HITACHI

For Messrs : _____ Date : Feb.10.'95

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

LMG7400PLFC

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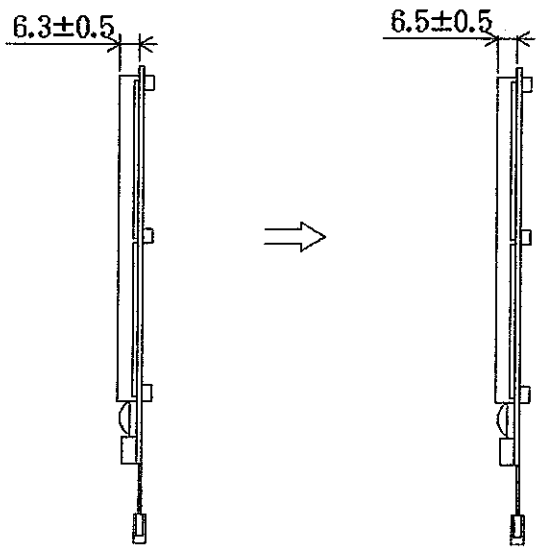
Accepted by: _____ Proposed by: Y.J. Wang

RECORD OF REVISION

Date	Sheet No.	Summary
'93.10.08	3284PS 2706- LMG7400PLFC-3 PAGE 6-2/2	MODIFY : BRIGHTNES (60.0) (80.0) ↓ MIN TYP BRIGHTNES 70.0 90.0
	3284PS 2709- LMG7400PLFC-3 PAGE 5-1/2	MODIFY : BEZEL OPENING SIZE 「(127)×(72)」→「124×70」 
'93.12.25	3284PS 2705- PAGE 5-1/2 LMG7400PLFC-4 3284PS 2706- LMG7400PLFC-4 PAGE 6-1/2	CHANGE:IDD&IEE TYP MAX IEE:4.0mA→2.5mA 4.0mA IDD:6.0mA→9.7mA 12.0mA CHANGE:CONTRAST RATIO K:18→20 DEL:RESPONES MAX.

RECORD OF REVISION

<table>
<tr><th>Date</th><th>Sheet No.</th><th>Summary</th></tr>
<tr><td>Feb.10.'95</td><td>3284PS 2704-
LMG7420PLFC-5
Page 4-1/1</td><td>CHANGE:
<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℃</td><td>40℃</td></tr>
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⇩
<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℃</td><td>50℃</td></tr>
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<tr><td>Feb.10.'95</td><td>3284PS 2705-
LMG7400PLFC-5
Page 5-1/2</td><td>CHANGE:
<table>
<tr><th></th><th>CONDITION</th><th>TYP.</th></tr>
<tr><td>VDD－V0</td><td>Ta=40℃, φ=10°</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℃, φ=10°</td><td>15.2</td></tr>
</table></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

RECORD OF REVISION

<table>
<tr><th>Date</th><th>Sheet No.</th><th>Summary</th></tr>
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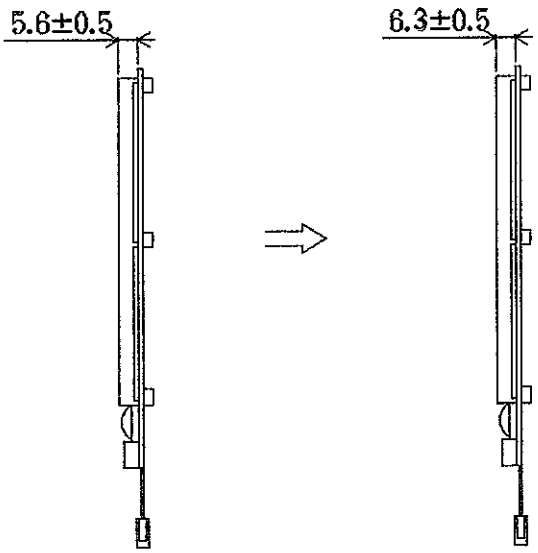
LMG7400PLFC-2
PAGE 9-1/3</td><td>MODIFY :
 
</td></tr>
<tr><td></td><td>MODIFY :
FRAME SIZE
「142.4×82.6」 → 「142.4×82.0」</td></tr>
<tr><td>3284PS 2709-
LMG7400PLFC-2
PAGE 9-3/3</td><td>MODIFY :
CN1
<table>
<tr><td>A18～20</td><td>NC</td><td>NO CONNECTION</td></tr>
</table>

⇩
<table>
<tr><td>A18</td><td>$\overline{\text{D • OFF}}$</td><td>NC/DISPLAY
GND/DISPLAY OFF</td></tr>
<tr><td>A19～20</td><td>NC</td><td>NO CONNECTION</td></tr>
</table></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

3. MECHANICAL DATA

(1) PART NAME	LMG7400PLFC
(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)DOTS
(6) DUTY	1/128
(7) LCD	FILM TYPE BLACK/WHITE (NEGATIVE TYPE) THE UPPER POLARIZER IS ANTI-GLARE TYPE.(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

I T E M	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 2

NOTE 1 MAKE CERTAINS YOU ARE GROUNDED WHEN HANDLING LCM

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

I T E M	OPERATING		STORAGE		C O M M E N T
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	0℃	50℃	-20℃	60℃	NOTE 2,3
HUMIDITY	NOTE 1		NOTE 1		WITHOUT CONDENSATION
VIBRATION	—	4.9 m/s² (0.5G)	—	19.6m/s² (2 G) NOTE 5	NOTE 4
SHOCK	—	29.4m/s² (3 G)	—	490.0m/s² (50 G)	XYZ DIRECTIONS
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE 1 Ta≦40℃:85%RH max.
Ta＞40℃:ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 85%RH AT 40℃

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

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

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

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

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	-	9.7	12.0	mA
POWER SUPPLY CURRENT FOR LCD RIVING NOTE 1	IEE	VDD-VSS=5.0V	-	2.5	4.0	mA
RECOMMENDED	VDD-V0	Ta= 0℃, ϕ =0°	-	16.9	-	V
LC DRIVING VOLTAGE		Ta=25℃, ϕ =0°	-	15.8	-	V
NOTE 2		Ta=50℃, ϕ =0°	-	15.2	-	V
FRAME FREQUENCY NOTE 2	fFRAME	-	-	75	-	Hz

NOTE 1 fFRAME=75Hz,VDD-V0 =15.8 V, Ta=25℃

NOTE 2 RECOMMENDED LC DRIVING VOLTAGE FLUCTUATE ABOUT ±1.0V BY EACH MODULE.
TEST PATTERN IS ALL " 0" .

NOTE 3 NEED TO MAKE SURE OF FLICKERING AND RIPPLING OF DISPLAY WHE SETTING THE FRAME FREQUENCY IN YOUR SET.

5.2 ELRCTRICAL CHARACTERISTICS OF BACKLIGHT

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

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 TEMPERATURE.

PLEASE CHECK THE CHARACTERISTICS OF INVERTER BEFORE APPLING

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

6. OPTICAL CHARACTERISTICS

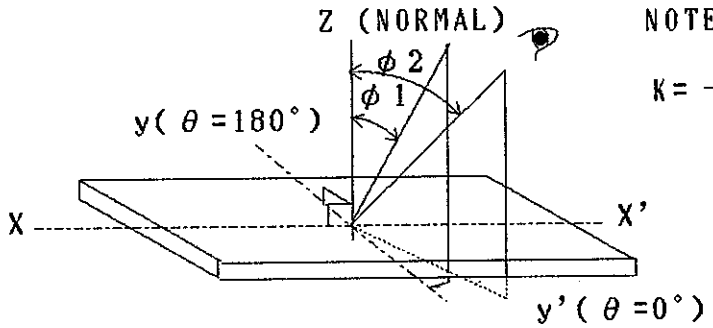
6.1 OPTICAL CHARACTERISTICS

Ta=25℃ (BACKLIGHT ON)

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	$\phi=10°$ $\theta=0°$	-	20	-	-	3
RESPONES TIME (RISE)	tr	$\phi=10°$ $\theta=0°$	-	(160)	-	ms	4
RESPONES TIME (FALL)	tf	$\phi=10°$ $\theta=0°$	-	(110)	-	ms	4

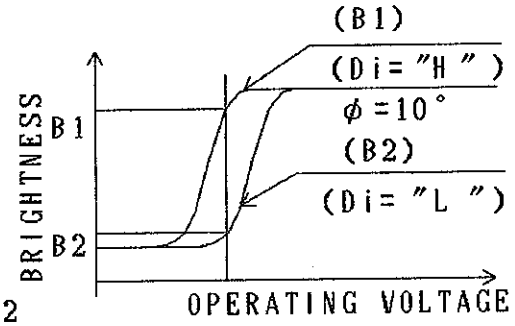
(MEASURE CONDITION BY HITACHI)

NOTE1. DEFINITION OF θ AND ϕ

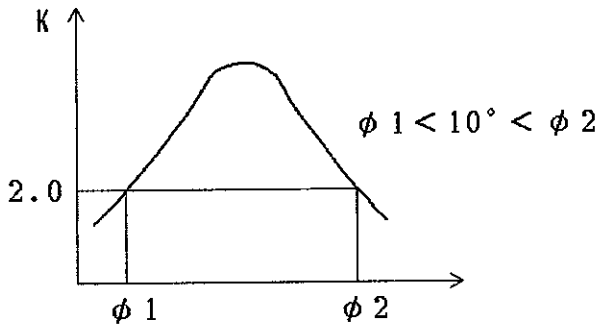


NOTE3. DEFINITION OF CONTRAST " K "

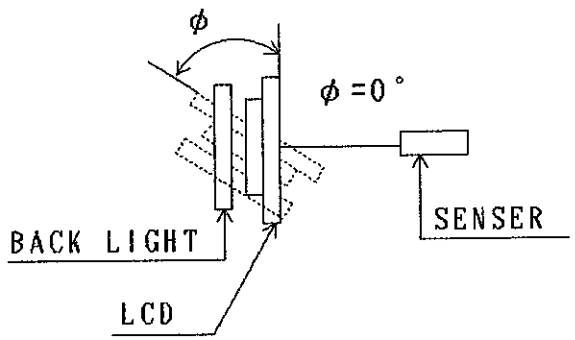
$$K=\frac{\text{BRIGHTNESS ON SELECTED DOT (B1)}}{\text{BRIGHTNESS ON NON-SELECTED DOT (B2)}}$$



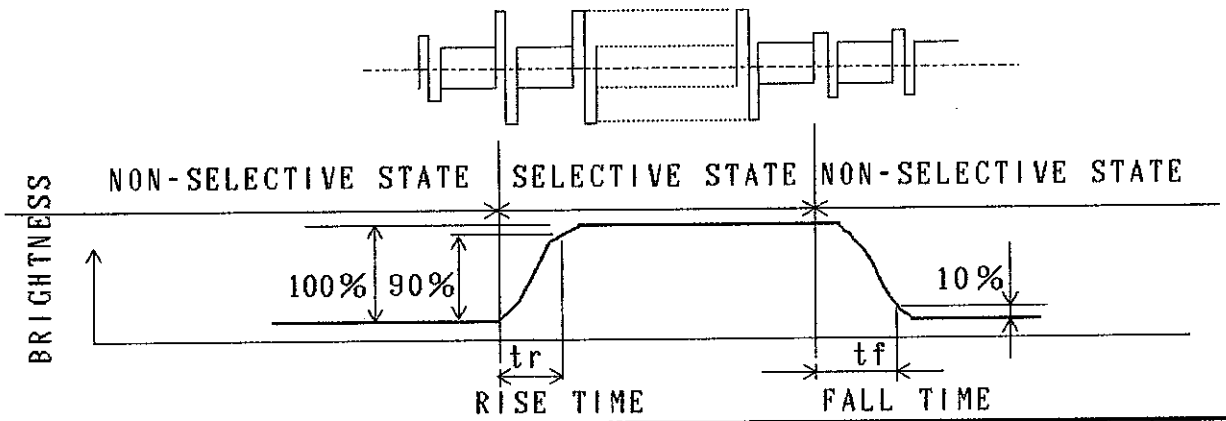
NOTE2. DEFINITION OF VIEWING ANGLE $\phi 1$ AND $\phi 2$



CONTRAST RATIO K VS VIEWING ANGLE ϕ



NOTE4. DEFINITION OF OPTICAL RESPONSE



6. 2 OPTICAL CHARACTERISTICS OF BACKLIGHT

(LCM,BACKLIGHT ON,Ta=25℃)

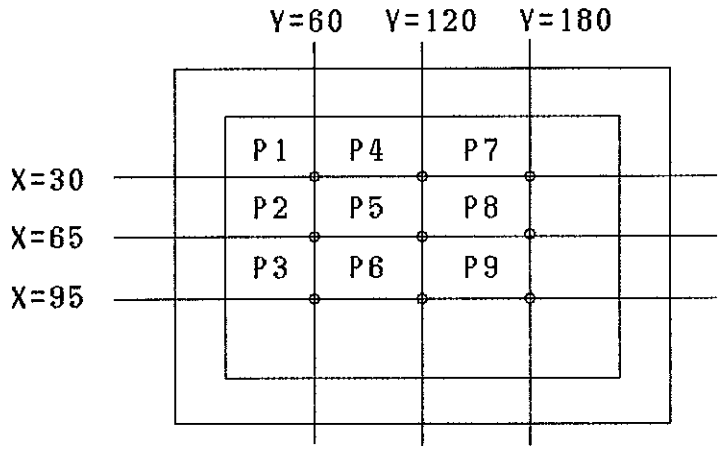
ITEM	MIN.	TYP.	MAX.	UNIT	NOTE
BRIGHTNES	70.0	90.0	-	cd/m²	IL=5mA NOTE 1,2
RISE TIME	-	5	-	MINUTE	IL=5mA BRIGHTNESS 80%
BRIGHTNESS UNIFOMITY	-	-	±30	%	UNDERMENTIONED NOTE 1,3

CFL :INITAL, Ta=25℃, VDD-V0= 15.8 V
DISPLAY DATA SHOULD BE ALL " ON" .

NOTE 1 MEASUREMENT AFTER 10 MINUTES OF CFL OPERATING.

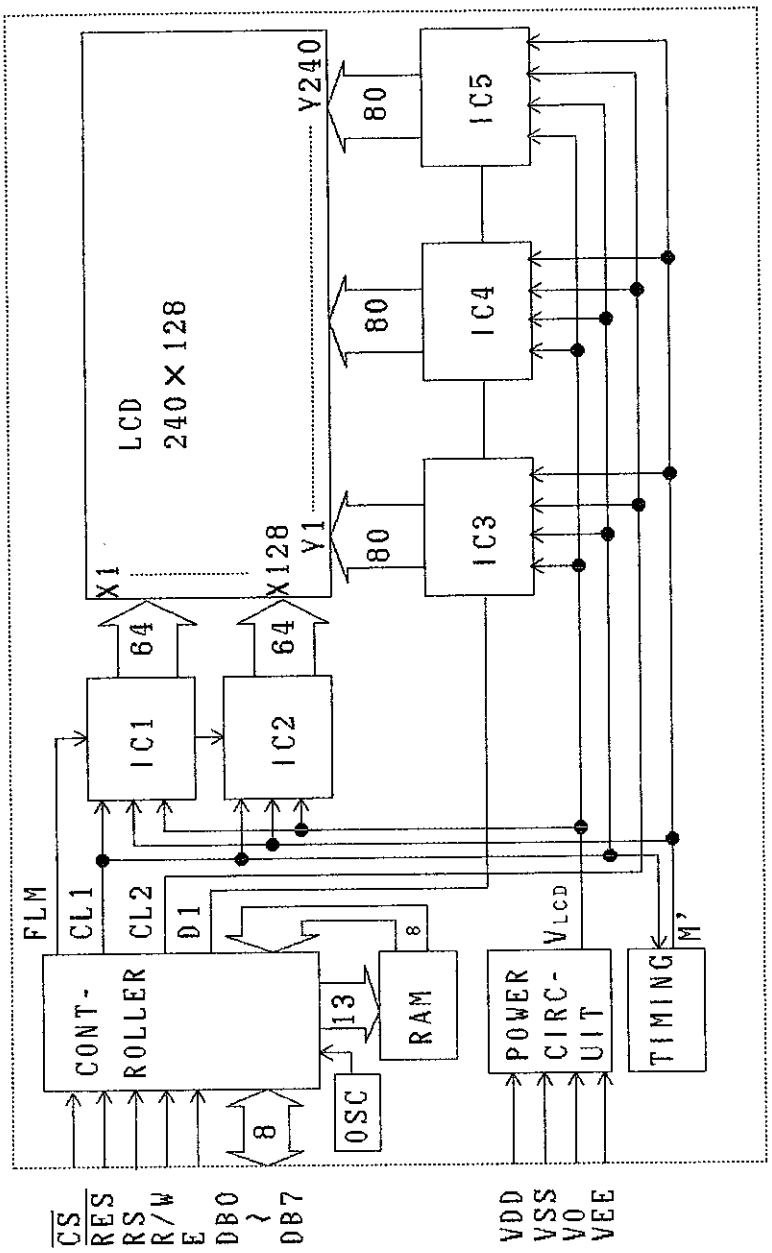
NOTE 2 BRIGHTNESS CONTROL :100%

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



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

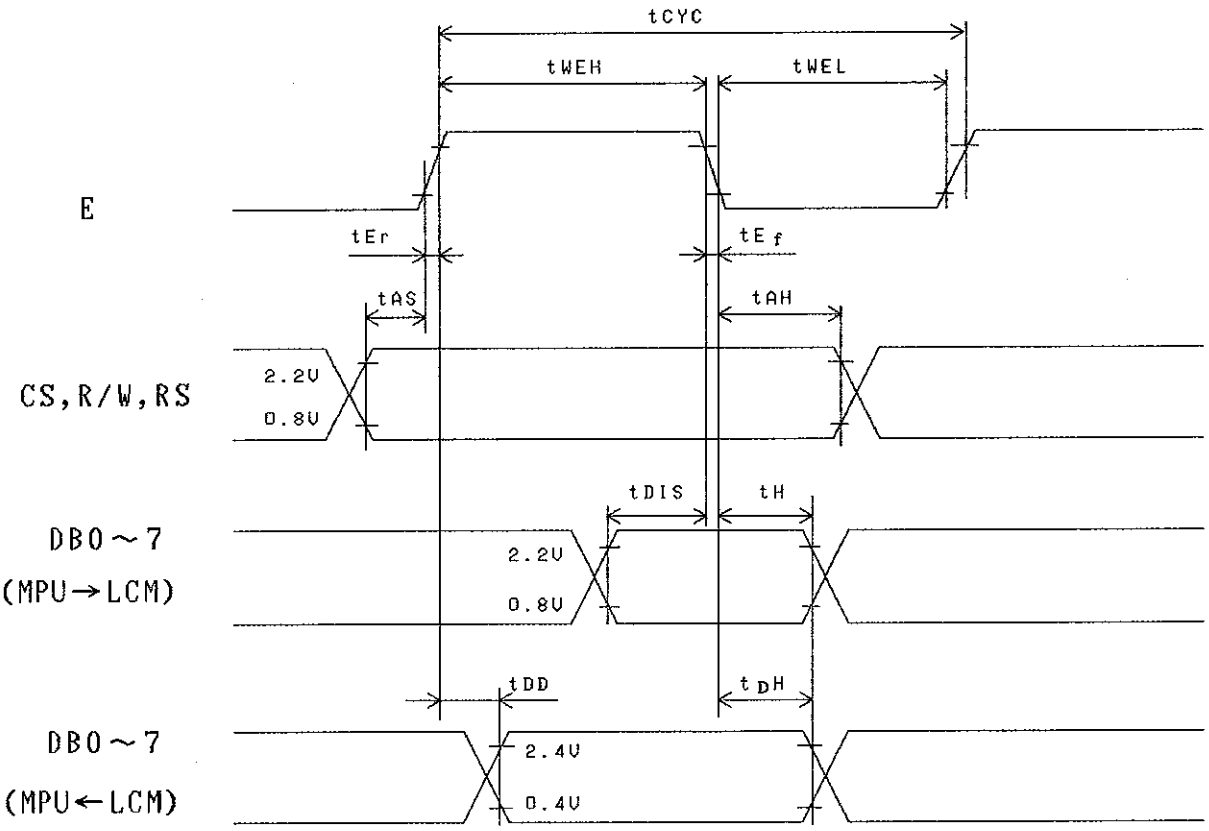
7. BLOCK DIAGRAM



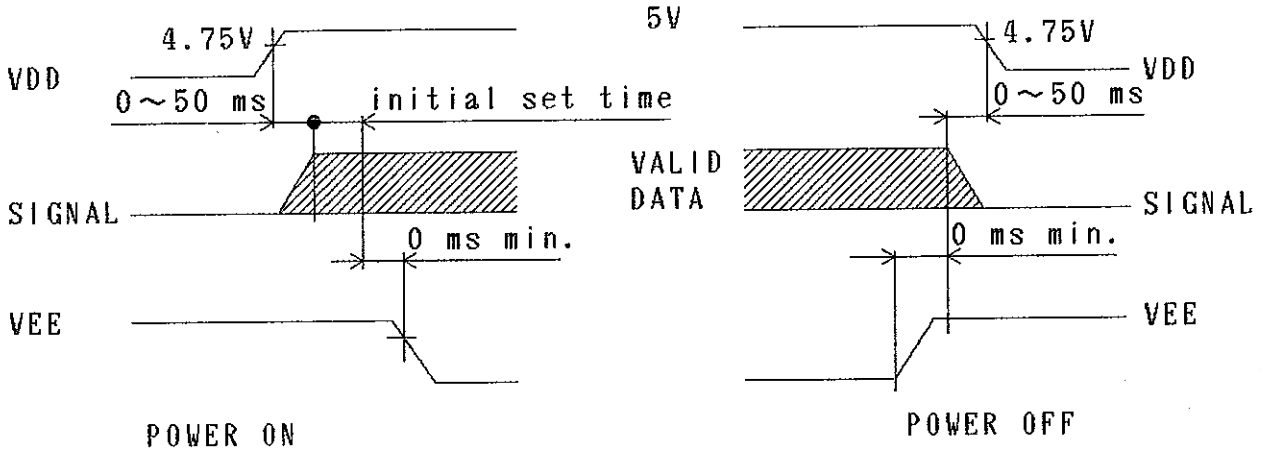
Kaohsiung Hitachi Electronics Co., Ltd.	Date	Feb.10'95	Sh. No.	3284PS 2707-LMG7400PLFC-5	Page	7-1/1

8. INTERFACE TIMING CHART

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
ENABLE CYCLE TIME		tCYC	1.0	-	-	μs
ENABLE PULSE WIDTH	H LEVEL	tWEH	0.45	-	-	μs
	L LEVEL	tWEL	0.45	-	-	μs
ENABLE RIST TIME		tEr	-	-	25	ns
ENABLE FALL TIME		tEf	-	-	25	ns
CS,R/W,RS SET UP TIME		tAS	140	-	-	ns
DATA SET UP TIME		tDIS	225	-	-	ns
DATA DELAY TIME		tDD	-	-	225	ns
DATA HOLD TIME		tH	10	-	-	ns
CS,R/W,RS→HOLD TIME		tAH	10	-	-	ns
DATA HOLD TIME		tDH	20	-	-	ns



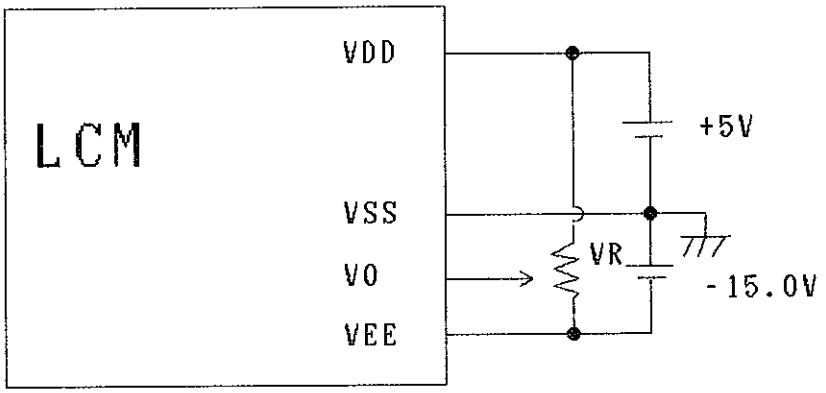
8.2 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL



NOTE: INITIAL SET TIME - THE TIME IS INITIAL INSTRUCTIONS SET TIME OF CONTROLLER HD61830.

(INITIAL INSTRUCTIONS): ① MODE CONTROL
② SET CHARACTER PITCH
③ SET NUMBER OF CHARACTER
④ SET NUMBER OF TIME DIVISION.

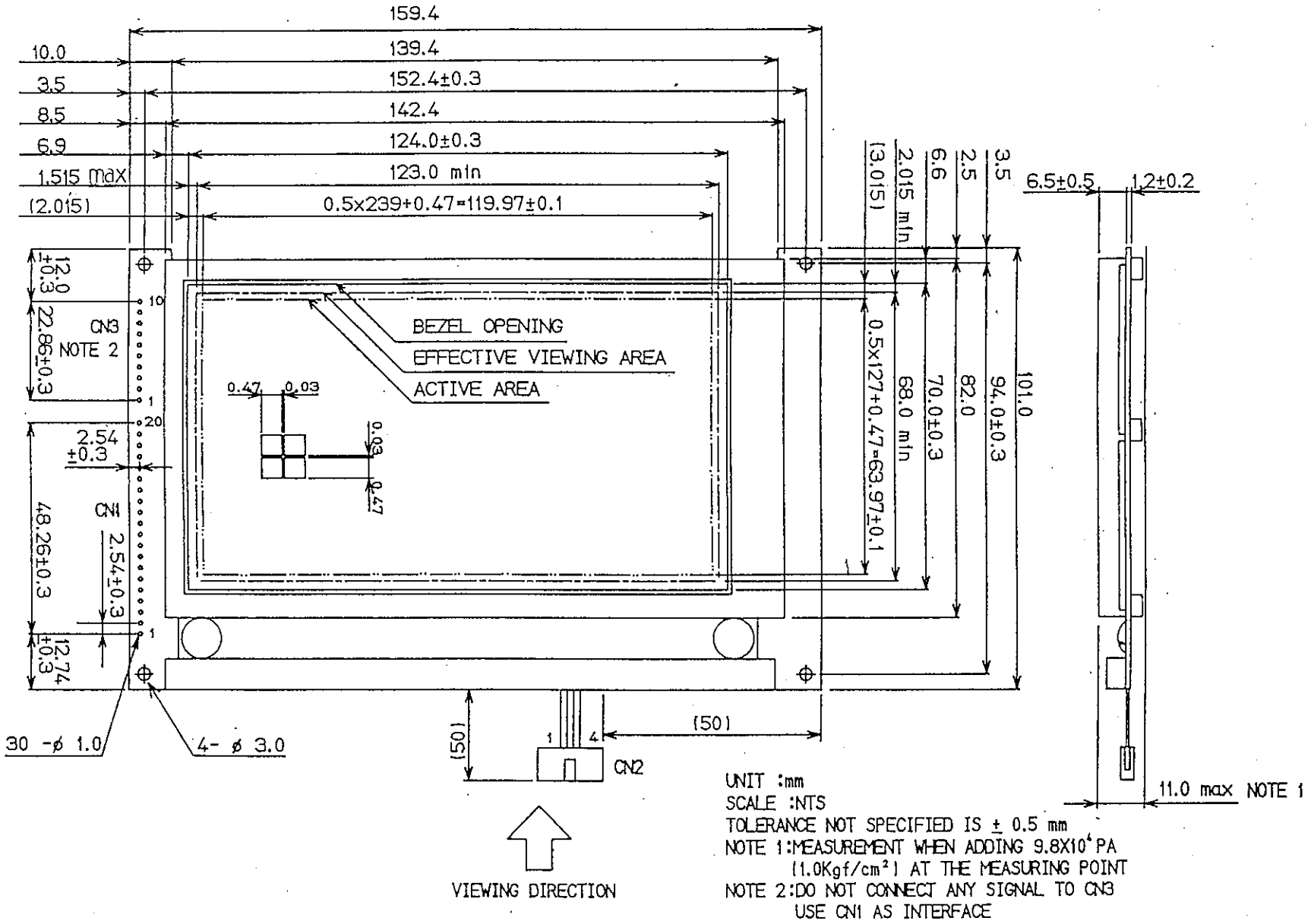
8 .3 POWER SUPPLY FOR LCM (EXAMPLE)



VR: 10～20K Ω

VDD-VO: LCD DRIVING VOLTAGE

LMG7400PLFC EXTERNAL DIMENSION



UNIT :mm
SCALE :NTS
TOLERANCE NOT SPECIFIED IS ± 0.5 mm
NOTE 1:MEASUREMENT WHEN ADDING $9.8X10^4$ PA
($1.0Kgf/cm^2$) AT THE MEASURING POINT
NOTE 2:DO NOT CONNECT ANY SIGNAL TO CN3
USE CN1 AS INTERFACE

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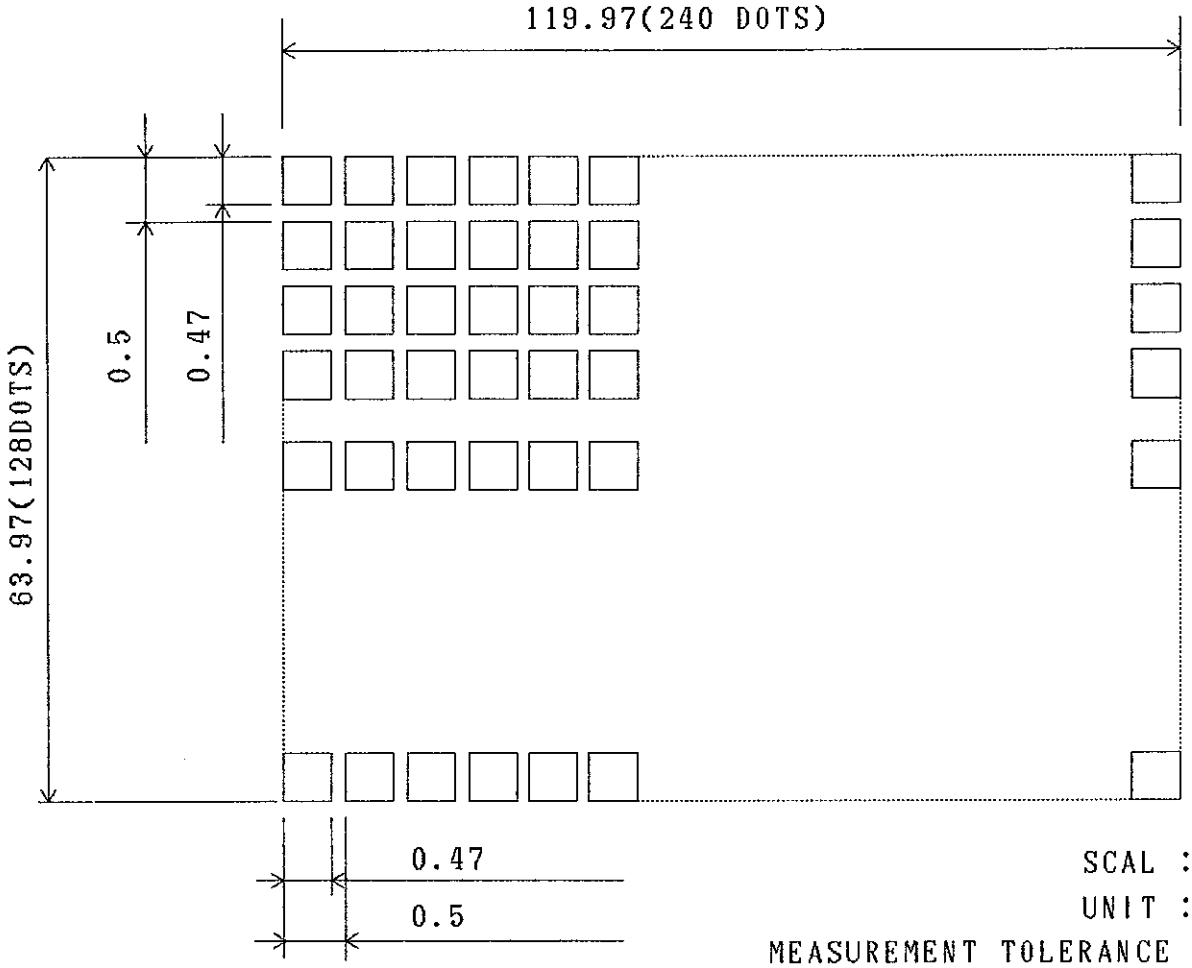
9. 2 DISPLAY PATTERN



SCAL :NTS
UNIT :mm
MEASUREMENT TOLERANCE :±0.1

9.3 INTERNAL PIN CONNECTION

CN1

PIN No.	Symbol	Function
A1	VSS(0V)	Ground
A2	VDD(+5V)	Power supply for logic
A3	V0	Power supply for LCD drive
A4	RS	Register select
A5	R/W	Read/write
A6	E	Enable
A7～14	DB0～DB7	Data bus
A15	CS	Chip select
A16	RES	Reset
A17	VEE(-15.0V)	Power supply for LCD drive
A18	$\overline{\text{D • OFF}}$	NC/DISPLAY GND/DISPLAY OFF
A19～20	N.C	No connection

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)

10. APPEARANCE STANDARD

10. 1 APPEARANCE INSPECTION CONDITION

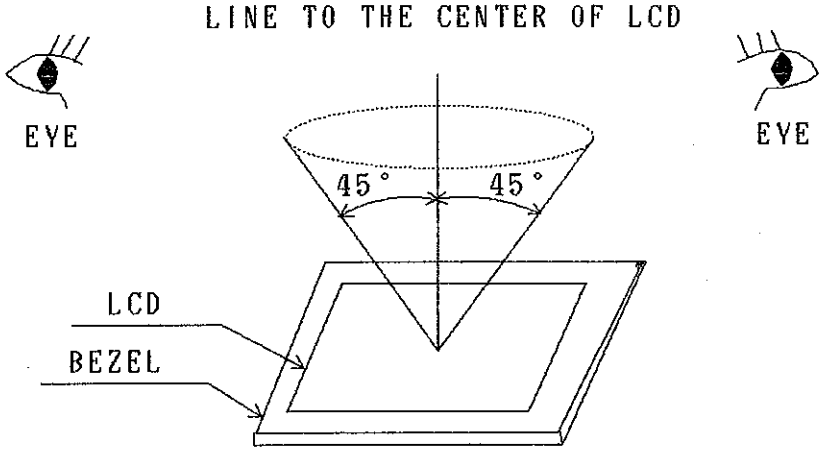
VISUAL INSPECTION SHOULD BE DONE UNDER THE FOLLOWING CONDITION.

(1) IN THE DARK ROOM

(2) WITH CFL PANEL LIGHTED WITH PRESCRIBED INVERTER CIRCUIT.

(3) WITH EYES 25cm DISTANCE FROM LCM

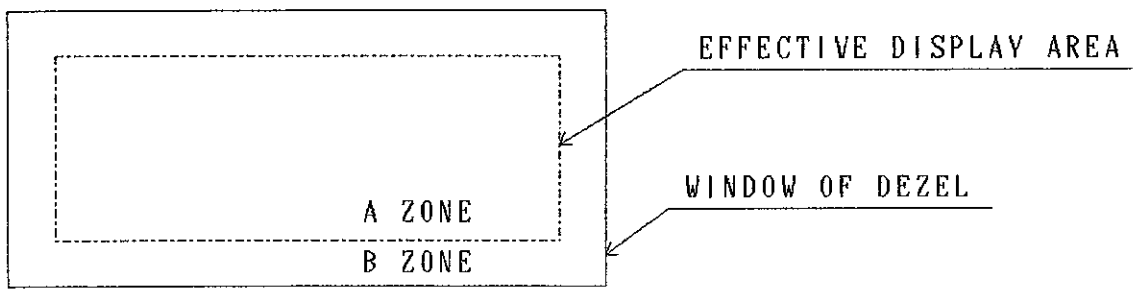
(4) VIEWING ANGLE WITHIN 45 DEGREES FROM THE VERTICAL LINE TO THE CENTER OF LCD



10. 2 DEFINITION OF EACH ZONE

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

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



10. 3 APPEARANCE SPECIFICATION

(1) LCD APPEARANCE

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

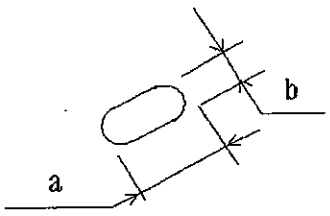
NO.	ITEM	CRITERIA			A	B
	SCRATCHES	DISTINQUISHED ONE IS NOT ACCEPTABLE (TO BE JUDGED BY HITACHI STANDARD)			※	-
	DENT	SAME AS ABOVE			※	-
	WRINKLES IN POLARIZER	SAME AS ABOVE			※	
	BUBBLES	AVERAGE DIAMETER D(mm)	MAXIMUM NUMBER ACCEPTABLE		○	-
		D≦0.2	IGNORE			
		0.2<D≦0.3	5			
		0.3<D≦0.5	1			
		0.5<D	NONE			
L C D	STAINS, FOREIGN MATERIALS DARK SPOT	FILAMENTOUS			○	※
		LENGTH L(mm)	WIDTH W(mm)	MAXIMUM NUMBER ACCEPTABLE		
		L≦2.0	T≦0.03	IGNORE		
		L≦3.0	0.03<T≦0.05	3		
		-	0.05<T	NONE		
		ROUND			○	※
		AVERAGE DIAMETER D(mm)	MAXIMUM NUMBER ACCEPTABLE	MINIMUM SPACE		
		D<0.2	IGNORE	-		
		0.2≦D<0.3	3	10mm		
		0.3≦D<0.4	2	30mm		
		0.4≦D	NONE	-		
		THE WHOLE NUMDER	FILAMENTOUS+ROUND=5			
		THOSE WIPED OUT EASILY ARE ACCEPTABLE			○	○
	COLOR TONE	TO BE JUDGED BY HITACHI STANDARD			○	-
	COLOR UNIFORMITY	SAME AS ABOVE			○	-
	PINHOLE	(A+B)/2≦0.15 MAXMUM NUMDER:IGNORED			○	-
		0.15<(A+B)/2≦0.3 MAXMUM NUMDER:IGNORED				
		C≦0.03MAXIMUM NUMDER:IGNORED				

NO.	ITEM	CRITERIA				A	B
L C D	CONTRAST IRREGULARITY (SPOT)	AVERAGE DIAMETER D(mm)	CONTRAST	MAXIMUM NUMBER ACCEPTABLE	MINIMUM SPACE	○	-
		D ≦ 0.25	TO BE JUDGED BY HITACHI STANDARD	IGNORE	-		
		0.25 < D ≦ 0.35		5	20mm		
		0.35 < D ≦ 0.5		2	20mm		
		0.5 < D		NONE	-		
	CONTRAST IRREGULARITY (A PAIR OF SCRATCH)	WIDTH W(mm)	LENGTH L(mm)	MAXIMUM NUMBER ACCEPTABLE	MINIMUM SPACE	○	-
		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 FOREIGH (SPOT)	AVERAGE DIAMETER D(mm)		MAXIMUM NUMBER ACCEPTABLE	○	-
		D≦0.4		IGNORED		
		0.4<D		NONE		
	FOREIGH MATERIALS (LINE)	WIDTH W(mm)	LENGTH L(mm)	MAXIMUM NUMBER ACCEPTABLE	○	-
		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	○	-
		W≦0.1	-	IGNORED		
		0.1<W≦0.2	L≦11.0	1		
			11.0<L	NONE		
		0.2<W	-	NONE		

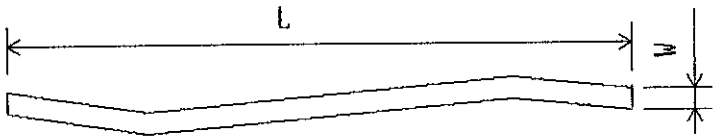
NOTE

(1) DEFINITION OF AVERAGE DIAMETER D

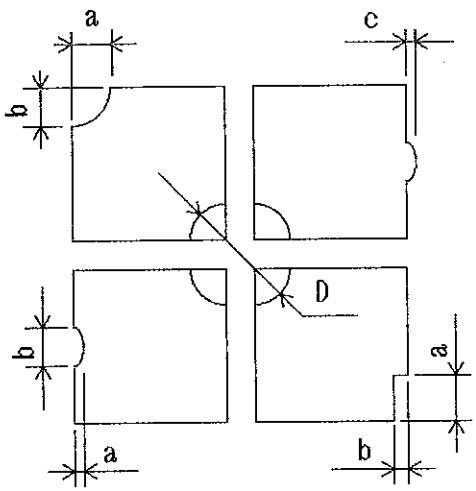


$$D = \frac{a+b}{2}$$

(2) DEFINITION OF LENGTH L AND WIDTH W



(3) DEFINITION OF PINHOLE

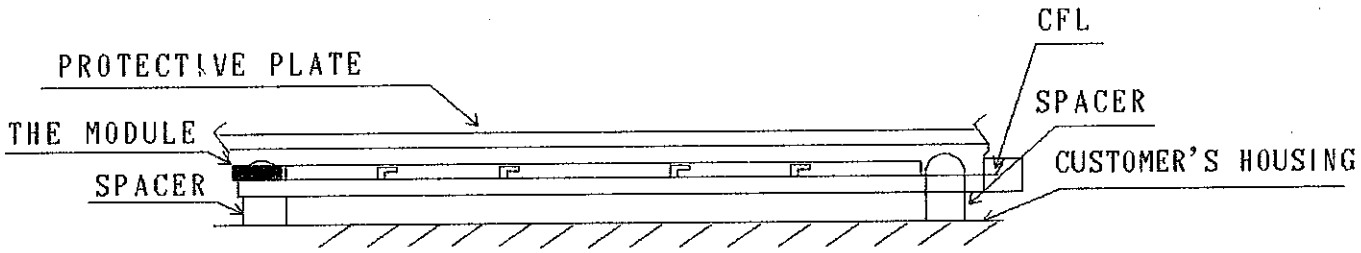


C : SALIENCE

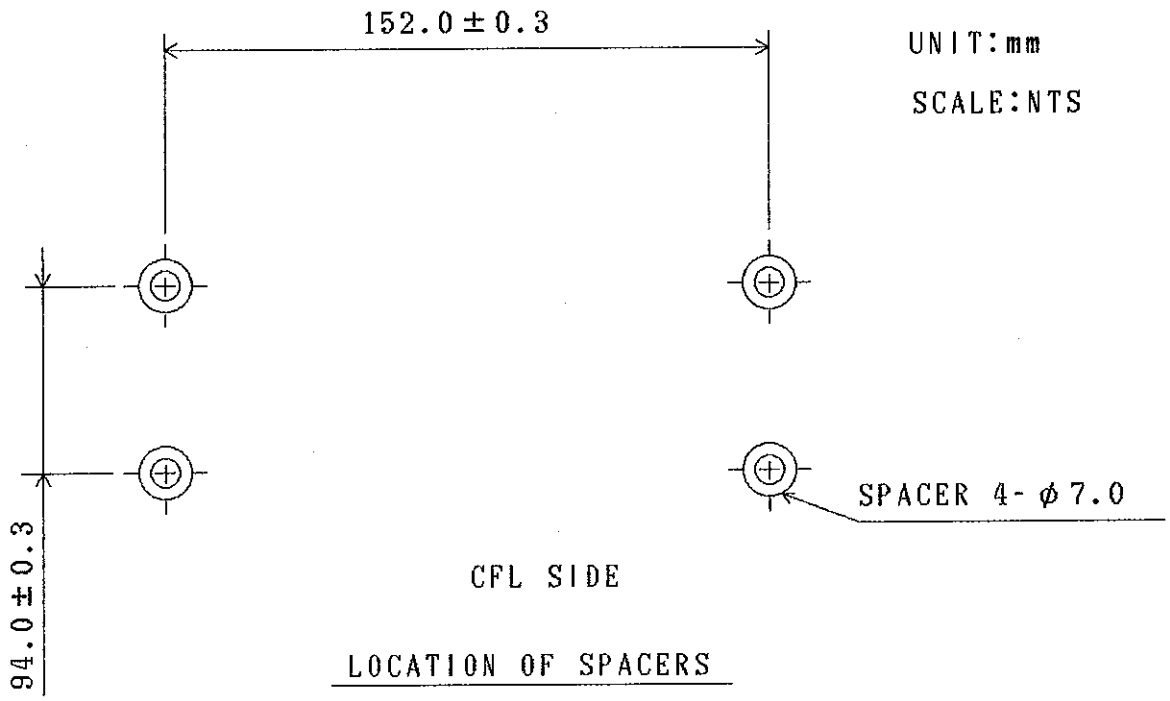
11 . PRECAUTION IN DESIGN

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



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 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 (VO) 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 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 VOTAGE IS APPLIED AND REACHES TO SPECIFIED VOLTAGE (5±0.25V). 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℃ OR 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 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 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 BULE 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 DISPLAYED 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℃ 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 RECOMMENDED.

(1) STORAGE IN A PLOYETHYLENE 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 ℃ TO 35 ℃

(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

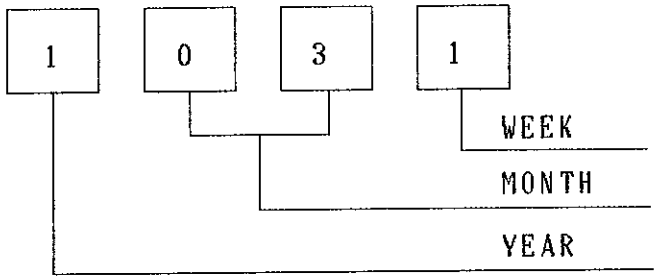
(1) IT IS RECOMMENDABLE TO CRASH DAMAGED OR UNNECESSARY LCD'S INTO PIECES AND WASH OFF LIQUID CRYSTAL BY EITHER OF SOLVENTS SUCH AS ACETONE AND ETHANOL, WHICH SHOUD BE BURNED UP LATER.

(2) WHEN ANY LIQUID LEAKED OUT OF A DAMAGED GLASS 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
1992	2
1993	3
1994	4
1995	5

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
21～27	1
28～ 3	2
4～10	3
11～17	4
18～20	5

LOCATION OF LOT MARK :ON THE BACK SIDE OF LCM

2031

13. PRECAUTIPON FOR USE

(1) A LIMIT SAMPLE SHOULD BE PROVIDED BY THE BOTH PARTIES 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 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.

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.