HITACHI

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For Messrs : HEWLETT PACKARD

Date : Nov. 4, '98

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

SX16H003

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Accepted by : _____ Proposed by : Ryauchi

RECORD OF REVISION

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	3284PS 2706-SX16H003-2 PAGE 6-3/3	6.2 OPTICAL CHARACTERICS OF BACKLIGHT REVISED NOTE IL=1.9mA → IL=(0.8mA)
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3.MECHANICALDATA

(1)	PART NAME	SX16H003
(2)	MODULE SIZE	173.0(W)mm*70.0(H)mm*7.0max.(D)mm
(3)	DOT SIZE	0.0575(W)mm*0.204(H)mm
(4)	DOT PITCH	0.0775(W)mm*0.224(H)mm
(5)	NUMBER OF DOTS	640*3(R,G,B)(W)*240(H) DOTS
(6)	DUTY	1/242
(7)	LCD	FILM TYPE (NEGATIVE TYPE) THE UPPER POLARIZER IS GLARE TYPE. THE BOTTOM POLARIZER IS TRANSMISSIVE TYPE.
(8)	VIEWIN GDIRECTION	6 O‘CLOCK
(9)	POWER CONSUMPTION (TOTAL)	(0.56w) (EXCEPT INVERTER)
(10)	BRIGHTNESS	(70)cd/m^2 TYP.
(11)	POWER SUPPLY VOLTAGE	3.3V ONLY

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	6.0	V	
CONTRAST ADJUSTMENT VOLTAGE	VCON-VSS	0	VDD	V	
INPUT VOLTAGE	Vi	-0.3	VDD+0.3	V	NOTE 1
INPUT CURRENT	Ii	0	1	A	
STATIC ELECTRICITY	-	-	-	V	NOTE 2

NOTE(1):$\overline{\text{DISP.OFF}}$, FLM , CL1 , CL2 , D0~D7.
NOTE(2):.MAKE CERTAINS YOU ARE GROUNDED WHEN HANDLING LCM.

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS.

I T E M	OPERATING		STORAGE		COMMENT
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	5°C	40°C	-20°C	60°C	NOTE 2,3,4
HUMIDITY	NOTE 1		NOTE 1		WITHOUT CONDENSATION
HUMIDITY	-	-	-	-	DEPENDS ON HOUSING DESIGN.
SHOCK	-	-	-	-	DEPENDS ON HOUSING DESIGN.
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 SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE.
THIS PHENOMENON IS REVERSIBLE.
NOTE (4) 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.

5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS OF LCD VSS=0V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE	VDD	VDD-VSS=3.3V	3.15	3.30	3.45	V
CONTRAST ADJUSTMENT VOLTAGE (NOTE 1)	VCON	-	0.8	-	2.8	V
INPUT VOLTAGE FOR LOGIC CIRCUIT (NOTE 2)	Vi	"H" LEVEL	0.8VDD	-	VDD	V
		"L" LEVEL	0	-	0.2VDD	
POWER SUPPLY CURRENT (NOTE 4)	IDD	VDD-VSS=3.3V	-	(20)	(30)	mA
INPUT LEAK CURRENT	ICON (NOTE 5)	VCON=0.8~2.8V	-	-	(20)	μA
	IIN (NOTE 2)	Vin=VDDORVSS	-	-	+/-1.0	
CONTRAST ADJUSTMENT VOLTAGE (NOTE 3)	VCON	Ta= 5°C , ϕ=0°	(1.5)	(2.0)	-	V
		Ta=25°C , ϕ=0°	-	(2.0)	-	
		Ta=40°C . ϕ=0°	-	(2.0)	(2.5)	
FRAME FREQUENCY (NOTE 4)	fFLM	-	60	70	80	Hz

(NOTE 1) IN PROPORTION AS THE VCON VOLTAGE DECREASE THE BRIGHTNESS WILL INCREASE.

(NOTE 2) $\overline{\text{DISP OFF}}$, FLM , CL1 , CL2 , D0~D7.

(NOTE 3) fFLM=70Hz , Ta=25° , DISPLAY PATTERN : CHECKER PATTERN.

(NOTE 4) RUSH CURRENT OF POWER ON : A(PK)* ms + A(PK)* ms

(NOTE 5) VCON

(NOTE 6) RECOMMENDED CONTRAST ADJUSTMENT VOLTAGE FLUCTATES ABOVE +/-0.3V BY EACH MODULE.
TEMPERATURE COMPENSATION CIRCUIT IS INCLUDED IN LCM.
(ONLY TYP VALUSE)

(NOTE 7) NEED TO MAKE SURE OF FLICKERING AND RIPPLING OF DISPLAY WHEN SETTING THE FRAME FREQUENCY IN YOUR SET.

5.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
LAMP VOLTAGE	VL	-	(560)	-	Vrms	Ta=25°C
FREQUENCY	fL	-	(60)	-	KHz	
LAMP CURRENT (1LAMP) NOTE 7	IL	-	(0.8)	-	mA	Ta=25°C
STARTING DISCHARGE VOLTAGE	VS (NOTE 2)	(1400)	-	-	Vrms	Ta= 5°C

(NOTE 1) PLEASE DESIGN YOUR 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. PLEASE CHECK THE CHARACTERISTICS OF YOUR INVERTER BEFORE APPLING TO YOUR SET.

(NOTE 3) AVERAGE LIFE TIME OF CFL WILL 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, PLEASE CONSIDER THE DRIVING FREQUENCY AND THE NOISE.

(NOTE 5) WHEN IL IS OVER 3.0mA, IT MAY CAUSE UNEVEN CONTRAST NEAR CFL LOCATION, DUE TO HEAT DISPERSION FROM CFL.

(NOTE 6) ABSOLUTE MAXIMUM RATINGS VOLTAGE OF CFL CABLE FOR THIS MODULE IS AS FOLLOWS.
VCFL SIDE : 2KV
VSS SIDE : 300V
THS INVERTER DESIGN SHALL NOT EXCEED THE RATED VOLTAGE.

6. OPTICAL CHARACTERISTICS

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

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA		ϕ2-ϕ1	θ=0°,K>=2.0	-	(40)	-	deg	1),2)
CONTRAST RATIO		K	ϕ=0° θ=0°	-	(30)	-	-	3),5),6)
RESPONSE TIME (RISE)		tr	ϕ=0° θ=0°	-	(250)	-	ms	4)
RESPONSE TIME (FALL)		tf	ϕ=0° θ=0°	-	(200)	-	ms	4)
COLOR TONE (PRIMARY COLOR)	RED	X	ϕ=0° θ=0°	-	(0.55)	-	-	7)
		Y		-	(0.34)	-	-	
	GREEN	X		-	(0.29)	-	-	
		Y		-	(0.55)	-	-	
	BLUE	X		-	(0.17)	-	-	
		Y		-	(0.22)	-	-	
	WHITE	X		-	(0.29)	-	-	
		Y		-	(0.37)	-	-	

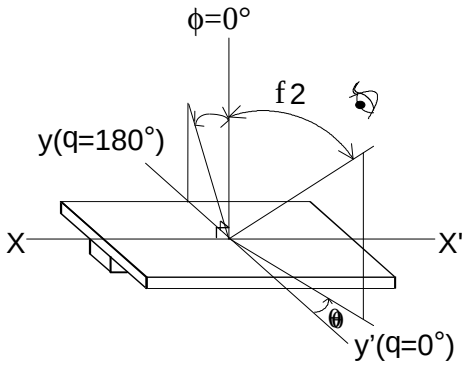
(MEASUREMENT CONDITION ; HITACHI STANDARD)

NOTE 1)~7) : SEE NEXT PAGE.

NOTE 1.DEFINITION OF θ AND ϕ

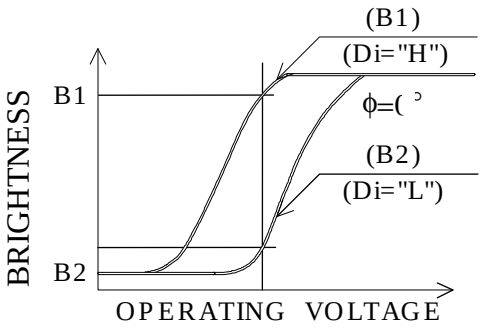
(NORMAL)

VIEWING DIRECTION 2



NOTE 3.DEFINITION OF CONTRAST "K"

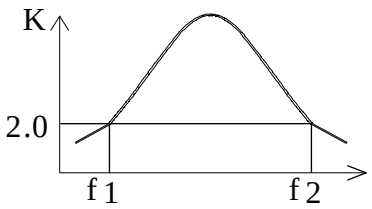
$$K = \frac{\text{BRIGHTNESS ON SELECTED DOT (B1)}}{\text{BRIGHTNESS ON NON-SELECTED DOT (B2)}}$$



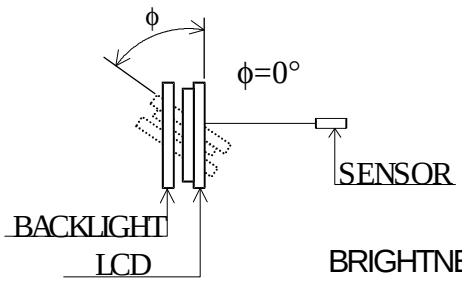
2.DEFINITION OF VIEWING ANGLE

ϕ1 AND ϕ2

ϕ1<0<ϕ2<(40°)



CONTRAST RATIO K VS VIEWING ANGLE f

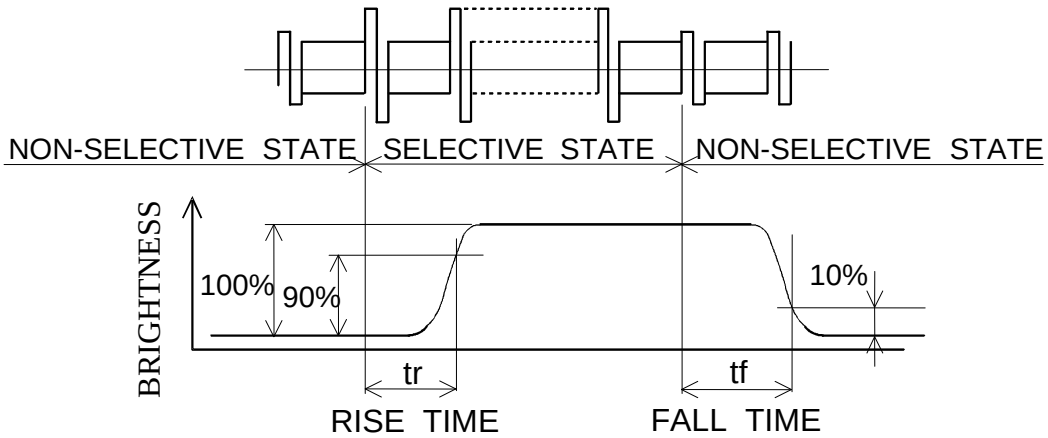


BRIGHTNESS : BM-7

APERTURE : 1°

DISTANCE : 0.4m

NOTE 4.DEFINITION OF OPTICAL RESPONSE



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 POTICAL CHARACTERISTICS OF BACKLIGHT

ITEM	MIN.	TYP.	MAX.	UNIT	NOTE
BRIGHTNESS	-	70	-	cd/m^2	(IL=0.8mA) NOTE 1,2
RISE TIME	-	(3)	-	MINUTE	IL=4.0mA BRIGHTNESS 80%
BRIGHTNESS UNIFORMITY	-	-	+/-25	%	UNDERMENTIONED NOTE 1,3

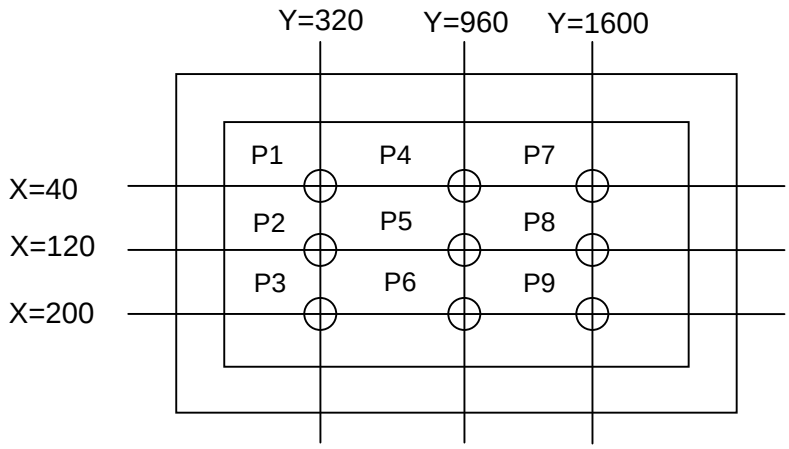
(MEASUREMENT CONDITION:HITACHI STANDARD)

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

NOTE 1 MEASUREMENT AFTER 10 MINUTES OF CFL OPERATING.
AVERAGE VALUE OF 9 POINTS (NOTE 3)

NOTE 2 BRIGHTNESS CONTROL : 100%.

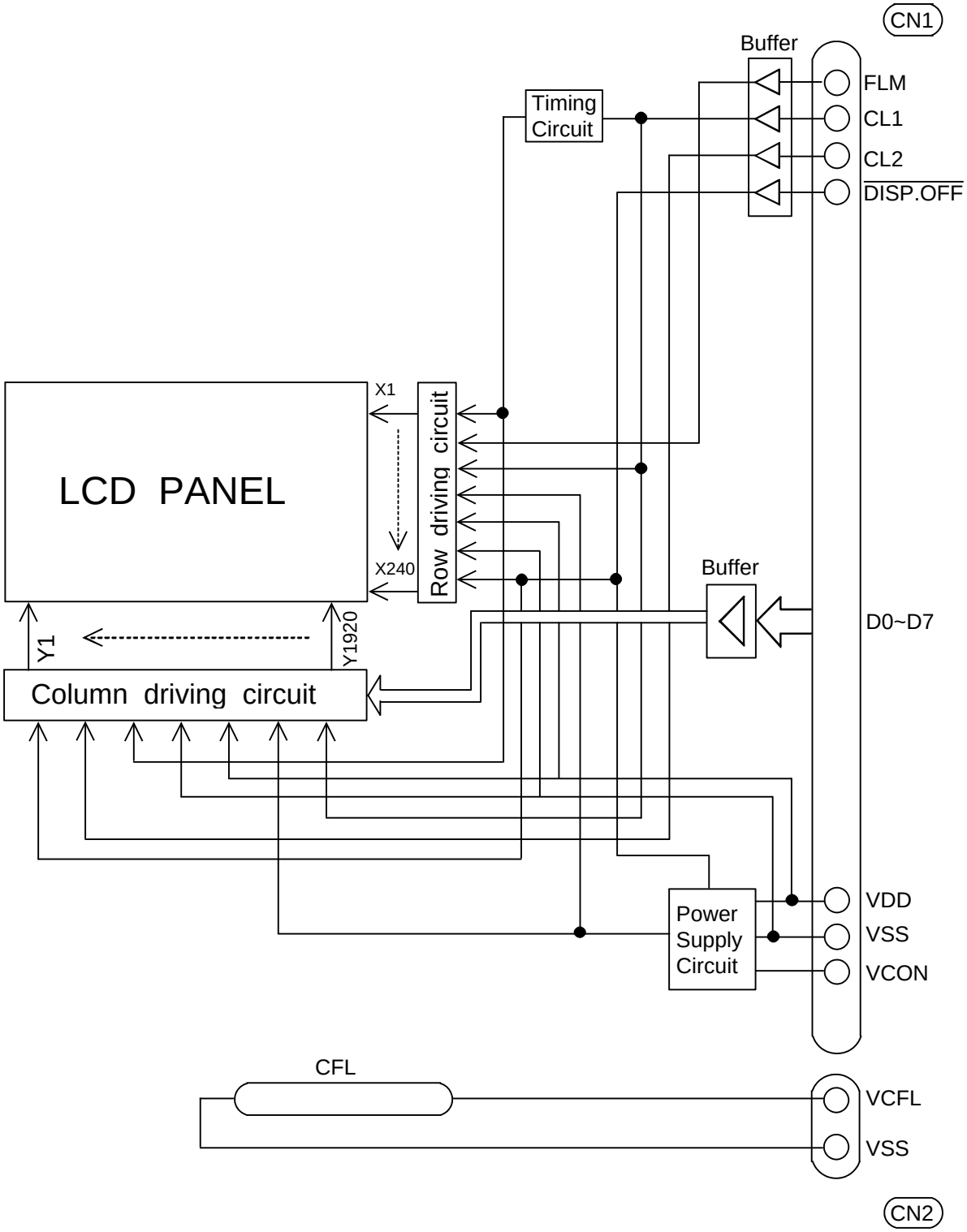
NOTE 3 MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.



NOTE 4 DEFINITION OF THE BRIGHTNESS TOLERACE.

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

7. BLOCK DIAGRAM



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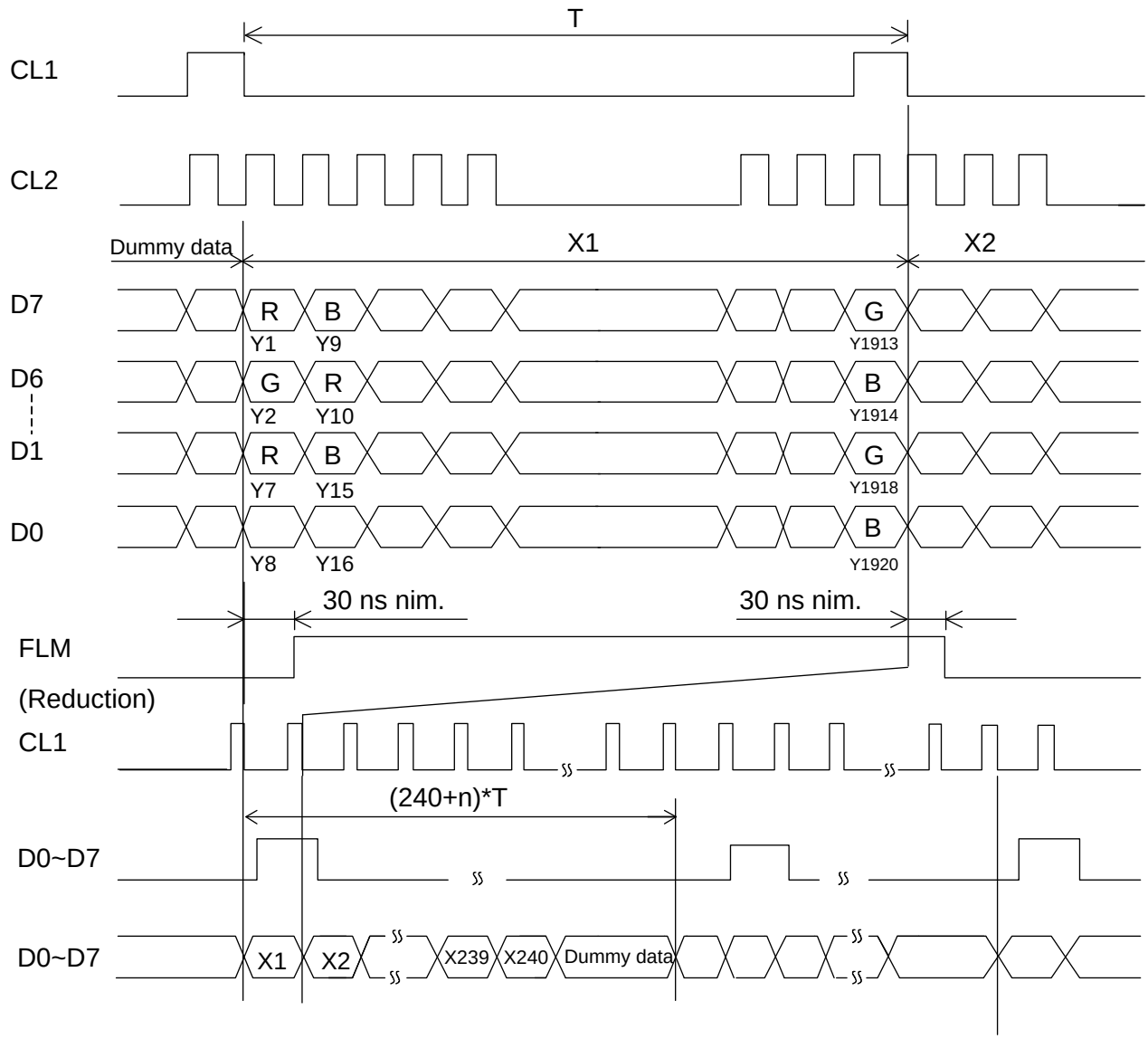
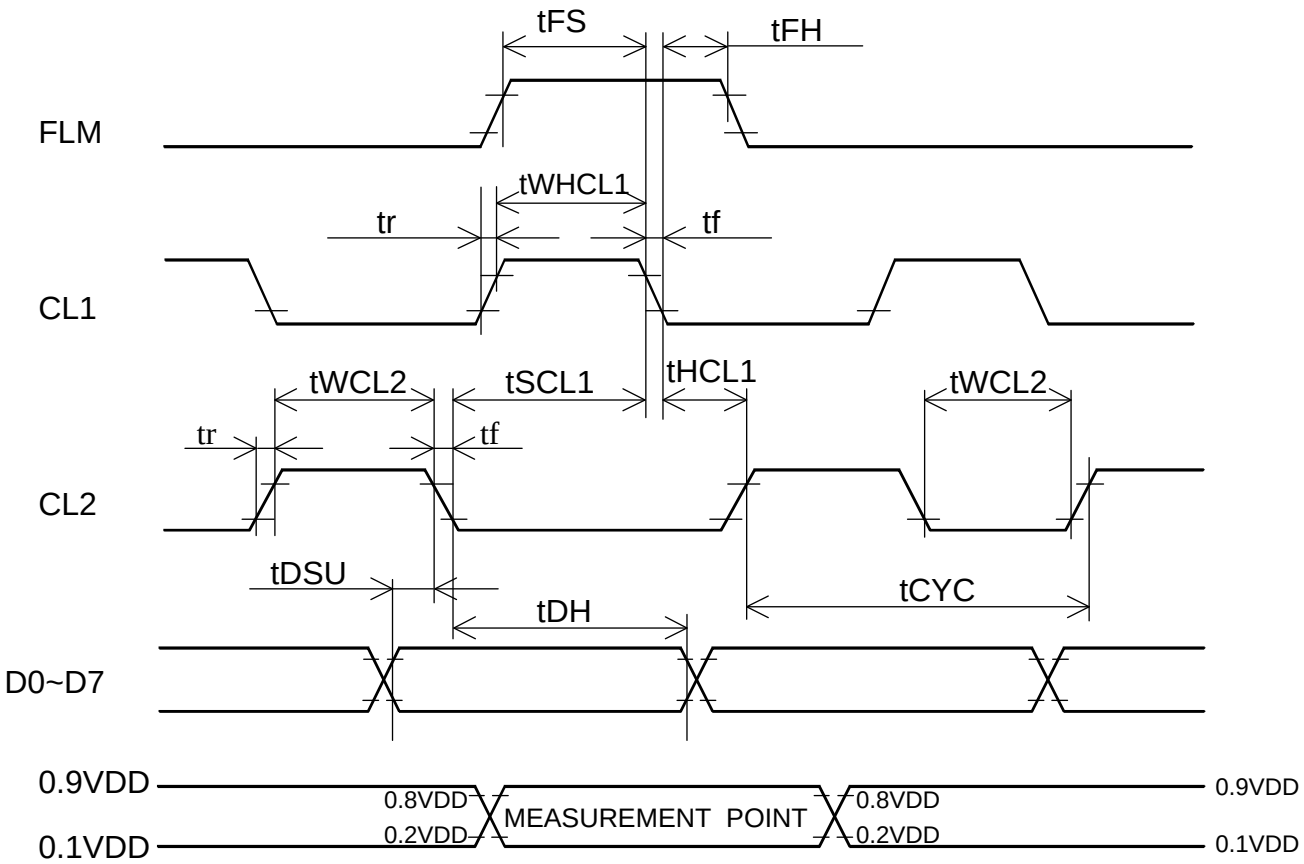
8. INTERFACE TIMING CHART

8.1 TIMING CHART

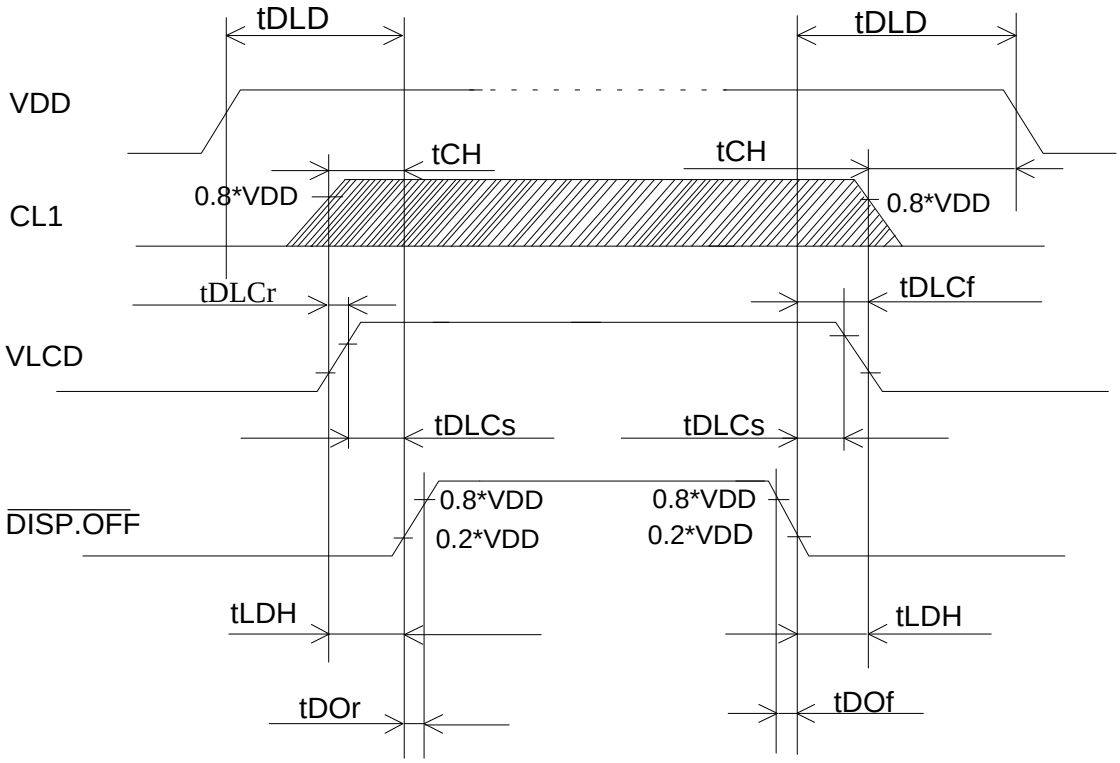


8.2 TIMING CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UMIT
CL1 PULSE WIDTH “H”	tWHCL1	100	-	-	ns
CLOCK CYCLE TIME	tCYC	60	-	-	ns
CL2 PULSE WIDTH	tWCL2	30	-	-	ns
CLOCK SET UP TIME	tSCL2	40	-	-	ns
CLOCK HOLD TIME	tHCL1	80	-	-	ns
CLOCK RISE FALL TIME	tr,tf	-	-	30	ns
DATA SET UP TIME	tDSU	20	-	-	ns
DATA HOLD TIME	tDH	20	-	-	ns
“FLM” SET UP TIME	tFS	100	-	-	ns
“FLM” HOLD TIME	tFH	50		-	ns



8.3 POWER ON/OFF SEQUENCE



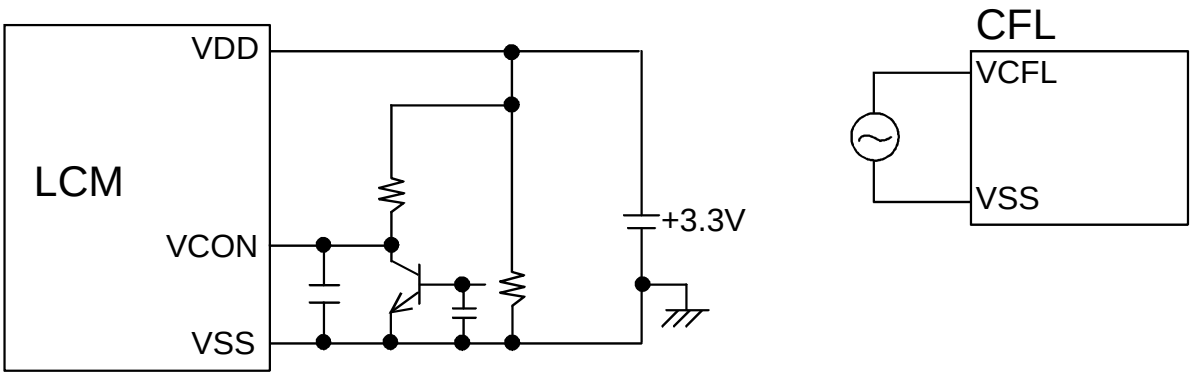
SYMBOL	MIN	MAX	UNIT	COMMENT
tDLD	200		ms	(NOTE 1)
tCH	0		ms	
tLDH	0		ms	
tDOr		100	ms	(NOTE 2)
tDOf		100	ms	
tDLCr	20		ms	
tDLCf	0		ms	
tDLCs	20		ms	

(NOTE 1) PLEASE KEEP THE SPECIFIED SEQUENCE BECAUSE WRONG SEQUENCE MAY CAUSE PERMANENT DAMAGE TO THE LCD PANEL.

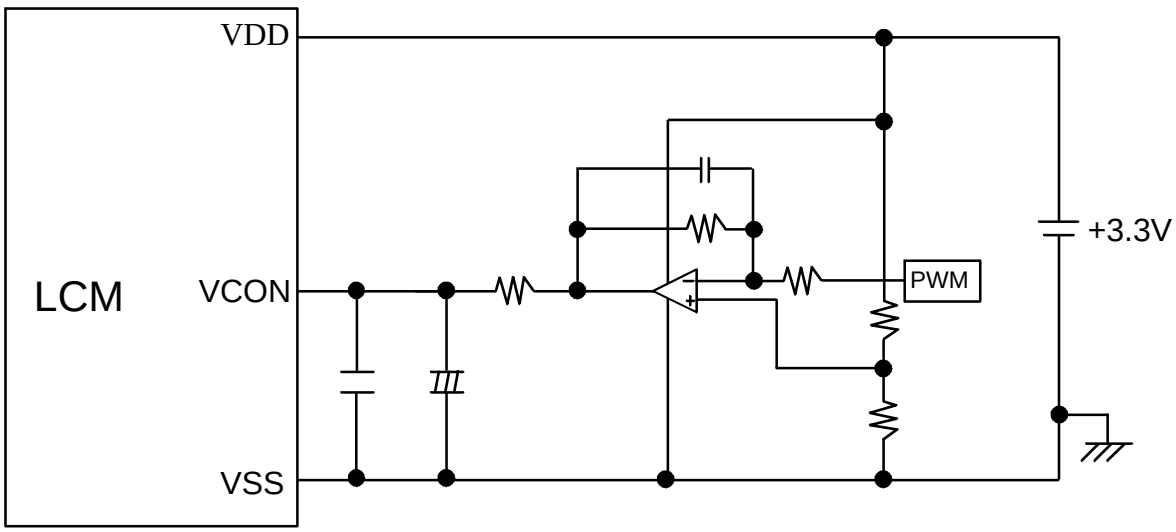
(NOTE 2) HITACHI RECOMMANDS YOU TO USE DISP . OFF FUNCTION. DISPLAY QUALITY MAY DETERIORATE IF YOU DON'T USE DISP . OFF FUNCTION.

8.4 POWER SUPPLY FOR LCM

Example 1



Example 2



IC=3-terminal Voltage Regulator.

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
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .		. . .	. . .	. . .	. . .	. . .
138	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
139	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
140	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
141	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
142	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
143	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
144	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
145	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .			. . .	. . .	. . .	. . .	. . .
238	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
239	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B
240	R	G	B	R	G	B	R	G	B	R	G	B		G	B	R	G	B

R : RED
G : GREEN
B : BLUE

8.6 INTERNAL PIN CONNECTION

CN1 : HIROSE : FH12A-24S-0.5SH) (SUITABLE FPC : t0.3+/-0.05mm, 0.5mm PITCH)

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	VDD	-	POWER SUPPLY FOR LOGIC
7	VSS	-	GND
8	D0	H/L	DISPLAY DATA
9	D1		
10	D2		
11	D3		
12	VSS	-	GND
13	D4	H/L	DISPLAY DATA
14	D5		
15	D6		
16	D7		
17	$\overline{\text{DISP.OFF}}$	H/L	H : ON / L : OFF
18	VDD	-	POWER SUPPLY FOR LOGIC
19	VCON	-	CONTRAST ADJUST
20	VSS	-	GND
21	Y(-)		ANALOG SIGNAL FROM DIGITIZER
22	X(-)		ANALOG SIGNAL FROM DIGITIZER
23	Y(+)		ANALOG SIGNAL FROM DIGITIZER
24	X(+)		ANALOG SIGNAL FROM DIGITIZER

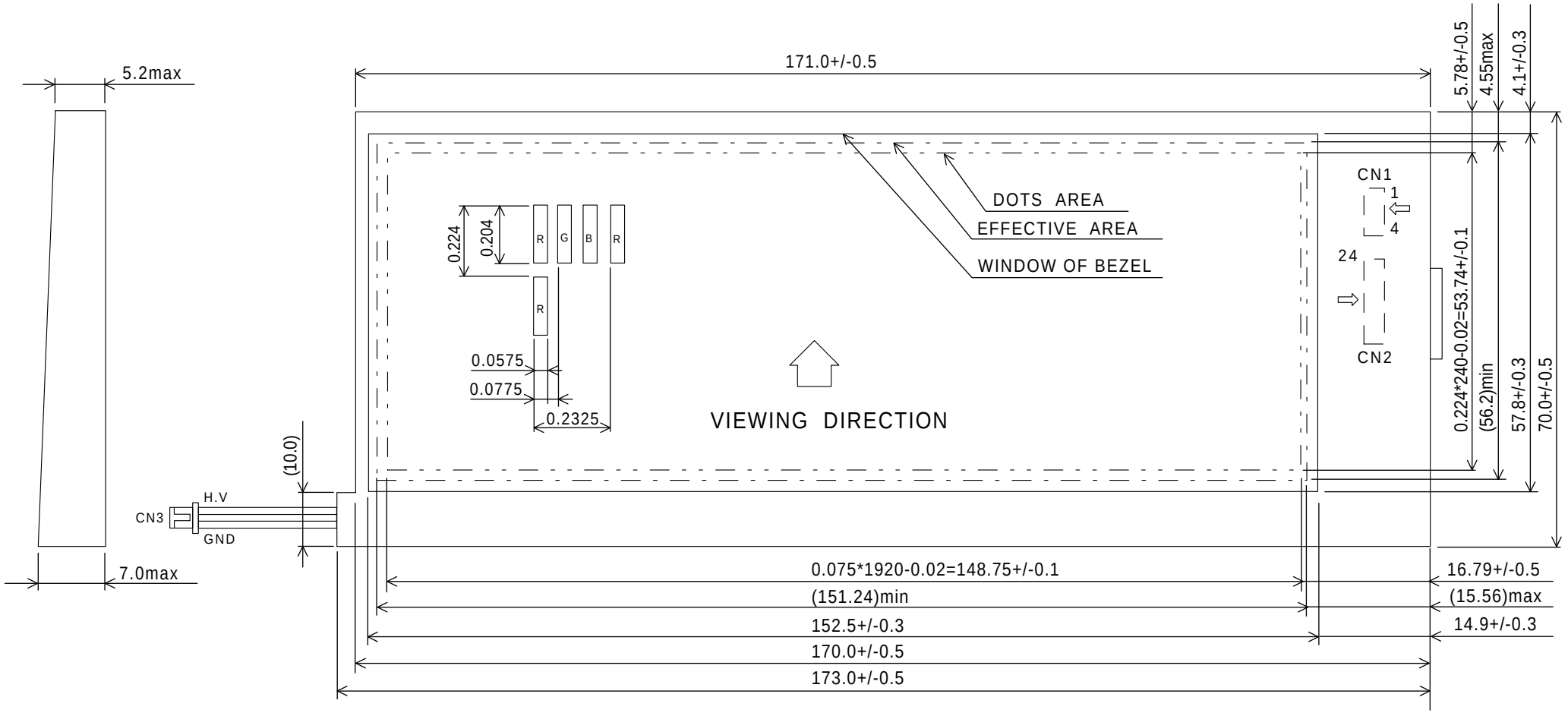
CN2 : HIROSE : FH12-10(4)SA-1SH (SUITABLE FPC : t0.3+/-0.5mm, 1mm PITCH

PIN No.	SIGNAL	LEVEL	FUNCTION
1	Y(-)	-	DIGITIZER
2	X(-)	-	DIGITIZER
3	Y(+)	-	DIGITIZER
4	X(+)	-	DIGITIZER

CFL JST : BHSR-02VS-1 (SUITABLE CONNECTOR : JST BHSMR-02VS)

PIN No.	SIGNAL	LEVEL	FUNCTION
1	VSS	-	GND FOR CFL
2	VCFL	-	POWER SUPPLY FOR CFL

9.1 DIMENSIONAL OUTLINE



SCALE : NTS
UNIT : mm

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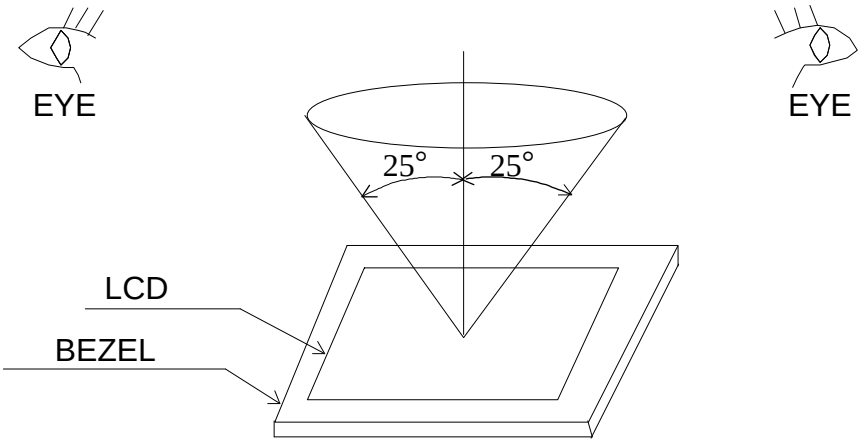
10. APPEARANCE STANDARD

10.1 APPEARANCE INSPECTION CONDITIONS

VISUAL INSPECTION SHOULD BE DONE UNDER THE FOLLOWING CONDITION.

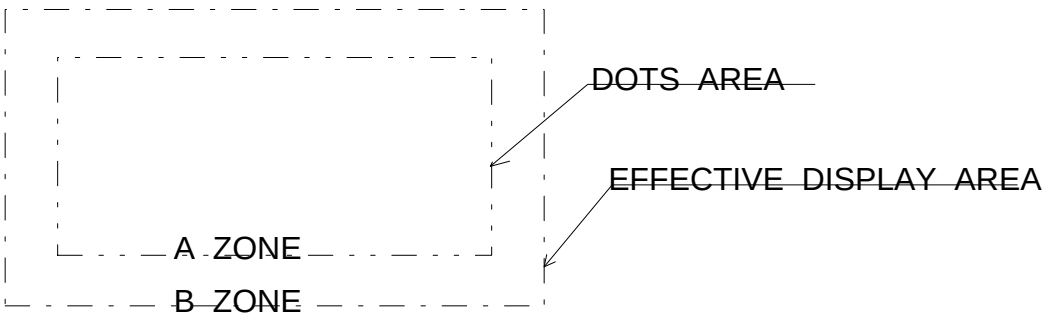
(1) THE INSPECTION SHOULD BE DONE IN A DARK ROOM.
(2) THE CFL SHOULD BE LIGHTED WITH THE PRESCRIBED INVERTER.
(3) THE DISTANCE BETWEEN EYES OF AN INSPECTOR AND THE LCD MODULE IS 25cm.
(4) THE VIEWING ZONE IS SHOWN THE FIGURE.
VIEWING ANGLE<=25°.



10.2 DEFINITION OF ZONE

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

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



10.3 APPEARENCE SPECIFICATION

(1)LCD APPEARANCE

*) IF THE PROBLEM RELATED TO THE SECION OCCURES ABOUT THIS ITEM, THE RESPONSIBLE PERSON OF BOTH PARTY (CUSTOMER AND HITACHI) WILL DISCUSS THE MATTER IN DETAIL.

No.	ITEM	CRITERIA			APPLIED ZONE
L C D	SCRATCHES	DISTINGUISHED ONE IS NOT ACCEPTABLE (TO BE JUDGED BY HITACHI STANDARD)			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	IGNORED		
		0.2<D<=0.3	12		
		0.3<D<=0.5	3		
		0.5<D	NONE		
	STAINS, FOREIGN MATERIALS DARK SPOT	FILAMENTOUS (LINE SHAPE)			A,B
		LENGTH L(mm)	WIDTH W(mm)	MAXIMUM ACCEPT-ABLE 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 ACCEPT-ABLE MUMBER	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 JUDGED BY HITACHI STANDARD			A
	COLOR UNIFORMITY	SAME AS ABOVE			A

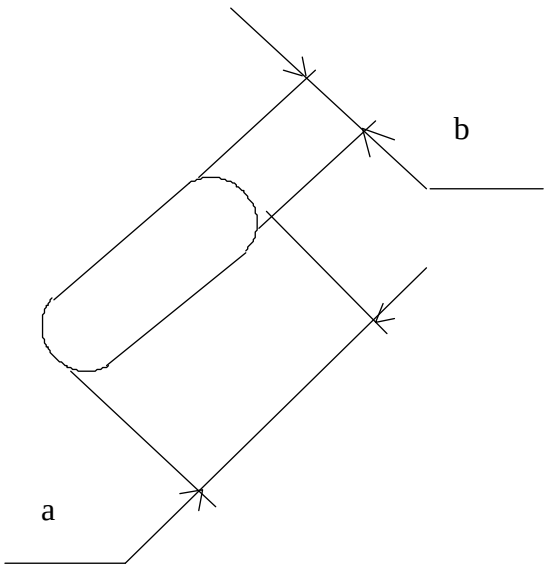
No.	ITEM	CRITERIA				APPLIED ZONE
L C	CONTRAST IRREGULARITY (SPOT)	AVERAGE DIAMETER D(mm)	CONTRAST	MAXIMUM ACCEPTABLE NUMBER	MINIMUM SPACE	A
		D<=0.25	TO BE JUDGED BY HITACHI STANDARD	IGNORE	-	
		0.25<D<=0.35		10	20mm	
		0.35<D<=0.5		4	20mm	
		0.5 <D<=0.7		3	50mm	
		0.7 <D		NONE	-	
D	CONTRAST IRREGULARITY (LINE) (A PAIR OF SCRATCH) (NOTE 3)	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	
		THE WHOLE NUMBER		6		
	RUBBING SCRATCH	TO BE JUDGED BY HITACHI LIMIT STANDARD				

(2) CFL BACKLIGHT APPEARANCE

No.	ITEM	CRITERIA			APPLIED ZONE
CFL BACKLIGHT	DARK SPOTS WHITE SPOTS FOREIGN MATERIALS (SPOT)	AVERAGE DIAMERTER D(mm)		MAXIMUM ACCEPTABLE NUMBER	
		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<=2.5	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<=11.0	1	
			11.0<L	NONE	
		0.2<W	-	NONE	

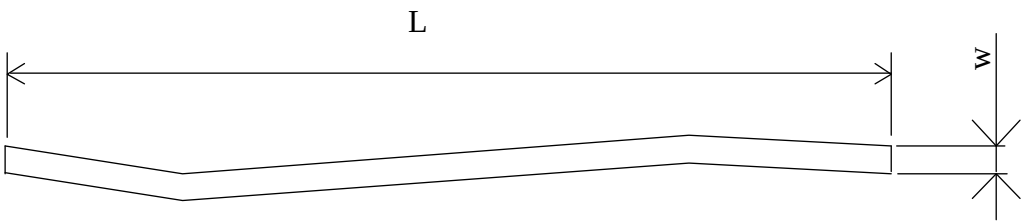
NOTE

(1) DEFINITION OF AVERAGE DIAMETER (D)



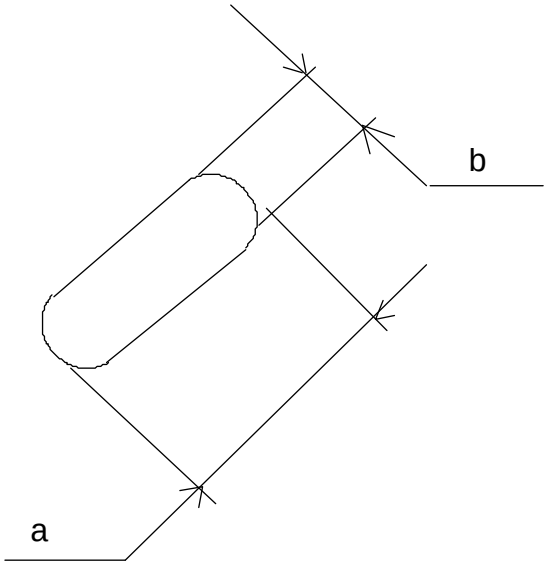
$$D=\frac{a+b}{2}$$

(2) DEFINITION OF LENGTH L AND WIDTH (W)



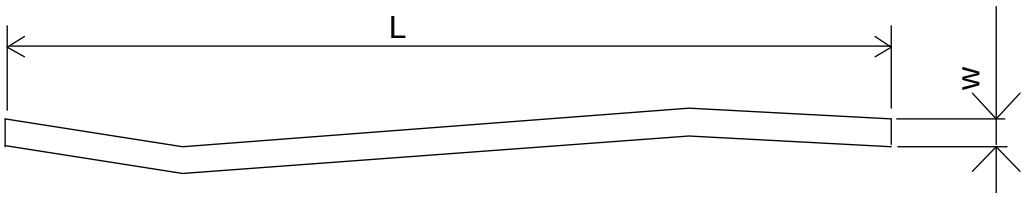
NOTE

(1) DEFINITION OF AVERAGE DIAMETER (D)



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

(2) DEFINITION OF LENGTH (L) AND WIDTH (W)



11. PRECAUTION IN DESIGN

11.1 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.

11.2 CAUTION AGAINST ELECTROSTATIC DISCHARGE
AS THIS MODULE IS CONTAINS C-MOS LSIs, IT IS NOT STRONG AGAINST ELECTROSTATIC DISCHARGE.
MAKE CERTAIN THAT THE OPERATOR'S BODY IS CONNECTED TO THE GROUND THROUGH A LIST BAND ETC.
AND DON'T TOUCH I/F PINS DIRECTLY.

11.3 POWER ON SEQUENCE
INPUT SIGNALS SHOULD NOT BE APPLIED TO LCD MODULE BEFORE POWER SUPPLY VOTAGE IS APPLIED AND REACHES TO SPECIFIED VOLTAGE (3+/-0.15V).
IF THE ABOVE SEQUENCE IS NOT KEPT, C-MOS LSIs OF LCD MODULES MAY BE DAMAGED DUE TO LATCH UP PHENOMENON.

11.4 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 OR HIGHER, SPECIAL CARE TO PREVENT THEM FROM HIGH HUMIDITY IS REQUIRED. A OMBINATION 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 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 CONTACY TERMINALS DUE TO COLDENESS WILL BE CAUSE FOR POLARIZER DAMAGE, STAIN AND DIRT ON PRODUCT. WHEN NECESSARY TO TAKE OUT THE PRODUCTS FORM SOME PLACE AT LOW TEMERATURE 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.

(9) MAXIMUM PRESSURE TO THE SURFACE MUST BE LESS $1.96*10^4$Pa($0.2kgf.cm^2$) AND IF THE PRESSURE AREA IS LESS THAN $1cm^2$, MAXIMUM PRESSURE MUST BE LESS THAN 1.96N(0.2kgf).

11.5 OPERATION PRECAUTION

(1) IT IS AN INDISPENSABLE CONDITTION TO DRIVE LCD'S WITHIN THE SPECIFIED VOLTAGE LIMIT SINE THE HIGHER VOLTAGE THAN THE LIMIT CAUSES SHORTER LCD LIFE AN ELECTROCHMICAL REACTION DUE TO DIRECT CURRENT 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 ABNORNALLY DISPLAYED BUT IT RESUMES NORMAL CONDITION AFTER TURNING OFF ONCE.

11.6 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°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.)

11.7 SAFETY

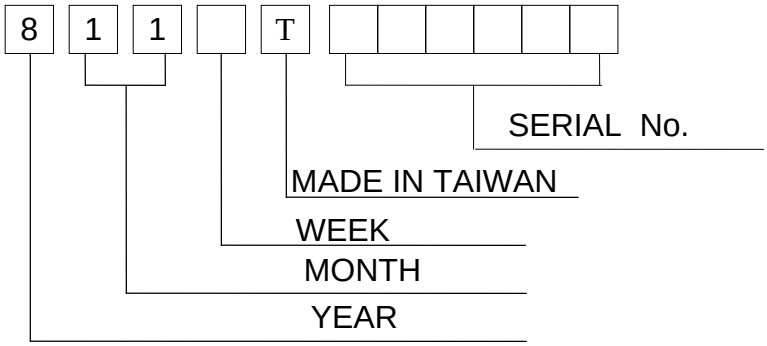
(1) IT IS RECOMMENDABLE TO CRASH DAMAGED OR UNNECESSARY LCD'S INTO PIECES AND WASH OFF LIQUID CRYSTAL BY EITHER OF SOLVENTS SUCH AS ACETONE AND ETHANOL, WHICH SHOUD BE BURNED UP LATER.

(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 DIGHT FOR PRODUCTION LOT AND 6 OR 7 DIGITS FOR PRODUCTION CONTROL.



YEAR	FIGURE IN LOT MARK
1997	7
1998	8
1999	9
2000	0
2001	1

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
1~ 7	1
8~14	2
15~21	3
22~28	4
29~31	5

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

8 1 1 1 T * * * * * *

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.

(3) REGARDING THE TREATMENT FOR MAINTENANCE AND REPAIRING, BOTH PARTIES WILL DISCUSS IT IN SIX MONTHS LATER AFTER LATEST DELIVERY OF THIS PRODUCT.

THE PRECAUTION THAT SHOULD BE OBSERVED WHEN HANDLING LCM HAVE BEEN EXPLAINED ABOVE. IF ANY POINTS ARE UNCLEAR OR IF YOU HAVE ANY REQUESTS , PLEASE CONTACT HITACHI.