L<=3.0	0.03<T<=0.05	6		
			0.05<T	NONE		
		ROUND			O	*
		AVERAGE DIAMETER D(mm)	MAXIMUM NUMBER ACCEPTABLE	MINIMUM SPACE		
		D<0.2	IGNORE	-		
		0.2<=D<0.3	6	10mm		
		0.3<=D<0.4	4	30mm		
		0.4<=D	NONE	-		
		THE WHOLE NUMBDR	FILAMENTOUS+ROUND=5			
		THOSE WIPED OUT EASILY ARE ACCEPTABLE			O	O
	COLOR TONE	TO BE JUDGED BY HITACHI STANDARD			O	-
	COLOR UNIFORMITY	SAME AS ABOVE			O	-
	PINHOLE	(A+B)/2<=0.15 MAXIMUM NUMBER : IGNORD			O	-
		0.15<(A+B)/2<=0.3 MAXIMUM NUMBER : IGNORD				
		C<=0.03 MAXIMUM NUMBER : IGNORD				

No.	ITEM	CRITERIA				A	B
L	CONTRAST IRREGULARITY (SPOT)	AVERAGE DIAMETER D(mm)	CONRRAST	MAXIMUM NUMBER ACCEPTABLE	MINUMUN SPACE	O	-
		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		NONE	-		
C D	CONTRAST IRREGULARITY (A PAIR OF SCRATCH)	WIDTH W(mm)	LENGTH L(mm)	MAXIMUM NUMBER ACCEPTABLE	MINIMUM SPACE	O	-
		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		
		THE WHOLE		6			
	RUBBING SCRATCH	TO BE JUDGED BY HITACHI STANDARD					

No.	ITEM	CRITERIA			A	B
CFL BACKLIGHT	DARK SPOTS IRREGULARITY FOREEGH (SPOT)	AVERAGE DIAMETER D(mm)		MAXIMUM NUMBER ACCEPTABLE	O	-
		D<=0.4		IGNORED		
		0.4< D		NONE		
	FOREIGH MATERIALS (LINE)	WIDTH W(mm)	LENGTH L(mm)	MAXIMUM NUMBER ACCEPTABLE	O	-
		W<=0.2	L<=2.5	1		
			2.5<L	NONE		
		0.2<W	-	NONE		
	SCRATCHES	WIDTH W(mm)	LENGTH L(mm)	MAXIMUM NUMBER ACCEPTABLE	O	-
		W<=0.1	-	IGNORED		
		0.1<W<=0.2	L<=11.0	1		
			11.0<L	NONE		
		0.2<W	-	NONE		

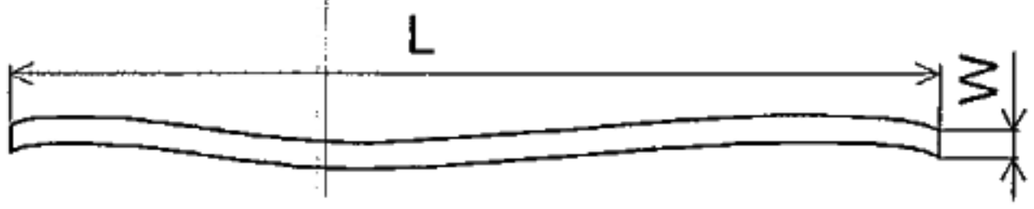
NOTE

(1) DEFINITION OF AVERAGE DIAMETER D

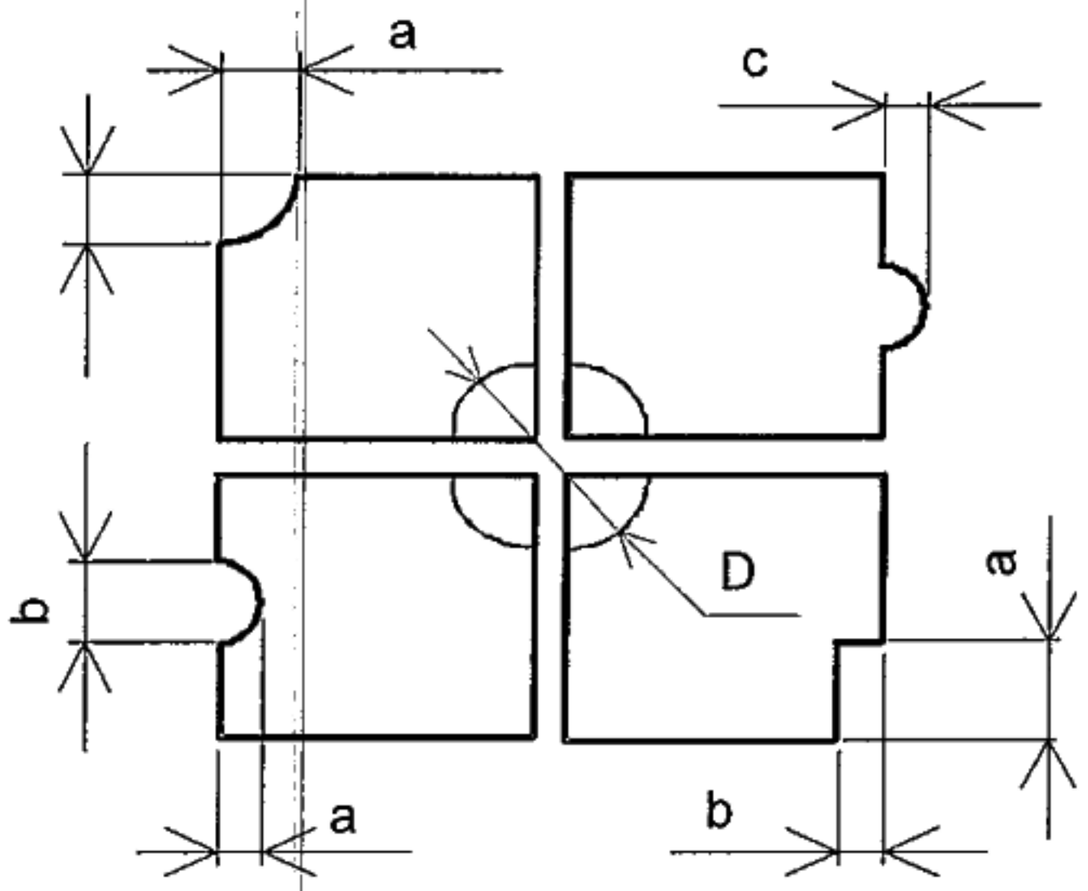


$$D=\frac{a+b}{2}$$

(2) DEFINITION OF LENGTH L AND WIDTH W



(3) DEFINITION OF PINHOLE



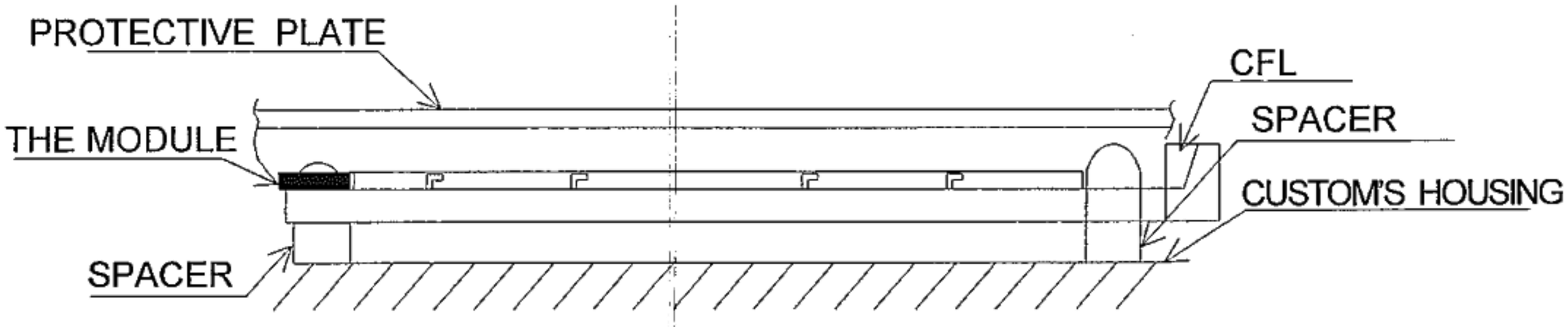
C:SALIENCE

KAOHSIUNG HITACHI ELECTRONICS CO.,LTD.	DATA	JUL.07.'99	SH. No.	7B64PS 2707-LMG7420PLFC-X-4	PAGE	10-5/5

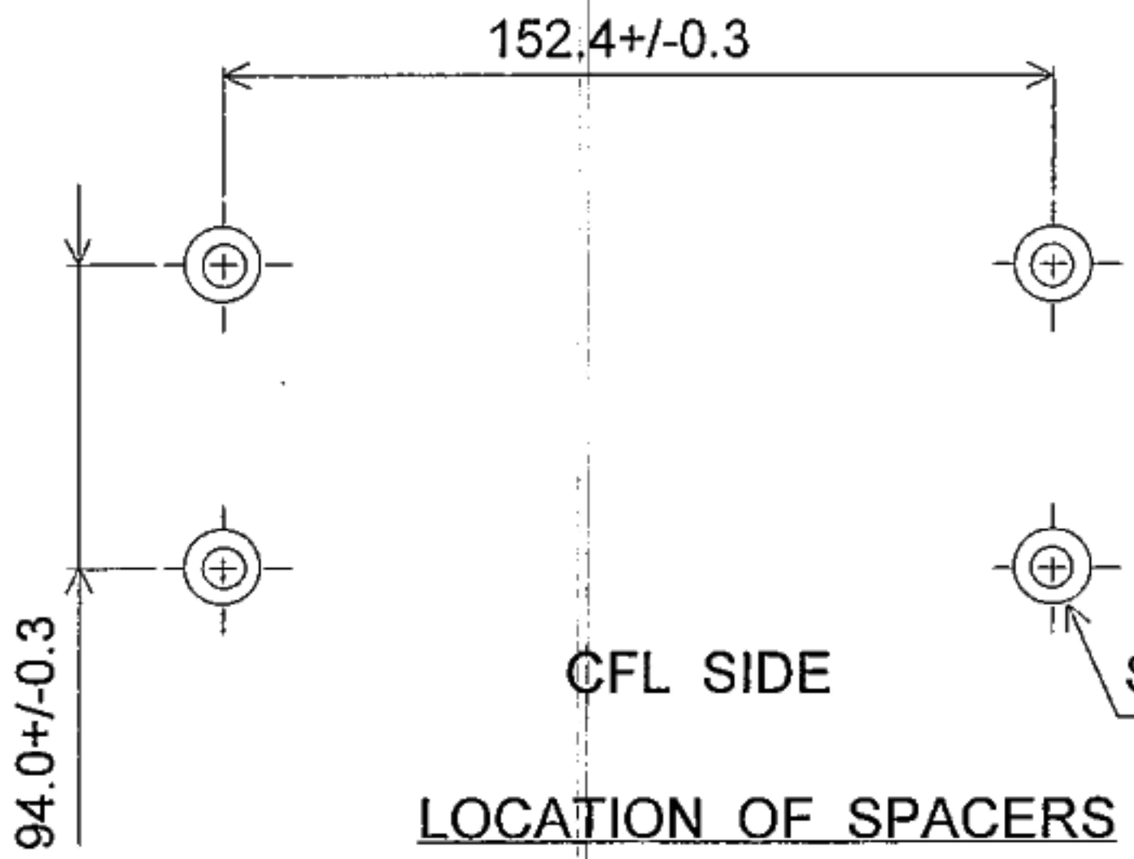
11. PRECAUTION IN DESIGN

11.1 MOUNTING METHOD

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



EXAMPLE OF MOUNTING



UNIT:mm
SCALE:NTS

LOCATION OF SPACERS

(1) USE OF PROTECTIVE PLATE,MADE OF AN ACRYLIC PLATE, ETC, IN ORDER TO PROTECT A POLARIZER AND LC CELL.
(2) TO PREVENT THE MODELE COVER FROM BEING PRESSES, 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 PROTEXTING LCD MODULE FROM ANY KIND SHOCK TO YOU SET.

11.2 LC DRIVING VOLTAGE(V0) AND VIEWING ANGLE RANGE.

SETTING VO 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 OPERATOE'S BODY IS REQUIRED WHEN HANDLING IT.

11.4 POWER ON SEQUENCE

INPUT SIGNALS SHOULD NOT BE APPLIED TO LCD MODULE BEFORE POWER SUPPLY VOTAGE IS APPLIED AND REACHES TO SPECIFIED VOLTAGE(5+/-0.25V) IF ABOVE SEQUENCE IS NOT LEPT, 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°C 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 DEGRADATION AS WELL AS BUBBLE GENETRATION AND POLARIZER PEEL-OFF. PLEASE KEEP THE TEMPERATURE AND HUMIDITY WITHIN THE SPECIFIED RANGE DOR 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 ALUMUNUM 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 ATTACHHED ON THE DISPLAY AREA BECAUSE ITS LONG PERIOD ADHERANCE MAY CAUSE DEFORMATION OR FADED COLOR ON THE SPOT.

(6) FOGY DEW DEPOSITED ON THE SURFACE AND CONTACT TERMINALS DUE TO COLDENESS WILL BE A CAUSE FOR POLARIZER DAMAGE, STAIN AND DIRT ON PRODUCT.WHEN NECESSARY TO TAKE OUT THE PRODUCTS FROM 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 POOB INSULATION BETWEEN TERMINALS ARE OFTEN CAUSED BY BEING TOUCHED BY BARE HANDS.
(THERE ARE SOME COME COSMETICS DETRIMENTAL TO POLARIZERS.)

(8) IN CENERAL 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 GIVE IT SHAPR 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 BULE COLOR IN THEN.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 DISPLAYED BUT IT RESUMES NORMAL CONDITION AFTER TURNING OFF ONCE.

(4) A SLIGHT DEW DEPOSITING ON TEMPINALS 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.

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 RECOMMENED.

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

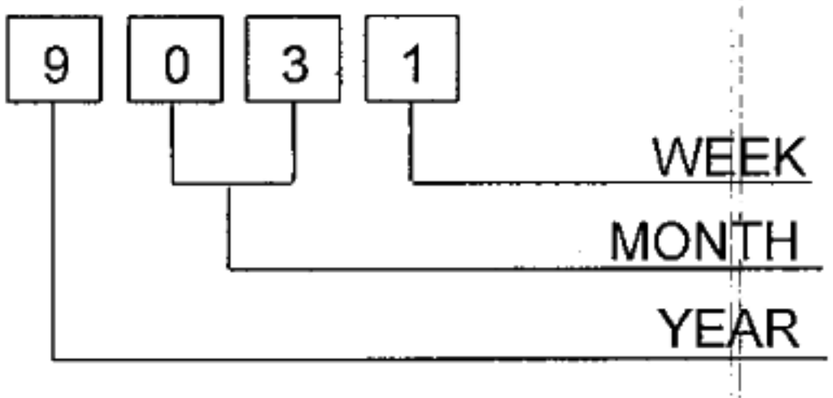
11.8 SAFETY

(1) IT IS RECOMMENDABLE TO CRASH DAMAGED OR UNNECESSARY LCD' INTO PIECES AND EASH OFF LIQUID CRYSTAL BY EITHER OR SOLVENTS SUCH AS ACETONE AND ETHANOL, WHICH SHOUD BE BURNED UP LATER.
(2) 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

LOT MARK

LOT MARK IS CONSISTED OF 4 DIGITS FOR PRODUCTION LOT



YEAR	FIGURE IN LOT MARK
1999	9
2000	0
2001	1
2002	2

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
22~29	4
30~31	5

LOCATION OF LCD MARK : ON THE BACK SIDE OF LCM

9031

KAOHSIUNG HITACHI ELECTRONICS CO.,LTD.	DATA	JUL.07.'99	SH. No.	7B64PS 2712-LMG7420PLFC-X-4	PAGE	12-1/1

13. PRECAUTION FOR USE

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