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HITACHI

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ELECTRONICS CO.,LTD
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KAOHSIUNG TAIWAN R.O.C.
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FOR MESSRS. WESTFALIA DATE.Jun.12.'01

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

SP10Q007-T

C O N T E N T S

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

ACCEPTED BY;

PROPOSED BY; H. T. Chen

RECORD OF REVISION

<table>
<tr><th>DATE</th><th>SHEET No.</th><th>SUMMARY</th></tr>
<tr><td>Nov.14.'00</td><td>7B64PS 2703-
SP10Q007-T-2
PAGE 3-1/1</td><td>CHANGED:
SP10Q007 ⟶ SP10Q007-T</td></tr>
<tr><td></td><td>7B64PS 2705-
SP10Q007-T-2
PAGE 5-1/2</td><td>CHANGED:
5.1 ELECTRIC CHARACTERISTICS
<table>
<tr><th>SYMBOL</th><th>CONDITION</th><th>TYP</th></tr>
<tr><td>IDD</td><td>NOTE 2</td><td>(1.9)</td></tr>
<tr><td>IEE</td><td>NOTE 2</td><td>(1.5)</td></tr>
<tr><td rowspan="3">VDD-VEE</td><td>Ta=0℃ φ=0°</td><td>(23)</td></tr>
<tr><td>Ta=25℃ φ=0°</td><td>(21.8)</td></tr>
<tr><td>Ta=40℃ φ=0°</td><td>(19.5)</td></tr>
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<table>
<tr><th>SYMBOL</th><th>CONDITION</th><th>TYP</th></tr>
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<tr><td>IEE</td><td>NOTE 2</td><td>1.5</td></tr>
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<tr><td>Ta=25℃ φ=0°</td><td>21.8</td></tr>
<tr><td>Ta=50℃ φ=0°</td><td>19.5</td></tr>
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5.2 ELECTRICAL CHRRACTERISTICS OF BACKLIGHT
<table>
<tr><th>CONDITION</th><th>MIN</th><th>TYP</th><th>MAX</th></tr>
<tr><td>-</td><td>-</td><td>(10.2)</td><td>-</td></tr>
<tr><td>VLED=(10.8)V</td><td>-</td><td>(60)</td><td>(90)</td></tr>
<tr><td>φ=0° θ=0°
VLED=(10.8)V</td><td>-</td><td>(15)</td><td>(20)</td></tr>
<tr><td>VLED=(10.8)V</td><td>-</td><td>-</td><td>+/-40</td></tr>
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<table>
<tr><th>CONDITION</th><th>MIN</th><th>TYP</th><th>MAX</th></tr>
<tr><td>-</td><td>9.5</td><td>10.2</td><td>11.0</td></tr>
<tr><td>VLED=(10.2)V</td><td>-</td><td>60</td><td>90</td></tr>
<tr><td>φ=0° θ=0°
VLED=(10.2)V</td><td>-</td><td>15</td><td>20</td></tr>
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<tr><td rowspan="3">Nov.14.'00</td><td>7B64PS 2705 - SP10Q007- T - 2 PAGE 5 - 2/2</td><td>CHANGED:
5.3 POWER SUPPLY FOR BACKLIGHT
VLED=10.8V ⟶ VLED=10.2V</td></tr>
<tr><td>7B64PS -2708 - SP10Q007 - T - 2 PAGE 8 - 3/3</td><td>CHANGED:
8.4 POWER SUPPLY FOR LCM
EXAMPLE DROWING INCREASE a CAPACITOR FOR 3.3 μf</td></tr>
<tr><td>7B64PS -2709 - SP10Q007 - T - 2 PAGE 9 -1/2</td><td>CHANGED:
9.1 DIMENSIONAL OUTLINE
64 ⟶ (64)</td></tr>
<tr><td rowspan="2">Mar.28.'01</td><td>7B64PS – 2705- SP10Q007- T – 3 PAGE 5-1/2</td><td>CHANGED : 5.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT
BRIGHTNESS FOR LCM SURFACE
<table>
<tr><th>MIN</th><th>TYP</th><th>MAX</th></tr>
<tr><td>-</td><td>15</td><td>20</td></tr>
</table>
⟶
<table>
<tr><th>MIN</th><th>TYP</th><th>MAX</th></tr>
<tr><td>20</td><td>25</td><td>-</td></tr>
</table></td></tr>
<tr><td>7B64PS – 2705- SP10Q007-T-3 PAGE 5-2/2</td><td>CHANGED : 5.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT
NOTE 4 : DELETE
20cd/㎡ LCM SURFACE BRIGHTNESS CAN BE ACHIEVED AT ILED 90mA MAX.</td></tr>
<tr><td>Jun.12.'01</td><td>7B64PS – 2704- SP10Q007-T-4 PAGE 4-1/1</td><td>CHANGED : 4.2ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS
<table>
<tr><td rowspan="2">ITEM</td><td>STORAGE</td></tr>
<tr><td>MAX</td></tr>
<tr><td>SHOCK</td><td>490.0 M/S^2 (50)</td></tr>
</table>
↓
<table>
<tr><td rowspan="2">ITEM</td><td>STORAGE</td></tr>
<tr><td>MAX</td></tr>
<tr><td>SHOCK</td><td>490.0 M/S^2 (50G)</td></tr>
</table></td></tr>
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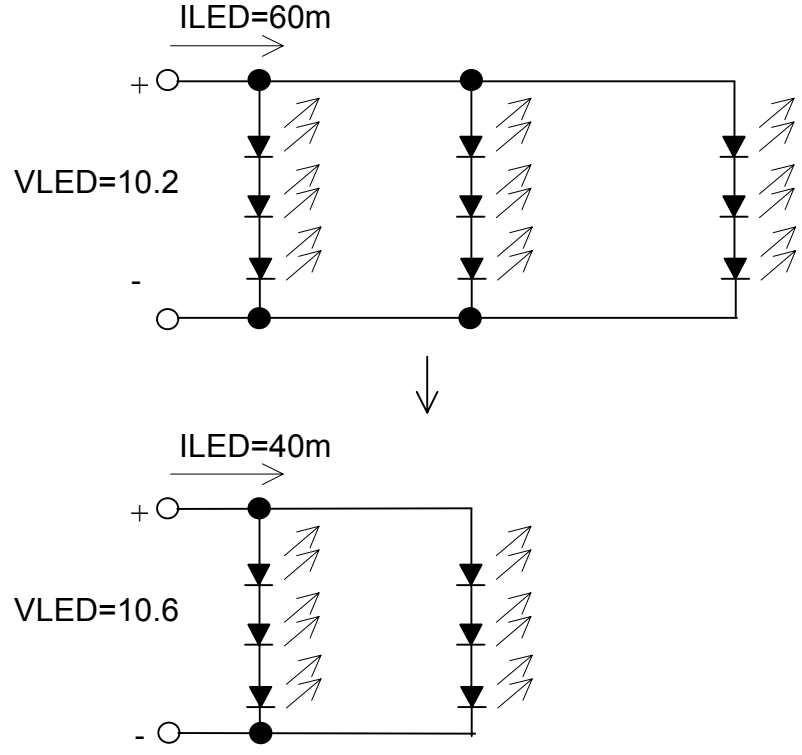
<tr><th>DATE</th><th>SHEET NO.</th><th>SUMMARY</th></tr>
<tr><td>JUN.12.'01</td><td>7B64PS – 2705-
SP10Q007-T-4
PAGE 5-1/2</td><td>CHANGED : 5.2 ELECTRICAL CHARACTISTICS OF BACKLIGHT
<table>
<tr><th>SYMBOL</th><th>CONDITION</th><th>MIN.</th><th>TYP.</th><th>MAX.</th></tr>
<tr><td>VLED</td><td>-</td><td>9.5</td><td>10.2</td><td>11.0</td></tr>
<tr><td>ILED</td><td>VLED=(10.2)V</td><td>-</td><td>60</td><td>90</td></tr>
<tr><td>-</td><td>ϕ=0°, θ =0°,
VLED=(10.2)V</td><td>20</td><td>25</td><td>-</td></tr>
<tr><td>-</td><td>VLED=(10.2)V</td><td>-</td><td>-</td><td>+/-40</td></tr>
</table>
↓
<table>
<tr><th>SYMBOL</th><th>CONDITION</th><th>MIN.</th><th>TYP.</th><th>MAX.</th></tr>
<tr><td>VLED</td><td>-</td><td>10.0</td><td>10.6</td><td>11.2</td></tr>
<tr><td>ILED</td><td>VLED=(10.6)V</td><td>-</td><td>40</td><td>75</td></tr>
<tr><td>-</td><td>ϕ=0°, θ =0°,
VLED=(10.6)V</td><td>20</td><td>25</td><td>-</td></tr>
<tr><td>-</td><td>VLED=(10.6)V</td><td>-</td><td>-</td><td>+/-40</td></tr>
</table></td></tr>
<tr><td></td><td>7B64PS – 2705-
SP10Q007-T-4
PAGE 5-2/2</td><td>CHANGED : POWER SUPPER FOR BACKLIGHT
 
</td></tr>
</table>

3. GENERAL SPECIFICATIONS

(1)	PART NAME	SP10Q007-T
(2)	MODULE SIZE	120.0(W)mm × 80.0(H)mm × 7.0(D)mm
(3)	EFFECTIVE DISPLAY AREA	88.1 min. × 60.0 min
(4)	DOT SIZE	0.335(W)mm × 0.335(H)mm
(5)	DOT PITCH	0.35(W)mm × 0.35(H)mm
(6)	DOT NUMBER (RESOLUTION)	240 (W) × 160 (H)
(7)	DUTY RATIO	1/160
(8)	LCD TYPE	F-STN TYPE BLACK / WHITE(POSITIVE TYPE) THE UPPER POLARIZER IS GLARE TYPE THE BOTTOM POLARIZER IS TRANSFLECTIVE TYPE
(9)	VIEWING DIRECTION	6 O'CLOCK
(10)	BACK LIGHT TYPE	LED (COLOR : WHITE)

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 DRIVING	VDD-VEE	0	27.5	V	
INPUT VOLTAGE	Vi	-0.3	VDD+0.3	V	NOTE 1
INPUT CURRENT	Ii	0	1	A	
STATIC ELECTRICITY	I/F ESD	-	100	V	NOTE 2,3,4
	ESD	-	8	KV	NOTE 2,3,5

NOTE 1. $\overline{\text{DISP.OFF}}$, FRAME , LOAD , CP , D0~D3.
NOTE 2. MAKE CERTAINS YOU ARE GROUNDED WHEN HANDLING LCM.
NOTE 3. ENERGY STORAGE CAPACITANCE 200PF , DISCHARGE RESISTANCE 250Ω
Ta=25℃ , 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.

ITEM	OPERATING		STORAGE		COMMNT
	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	-	2.45m/s^2 (0.25G)	-	11.76m/s^2 (1.2G) NOTE 5	NOTE 4 , 5
SHOCK	-	29.4m/s^2 (3 G)	-	490.0m/s^2 (50G)	XYZ DIRECTIONS NOTE 5
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. THE PHENOMENON IS REVERSIBLE.

NOTE 4 5Hz~100Hz (EXCEPT RESONANCE FREQUENCY AND X,Y,Z EACH DIRECTION WITHIN 1 HOUR)

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

5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD-VSS	-	4.75	5.0	5.25	V
			3.0	3.3	3.6	
POWER SUPPLY VOLTAGE FOR LC DRIVING	VEE-VSS	-	-23.1	-22.0	-	V
INPUT VOLTAGE NOTE 1	VI	H LEVEL	0.8VDD	-	VDD	V
		L LEVEL	0	-	0.2VDD	V
POWER SUPPLY CURRENT FOR LOGIC NOTE 2	IDD	NOTE 2	-	1.9	-	mA
POWER SUPPLY CURRENT FOR LC DRIVING NOTE 2	IEE	NOTE 2	-	1.5	-	mA
RECOMMENDED LC DRIVING VOLTAGE NOTE 3	VDD-VEE	Ta= 0°C , ϕ= 0°	-	23	-	V
		Ta=25°C , ϕ= 0°	-	21.8	-	V
		Ta=50°C , ϕ= 0°	-	19.5	-	V
FRAME FREQUENCY NOTE 4	fFRAME	-	70	75	140	Hz

NOTE 1 $\overline{\text{DISP.OFF}}$, fFRAME , LOAD , CP , D0~D3.

NOTE 2 fFRAME=75Hz , TEST PATTERN IS ALL ”Q”.
VDD-VEE=21.8V , Ta=25°C

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

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

5.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED	-	10.0	10.6	11.2	V
POWER SUPPLY CURRENT FOR LED BACKLIGHT	ILED	VLED=(10.6)V	-	40	75	mA
BRIGHTNESS FOR LCM SURFACE NOTE4	-	ϕ=0°, θ =0°, VLED=(10.6)V	20	25	-	cd/㎡
BRIGHTNESS UNIFORMITY NOTE 1,2,3	-	VLED=(10.6)V	-	-	+/-40	%

NOTE 1. Ta=25°C , VDD-VEE=21.8V
DISPLAY DATA SHOULD BE ALL “ON”.

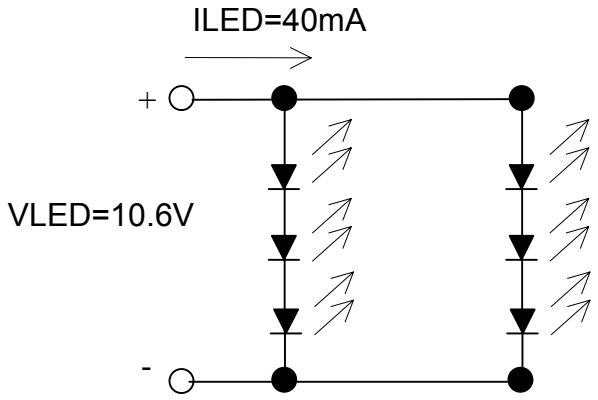
NOTE 2. MEASUREMENT DURING LED OPERATING.

NOTE 3.

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

NOTE 4. TYPICAL BRIGHTNESS AFTER 40KHRS OPERATION IS 40% OF INITIAL BRIGHTNESS.

5.3 POWER SUPPLY FOR BACKLIGHT



6. OPTICAL CHARACTERISTICS

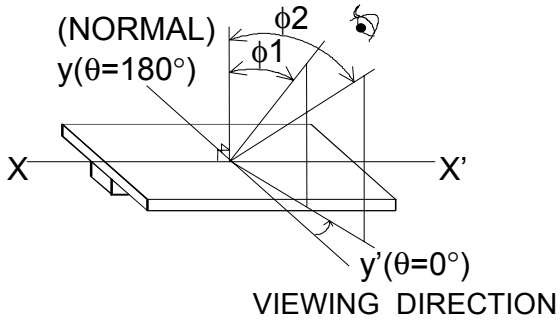
6.1 OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITIONAL	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	$\phi 2-\phi 1$	K>=2.0	-	40	-	deg	1,2
CONTRAST RATIO	K	$\phi=0°$, $\theta=0°$	-	8	-	-	3
RESPONSE TIME (RISE)	tr	$\phi=0°$, $\theta=0°$	-	160	-	ms	4
RESPONSE TIME (FALL)	tf	$\phi=0°$, $\theta=0°$	-	110	-	ms	4

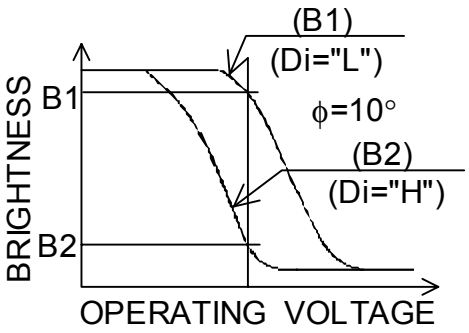
(AS PER HITACHI MEASUREMENT CONDITIONS)

NOTE 1. DEFINITION OF θ AND ϕ

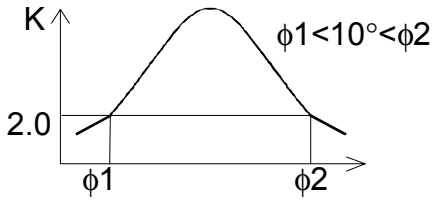


NOTE 3. DEFINITION OF CONTRAST "K"

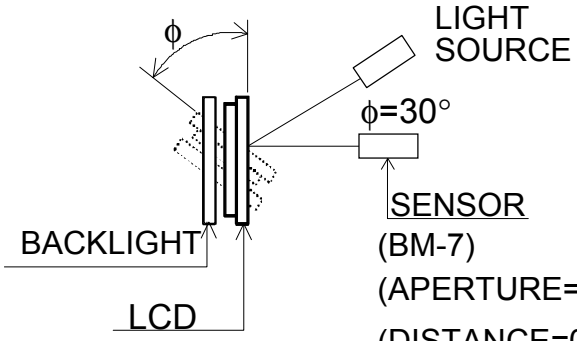
$$K=\frac{\text{BRIGHTNESS ON NON-SELECTED DOT (B1)}}{\text{BRIGHTNESS ON SELECTED DOT (B2)}}$$



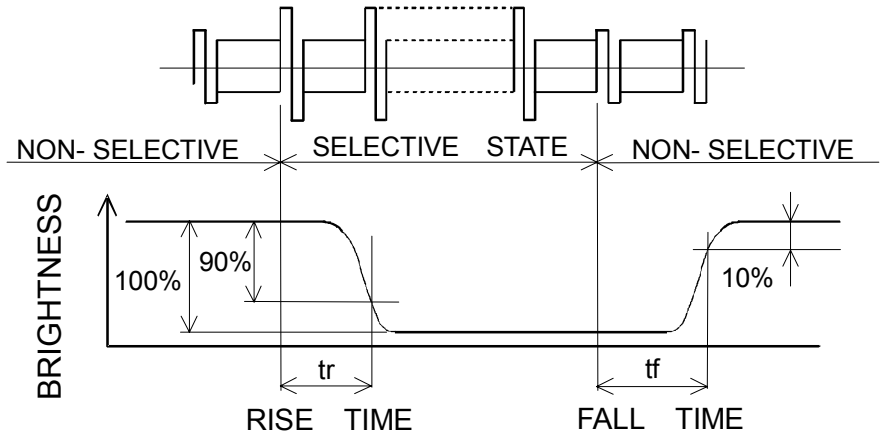
NOTE 2. DEFINITION OF VIEWING ANGLE $\phi 1$ AND $\phi 2$.



CONTRAST RATIO K VS VIEWING ANGLE ϕ



NOTE 4. DEFINITION OF OPTICAL RESPONSE



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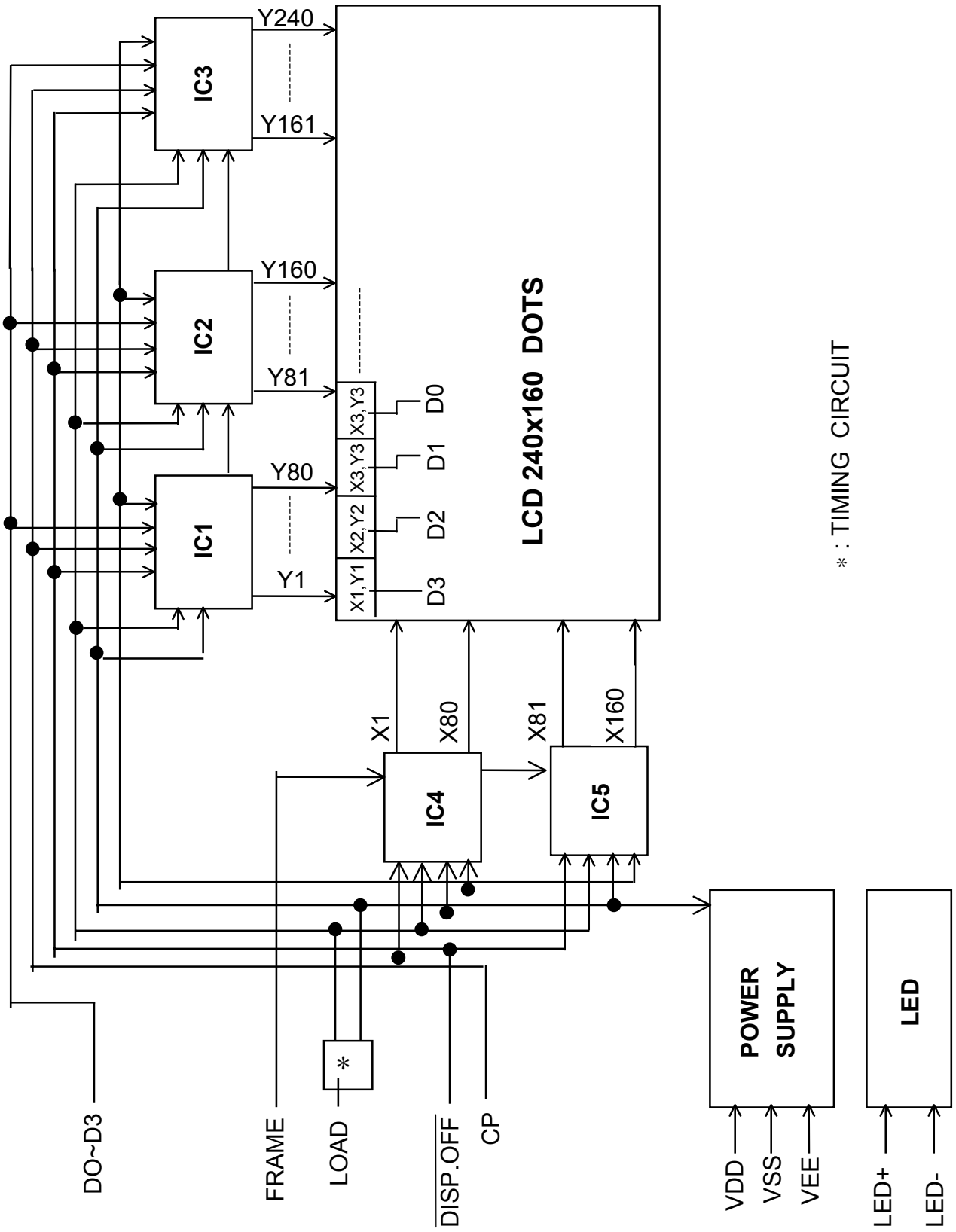
7. BLOCK DIAGRAM



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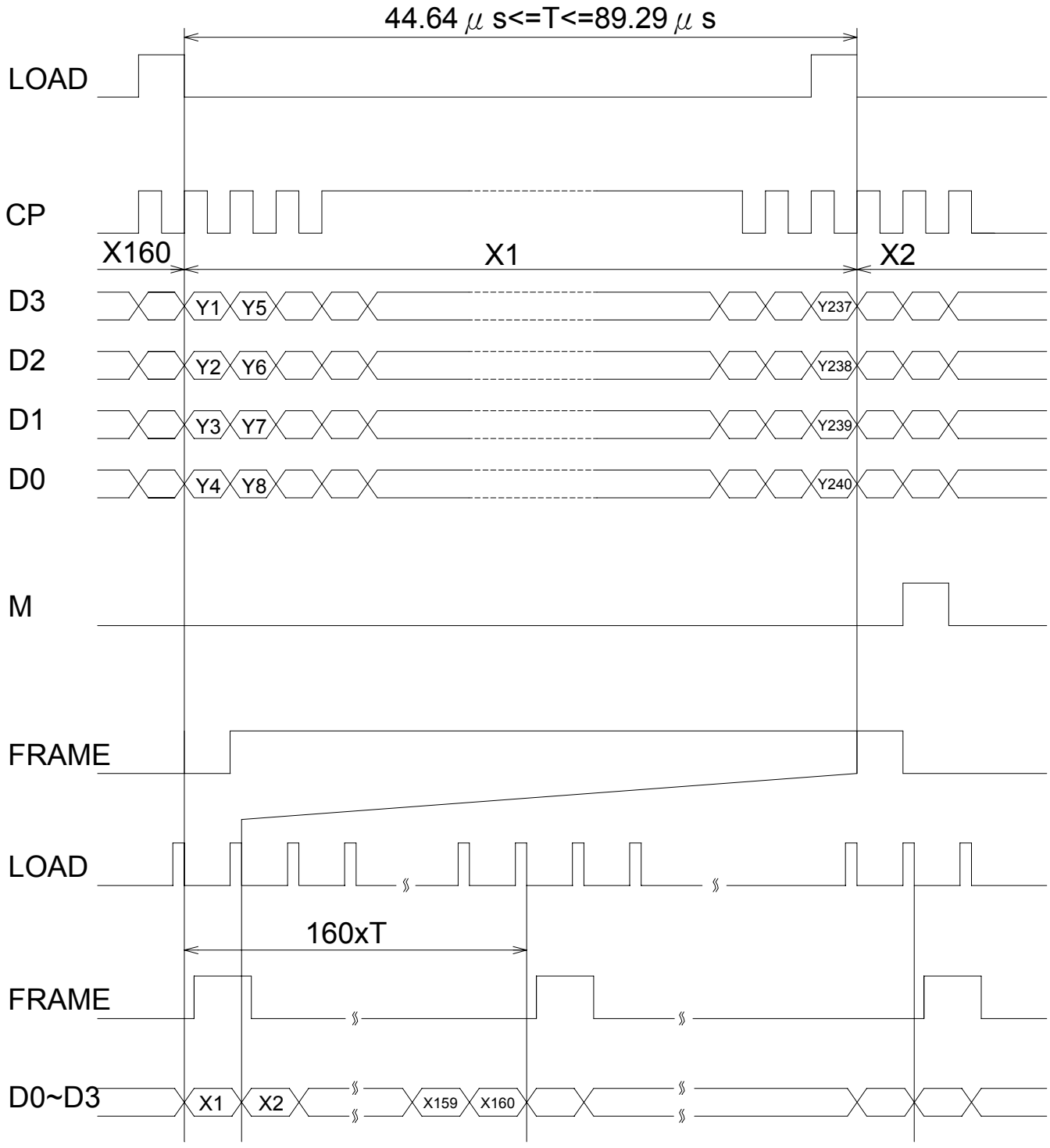
8. INTERFACE TIMING CHART

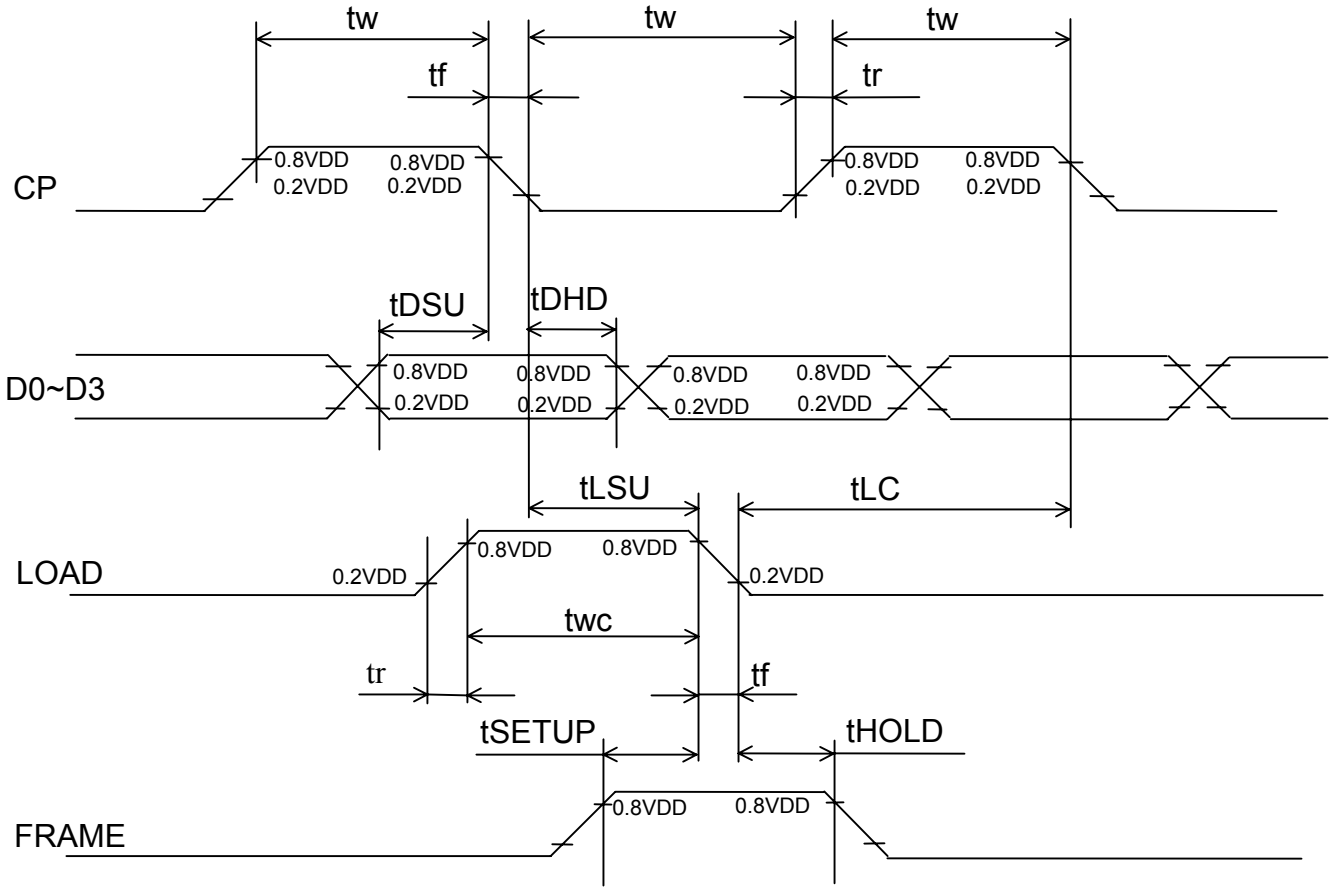
8.1 TIMING CHART



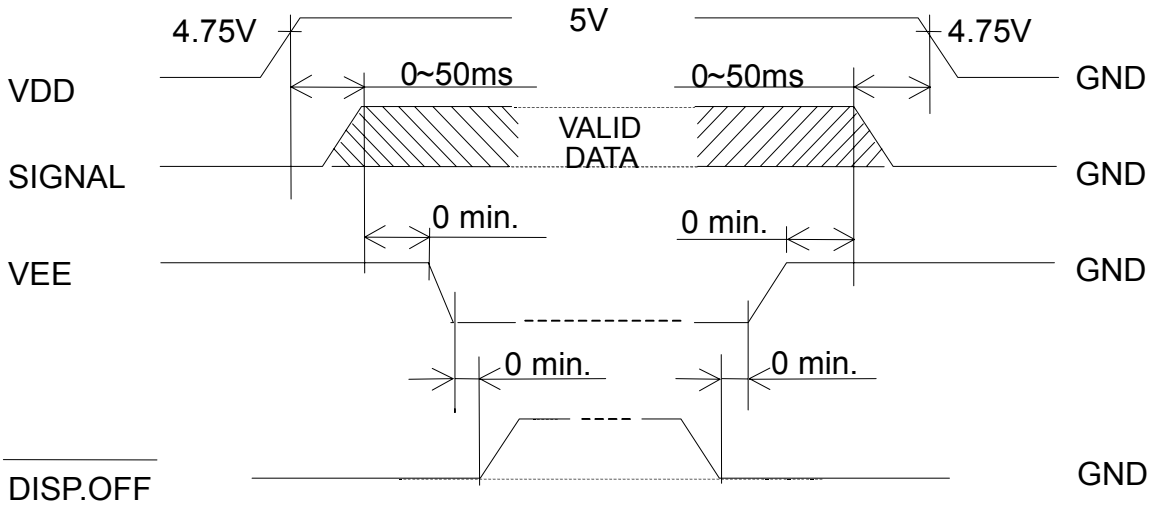
8.2 TIMING CHARACTERISTICS

0°C<=Ta=50°C,VDD=5.0V+/-5%

ITEM	SYMBOL	MIN.	TYP.	MAX.	UMIT
CLOCK FREQUENCY	fCP	-	-	6.5	MHz
CLOCK PULSE WIDTH	tW	63	-	-	ns
CLOCK RISE, FALL TIME	tr,tf	-	-	20	ns
DATA SET UP TIME	tDSU	50	-	-	ns
DATA HOLD TIME	tDHD	50	-	-	ns
LOAD SET UP TIME	tLSU	80	-	-	ns
LOAD CLOCK TIME	tLC	80	-	-	ns
"FRAME" SET UP TIME	tSETUP	100	-	-	ns
"FRAME" HOLD TIME	tHOLD	100	-	-	ns
"LOAD" PULSE WIDTH	tWC	125	-	-	ns

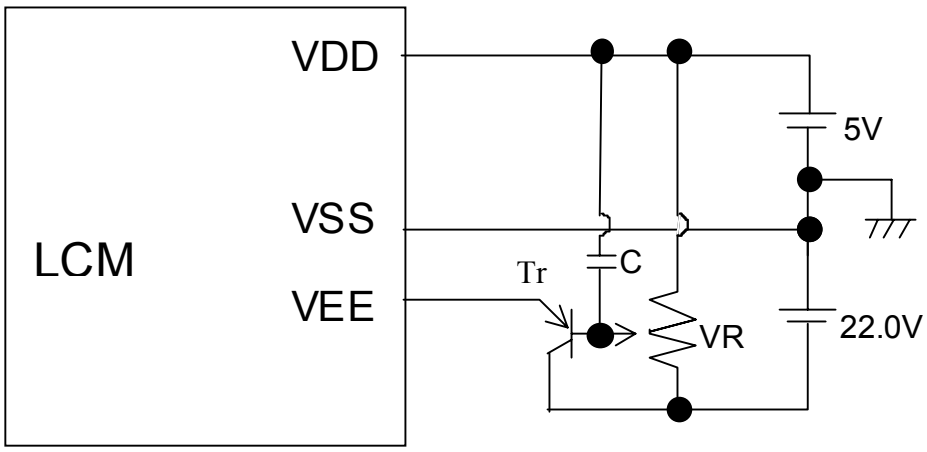


8.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL



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

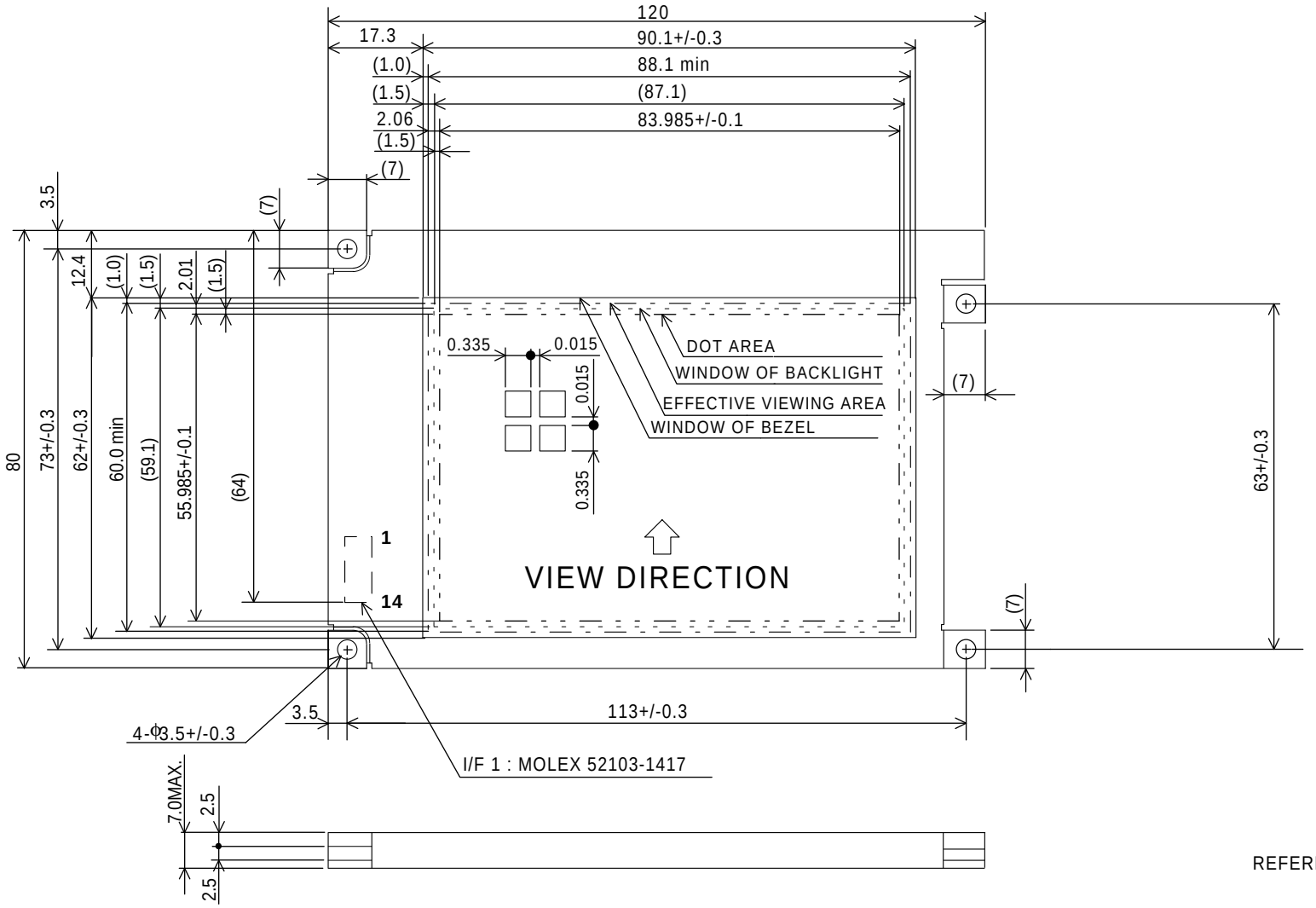
8.4 POWER SUPPLY FOR LCM
EXAMPLE :



VR : 10~20kΩ
Tr : 2SA673APKC(hfe=100 , IC=500mA) OR EQUIVQLENT Tr.
C:3.3 μf

9. DIMENSIONAL OUTLINE

9.1 DIMENSIONAL OUTLINE



REFERENCE MARK : ( )
UNIT : mm
SCALE : NTS
TOLERANCESNOT SPECIFIED : +/-0.5mm

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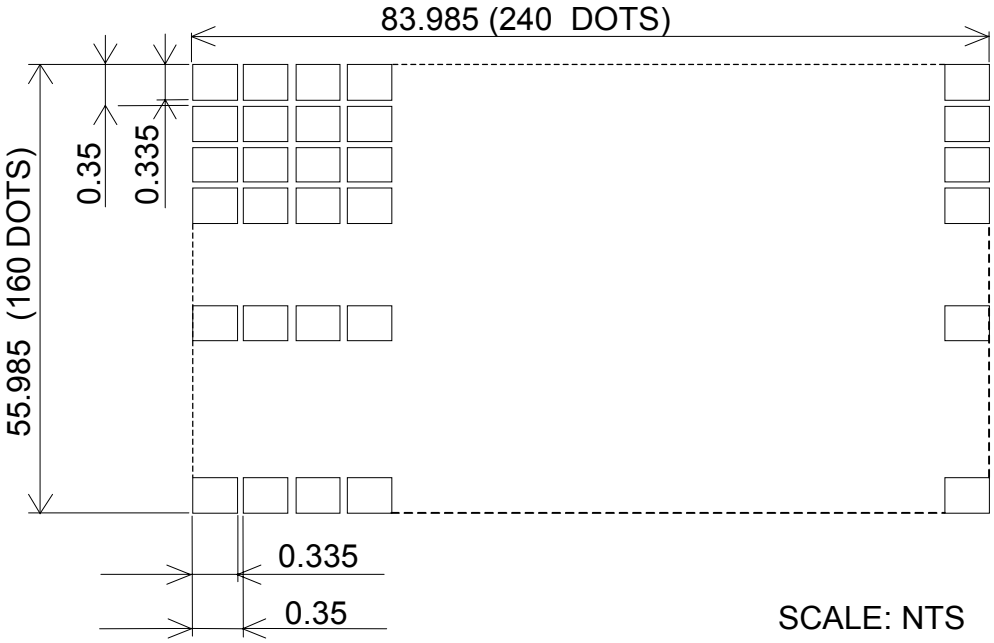
9.2 DISPLAY PATTERN



SCALE: NTS

UNIT : mm

MEASUREMENT TOLERANCE : +/-0.1

9.3 INTERFACE PIN CONNECTION

I/F1:MOLEX/52103-1417

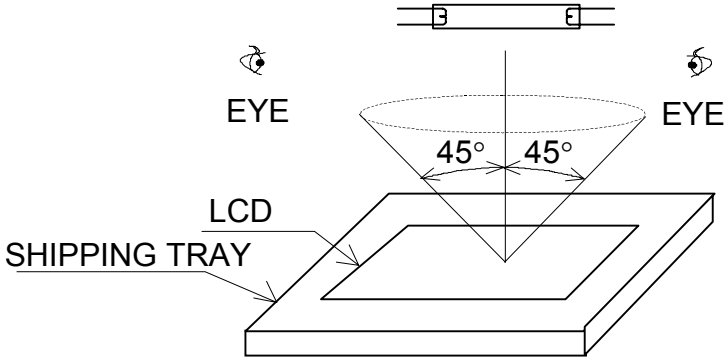
(SUITABLE FPC : 1.0 PITCH , 14 PIN 0.3t)

INTERFACE		PIN No.	SIGNAL	LEVEL	FUNCTION
LCM	I/F1	1	FRAME	H	FIRST LINE MARKER
		2	LOAD	H→L	DATA LATCH
		3	CP	H→L	DATA SHIFT
		4	VDD	-	POWER SUPPLY FOR LOGIC
		5	VSS	-	GND
		6	VEE	-	POWER SUPPLY FOR LC
		7	D0	H/L	DISPLAY DATA
		8	D1		
		9	D2		
		10	D3		
		11	$\overline{\text{DISP.OFF}}$	H/L	H : ON / L : OFF
		12	GND	-	FRAME GND
		13	VLED+	-	POWER SUPPLY FOR LED(+)
		14	VLED-	-	POWER SUPPLY FOR LED(-)

10. QUALITY STANDARD

10.1 APPEARANCE INSPECTION CONDITIONS (IN THE EFFECTIVE VIEWING AREA)

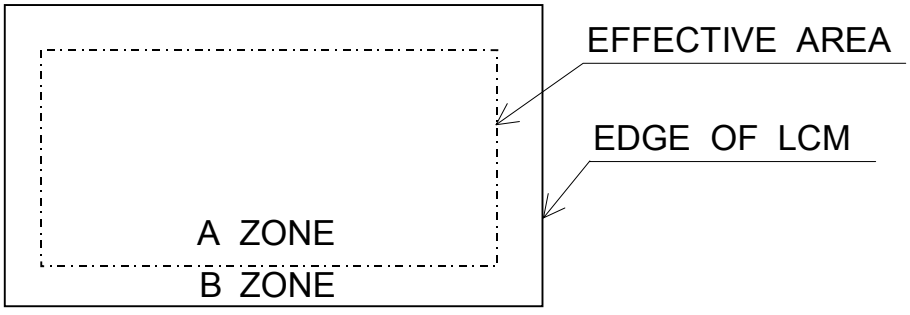
VISUAL INSPECTION UNDER SINGLE 20W FLUORECENT LAMP WITH EYE TO LCD DISTANCE 25CM AND LAMP TO LCD DISTANCE ABOUT 25CM TO 30CM. VIEWING ANGLE WITHIN 45 DEGREES FROM THE PERPENDICULAR TO THE CENTER OF THE LCD.



10.2 DEFINITION OF EACH ZONE

A ZONE : VIEWING AREA SPECIFIED ON PAGE 9-1/2 OF THIS DOCUMENT.

B ZONE : AREA BETWEEN THE EDGE OF LCD GLASS AND THE VIEWING AREA SPECIFIED ON PAGE 9-1/2 OF THIS DOCUMENT.



10.3 APPEARENCE SPECIFICATION

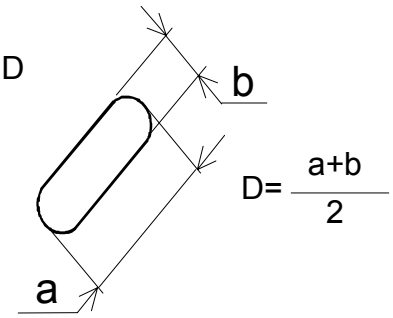
*) IF THE PROBLEM OCCURESS ABOUT THIS ITEM, THE RESPONSIBLE PERSON OF BOTH PARTY (CUSTOMER AND HITACHI) WILL DISCUSS MORE DETAIL.

No.	ITEM	CRITERIA			A	B
L C D	SCRATCHES	DISTINGUISHED ONE IS NOT ACCEPTABLE (TO BE JUDGED BY HITACHI LIMIT SAMPLE)			*	-
	DENT	SAME AS ABOVE			*	-
	WRINKLES IN POLARIZER	SAME AS ABOVE			*	-
	BUBBLES	AVERAGE DIAMETER D(mm)	MAXIMUM 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	W<=0.03	IGNORE		
		L<=3.0	0.03<W<=0.05	6		
		-	0.05<W	NONE		
		ROUND			O	-
		AVERAGE DIAMETER D(mm)	MAXIMUM NUMBER ACCEPTABLE	SPACE		
		D<0.2	IGNORE	-		
		0.2 <=D<0.33	8	10mm		
		0.33<=D	NONE	-		
		TOTAL	FILAMENTOUS + ROUND = 10			
		THOSE WIPED OUT EASILY ARE ACCEPTABLE			O	O
	COLOR TONE	TO BE JUDGE BY HITACHI LIMIT SAMPLE			O	-
	COLOR UNIFORMITY	SAME AS ABOVE			O	-
	PINHOLE	(a+b)/2<=0.15MAX. NO. ACCEPTABLE IGNORE			O	-
		0.15<(a+b)/2<=0.3MAX. NO. ACCEPTABLE<=10				
		C<=0.03		IGNORE		

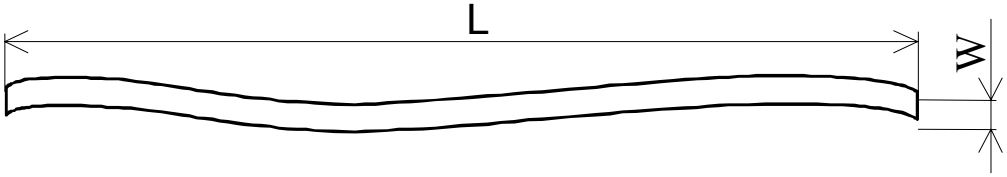
No.	ITEM	CRITERIA				A	B
L	CONTRAST IRREGULARITY (SPOT)	AVERAGE DIAMETER D(mm)	CONTRAST	MAXIMUM NUMBER ACCEPTABLE	MINIMUM SPACE	O	-
		D<0.25	TO BE JUDGE BY HITACHI LIMIT SAMPLE	IGNORE	-		
		0.25<D<=0.35		<=10	20mm		
		0.35<D<=0.5		<=4	20mm		
		0.5<D		NONE	-		
C D	CONTRAST IRREGULARITY (FILAMENTOUS)	WIDTH W(mm)	LENGTH L(mm)	MAXIMUM NUMBER ACCEPTABLE	DISTANCE	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		
		TOTAL		<=6			
	RUBBING SCRATCH	TO BE JUDGED BY HITACHI LIMIT SAMPLE				*	-

NOTE

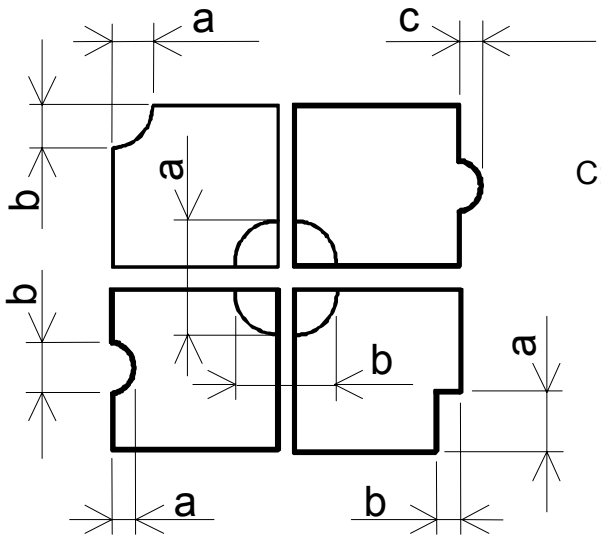
(1) DEFINITION OF AVERAGE DIAMETER D



(2) DEFINITION OF LENGTH L AND WIDTH W



(3) DEFINITION OF PINHOLE



C:SALIENCE

11. PRECAUTION IN DESIGN

11.1 LC DRIVING VOLTAGE (VEE) AND VIEWING ANGLE RANGE.
SETTING VEE OUT OF THE RECOMMENDED CONDITION WILL BE A CAUSE FOR A CHANGE OF VIEWING ANGLE RANGE.

11.2 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.

11.3 POWER ON SEQUENCE
INPUT SIGNALS SHOULD NOT BE APPLIED TO LCD MODULE BEFORE POWER SUPPLY VOLTAGE IS APPLIED AND REACHES TO SPECIFIED VOLTAGE (5V+/-0.5%).
IF ABOVE SEQUENCE IS NOT KEPT, C-MOS LSIS OF LCD MODULES MAY BE DAMAGED DUE TO LATCH UP PROBLEM.

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 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 STORAGE.

(2) SINCE UPPER/BOTTOM POLARIZERS TEND TO BE EASILY DAMAGED, THEY SHOULD BE HANDLED FULL WITH CARE SO AS NOT TO GET THEM TOUCHED, PUSHED OR RUBBED.

(3) AS THE ADHESIVES USED FOR ADHERING UPPER/BOTTOM POLERIZERS 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.

(4) LIGHTLY WIPE TO CLEAN THE DIRTY SURFACE WITH ABSORBENT COTTON WASTE OR OTHER SOFT MATERIAL LIKE CHAMOIS , SOAKED IN THE CHAMICALS 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 COLDNESS WILL BE 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 CONTANT 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 PERPHERY. BECAUSE BE CAREFUL NOT TO GIVE IT SHARP SHOCK CAUSED BY DROPPING DOWN, ETC.

11.5 CAUTION FOR HANDING

(1) IT IS AN INDISPENSABLE CONDITION TO DRIVE LCD'S WITHIN THE SPECIFIED VOLTAGE LIMIT SINCE THE HIGER 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 DRIVE SHOULD BE AVOIDED.

(2) RESPONSE TIME WILL BE EXTREMELY DELAYED AT LOWER TEMPERATURE THAN THE OPERATING TEMPERATURE RANGE AND ON THE OTHER HAND AT HIGER TEMPERATURE LCD'S SHOW DARK BULL COLOR IN THEM . HOWEVER THOSE PHENOMENA DO NOT MEAN MALFUNCTION OR OUT OR 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.

11.6 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 BULL 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°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 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 DEGREE C TO 35 DEGREE.

(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

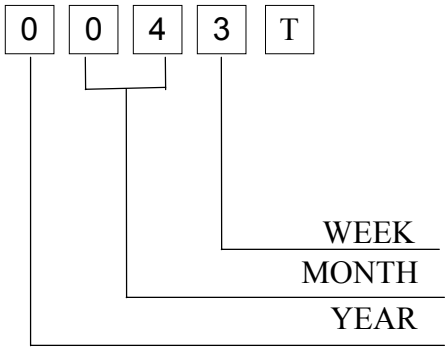
(1) IT IS RECOMMENDABLE TO CRASH DAMAGED OR UNNECESSARY LCDS INTO PIECES AND WASH OFF LIQUID CRYSTAL BY EITHER OF SOLVENTS SUCH AS ACETONE AND ETHANOL, WHICH SHOUD BE BURNED UP LATER.

(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 NUMBER.



YEAR	FIGURE IN LOT MARK
2000	0
2001	1
2002	2
2003	3
2004	4

NOTE 1. SOME PRODUCTS HAVE ALPHABET AT THE END OR THE FIRST.

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
22~29	4
30~31	5

LOCATION OF LOT MARK : ON THE BACK SIDE OF LCM

0 0 4 3 T

T : MADE IN TAIWAN.

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 EXPLAINED ABOVE. IF ANY POINTS ARE UNCLEAR OR IF YOU HAVE ANY REQUESTS , PLEASE CONTACT HITACHI.