

HITACHI

KAOHSIUNG HITACHI
ELECTRONICS CO.,LTD
P.O. BOX 26-27
2,13TH EAST ST.K.E.P.Z.
KAOHSIUNG TAIWAN R.O.C.
TEL:(07) 8211101(10 LINE)
TELEX:81903 KHE
FAX:(07) 821-5860

FOR MESSRS : _____

DATE : Oct.12.'99

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

SP10Q003-T

C O N T E N T S

No.	ITEM	SHEET No.	PAGE
1	COVER	7B64PS 2701-SP10Q003-T-4	1-1/1
2	RECORD OF REVISION	7B64PS 2702-SP10Q003-T-4	2-1/2~2/2
3	MECHANICAL DATA	7B64PS 2703-SP10Q003-T-4	3-1/1
4	ABSOLUTE MAXIMUM RATINGS	7B64PS 2704-SP10Q003-T-4	4-1/1
5	ELECTRICAL CHARACTERISTICS	7B64PS 2705-SP10Q003-T-4	5-1/1
6	OPTICAL CHARACTERISTICS	7B64PS 2706-SP10Q003-T-4	6-1/1
7	BLOCK DIAGRAM	7B64PS 2707-SP10Q003-T-4	7-1/1
8	INTERFACE TIMING CHART	7B64PS 2708-SP10Q003-T-4	8-1/3~3/3
9	DIMENSIONAL OUTLINE	7B64PS 2709-SP10Q003-T-4	9-1/2~2/2
10	QUALITY STANDARD	7B64PS 2710-SP10Q003-T-4	10-1/3~3/3
11	PRECAUTION IN DESIGN	7B64PS 2711-SP10Q003-T-4	11-1/3~3/3
12	DESIGNATION OF LOT MARK	7B64PS 2712-SP10Q003-T-4	12-1/1
13	PRECAUTION FOR USE	7B64PS 2713-SP10Q003-T-4	13-1/1
14	DIGITIZER TECHNICAL SPECIFICATION	7B64PS 2714-SP10Q003-T-4	14-1/4~4/4

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

ACCEPTED BY; _____

PROPOSED BY; M.C. Chen

KAOHSIUNG HITACHI ELECTRONICS CO.,LTD.	Sh. No.	7B64PS 2701-SP10Q003-T-4	PAGE	1-1/1
---	------------	--------------------------	------	-------

RECORD OF REVISION

DATE	SHEET No.	SUMMARY																																																														
Dec.15.'98	7B64PS 2703- SP10Q003-T-2 PAGE 3-1/1	1.MODULE SIZE HAS BEEN CHANGED. 2.ADD TOUCH PANEL.																																																														
	7B64PS 2705- SP10Q003-T-2 PAGE 5-1/1	CHANGED: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">1</td> <td style="width: 30%;">IDD</td> <td style="width: 10%;">(0.4)</td> <td style="width: 10%; text-align: center;">→</td> <td style="width: 10%;">0.3</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td>2</td> <td>ILCD</td> <td>(2.6)</td> <td style="text-align: center;">→</td> <td>1.8</td> <td></td> <td></td> </tr> <tr> <td rowspan="3">3</td> <td rowspan="3">VLCD-VSS</td> <td>0°C</td> <td>(27.2)</td> <td style="text-align: center;">→</td> <td>27.4</td> <td></td> </tr> <tr> <td>25°C</td> <td>(26.0)</td> <td style="text-align: center;">→</td> <td>26.3</td> <td></td> </tr> <tr> <td>40°C</td> <td>(25.2)</td> <td style="text-align: center;">→</td> <td>25.4</td> <td></td> </tr> <tr> <td>4</td> <td>VLED:</td> <td>(3.5)V</td> <td style="text-align: center;">→</td> <td>3.6V</td> <td></td> <td></td> </tr> <tr> <td rowspan="2">5</td> <td rowspan="2">ILED:</td> <td>TYP.</td> <td>MAX</td> <td style="text-align: center;">→</td> <td>TYP</td> <td>MAX</td> </tr> <tr> <td>-</td> <td>(90)</td> <td></td> <td>75</td> <td>90</td> </tr> <tr> <td rowspan="2">6</td> <td rowspan="2">BLED:</td> <td>MIN</td> <td>TYP</td> <td style="text-align: center;">→</td> <td>MIN</td> <td>TYP</td> </tr> <tr> <td>-</td> <td>(3)</td> <td></td> <td>2.0</td> <td>4.0</td> </tr> </table>	1	IDD	(0.4)	→	0.3			2	ILCD	(2.6)	→	1.8			3	VLCD-VSS	0°C	(27.2)	→	27.4		25°C	(26.0)	→	26.3		40°C	(25.2)	→	25.4		4	VLED:	(3.5)V	→	3.6V			5	ILED:	TYP.	MAX	→	TYP	MAX	-	(90)		75	90	6	BLED:	MIN	TYP	→	MIN	TYP	-	(3)		2.0	4.0
	1	IDD	(0.4)	→	0.3																																																											
	2	ILCD	(2.6)	→	1.8																																																											
	3	VLCD-VSS	0°C	(27.2)	→	27.4																																																										
25°C			(26.0)	→	26.3																																																											
40°C			(25.2)	→	25.4																																																											
4	VLED:	(3.5)V	→	3.6V																																																												
5	ILED:	TYP.	MAX	→	TYP	MAX																																																										
		-	(90)		75	90																																																										
6	BLED:	MIN	TYP	→	MIN	TYP																																																										
		-	(3)		2.0	4.0																																																										
7B64PS 2706- SP10Q003-T-2 PAGE 6-1/1	CHANGED: TYP 1.CONTRAST RATIO K=(12) ↓ K=7 (WITH T/P) K=12 (NO T/P)																																																															
7B64PS 2709- SP10Q003-T-2 PAGE 9-1/2	CHANGED ALL PAGE.																																																															
7B64PS 2709- SP10Q003-T-2 PAGE 9-2/2	ADD INTERFACE PIN OF T/P																																																															
May.12.'99	7B64PS2704- SP10Q003-T-3 PAGE 4-1/1	CHANGED: OPERATING TEMP. 0 ~ 40℃ ; 0 ~ 50℃																																																														
	7B64PS2705- SP10Q003-T-3 PAGE 5-1/1	CHANGED: ILED:75mA TYP. 90mA MAX ; 55mA TYP. 70mA MAX BRIGHTNESS UNIFORMITY 50% ; 40% ADDED: ADD LED CIRCUIT.																																																														
	7B64PS2709- SP10Q003-T-3 PAGE 9-1/2	CHANGED: 2.8mm MAX ; 3.3 ; 0.5 ADD DIMENSION 71.5MAX.																																																														
	7B64PS2709- SP10Q003-T-3 PAGE 9-2/2	CHANGED: PIN2: VSS(LOGIC GROUND) ; S.GND(SHIELD GROUND)																																																														

RECORD OF REVISION

DATE	SHEET No.	SUMMARY
Oct.12.'99	7B64PS 2705- SP10Q003-T-4 PAGE 5-1/1	CHANGED: 0°C 27.4 → 26.9 VLCD-VSS 25°C 26.3 → 25.8 40°C 25.4 → 24.9

3. MECHANICAL DATA

(1) PART NAME	SP10Q003-T
(2) MODULE SIZE	70.1 (W)mm * 92.1 (H)mm * 9.0 (D)mm MAX.
(3) EFFECTIVE DISPLAY AREA	60.6 mm. * 79.8 mm.
(4) DOT SIZE	0.225 (W)mm * 0.225 (H)mm
(5) DOT PITCH	0.24 (W)mm * 0.24 (H)mm
(6) NUMBER OF DOTS	240 (W) * 320 (H) DOTS
(7) DUTY	1/320
(8) BIAS	1/18
(9) LCD	FILM TYPE BLACK/WHITE (POSITIVE TYPE) THE UPPER POLARIZER IS GLARE TYPE. THE BOTTOM POLARIZER IS TRANSFLECTIVE TYPE.
(10) VIEWING DIRECTION	6 O'CLOCK
(11) BACKLIGHT	LED (COLOR:WHITE)
(12) TOUCH PANEL	ANALOG RESISTIVE LINEARITY : +/-1.5% HARDNESS : 2H TRANSPARENCY : 80% SURFACE TYPE : NON-GLARE

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	-0.3	7.0	V	
POWER SUPPLY FOR LC DRIVE	VLCD-V0	0	36.0	V	
INPUT VOLTAGE	Vi	-0.3	VDD+0.3	V	NOTE 1,2

NOTE 1. DISP.OFF,YD, LOAD, CP,D0~D3,M.

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	0°C	50°C NOTE 4	-20°C	60°C NOTE 4	NOTE 2,3
HUMIDITY	NOTE 1		NOTE 1		WITHOUT CONDENSATION
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1) 40°C 85%RH.....150HRS(POLARIZER & ADHESIVE TAPE DAMAGE ACCEPTED)
40°C 85%RH.....48HRS(POLARIZER & ADHESIVE TAPE DAMAGE NO ACCEPTED)

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) THERE ARE POSSIBLITY THAT COLOR UN-UNIFORMITY HAPPENED WHILE OPERATING AT 40°C ~ 50φJ.

5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS OF LCD

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD-VSS	-	2.7	3.3	4.7	V
POWER SUPPLY VOLTAGE FOR LC DRIVING	VLCD-VSS	-	26.0	-	33.0	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	VDD-VSS=3.3V VLCD-VSS=26.3V	-	0.3	-	mA
POWER SUPPLY CURRENT FOR LC DRIVING NOTE 2	ILCD	VDD-VSS=3.3V VLCD-VSS=26.3V	-	1.8	-	mA
RECOMMENDED LC DRIVING VOLTAGE NOTE 3	VLCD-VSS	Ta= 0°C , θ=0°	-	26.9	-	V
		Ta=25°C , θ=0°	-	25.8	-	V
		Ta=40°C , θ=0°	-	24.9	-	V
FRAME FREQUENCY NOTE 4	fYD	-	70	-	120	Hz

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

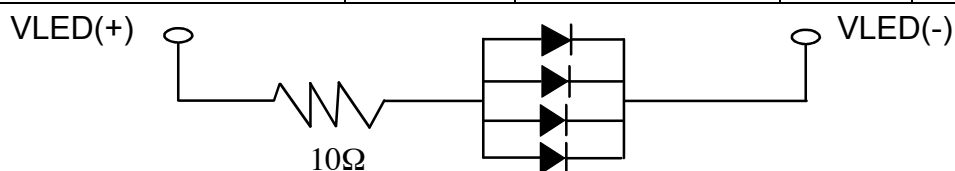
NOTE (2) fYD=75Hz , ALL "Q" PATTERN
VLCD-VSS=26.3V , Ta=25°C.

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

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

5.2 ELECTRICAL CHARACTERISTICS OF LED BACKLIGHT

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED	-	-	3.6	-	V
POWER SUPPLY CURRENT FOR LED BACKLIGHT	ILED	VLED=3.6V	-	55	70	mA
THE BRIGHTNESS ON LCM SURFACE (WITH T/P)	BLED	$\phi=0^\circ$, $\theta=0^\circ$ VLED=3.6V	2.0	4.0	-	cd/m ²
BRIGHTNESS UNIFORMITY	-	-	-	-	40	%



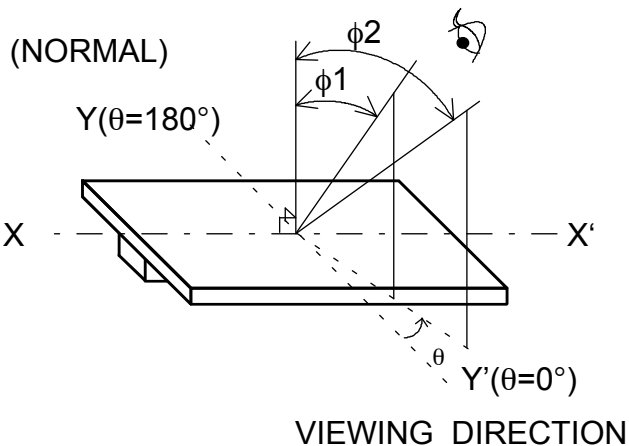
6. OPTICAL CHARACTERISTICS

6.1 LCM Ta=25°C

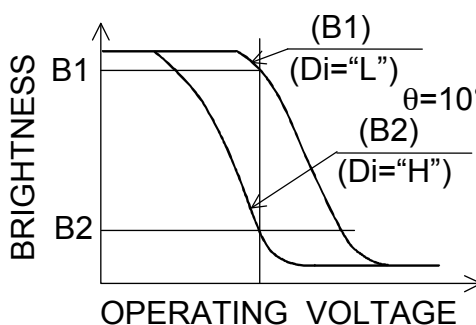
ITEM	SYMBOL	CONDITIONAL	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	$\phi 2-\phi 1$	$K \geq 2.0$	-	40	-	deg	1,2
CONTRAST RATIO	WITH T/P	$\phi = 0^\circ, \theta = 0^\circ$	-	7	-	-	3
	NO T/P	$\phi = 0^\circ, \theta = 0^\circ$	-	12	-	-	3
RESPONSE TIME (RISE)	tr	$\phi = 0^\circ, \theta = 0^\circ$	-	200	-	ms	4
RESPONSE TIME (FALL)	tf	$\phi = 0^\circ, \theta = 0^\circ$	-	400	-	ms	4

NOTE 1. DEFINITION OF θ AND ϕ

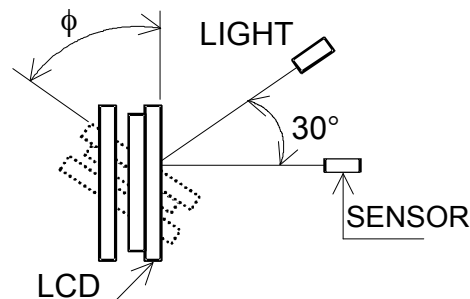
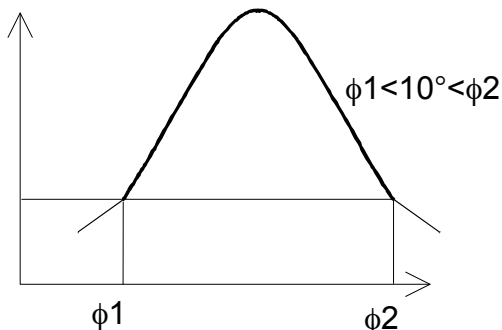
(MEASURE CONDITION BY HITACHI)



NOTE 3. DEFINITION OF CONTRAST "K"

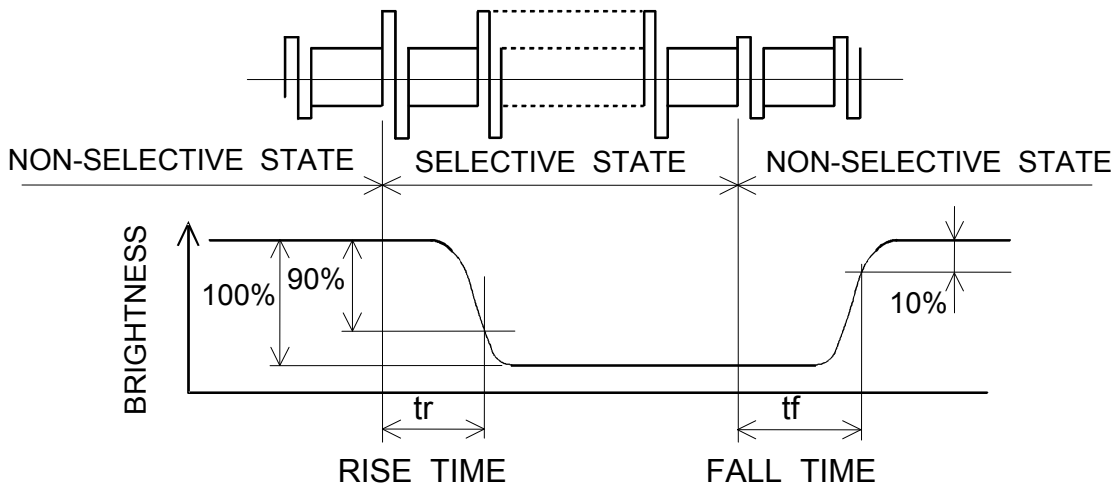


NOTE 2. DEFINITION OF VIEWING ANGLE $\phi 1$ AND $\phi 2$

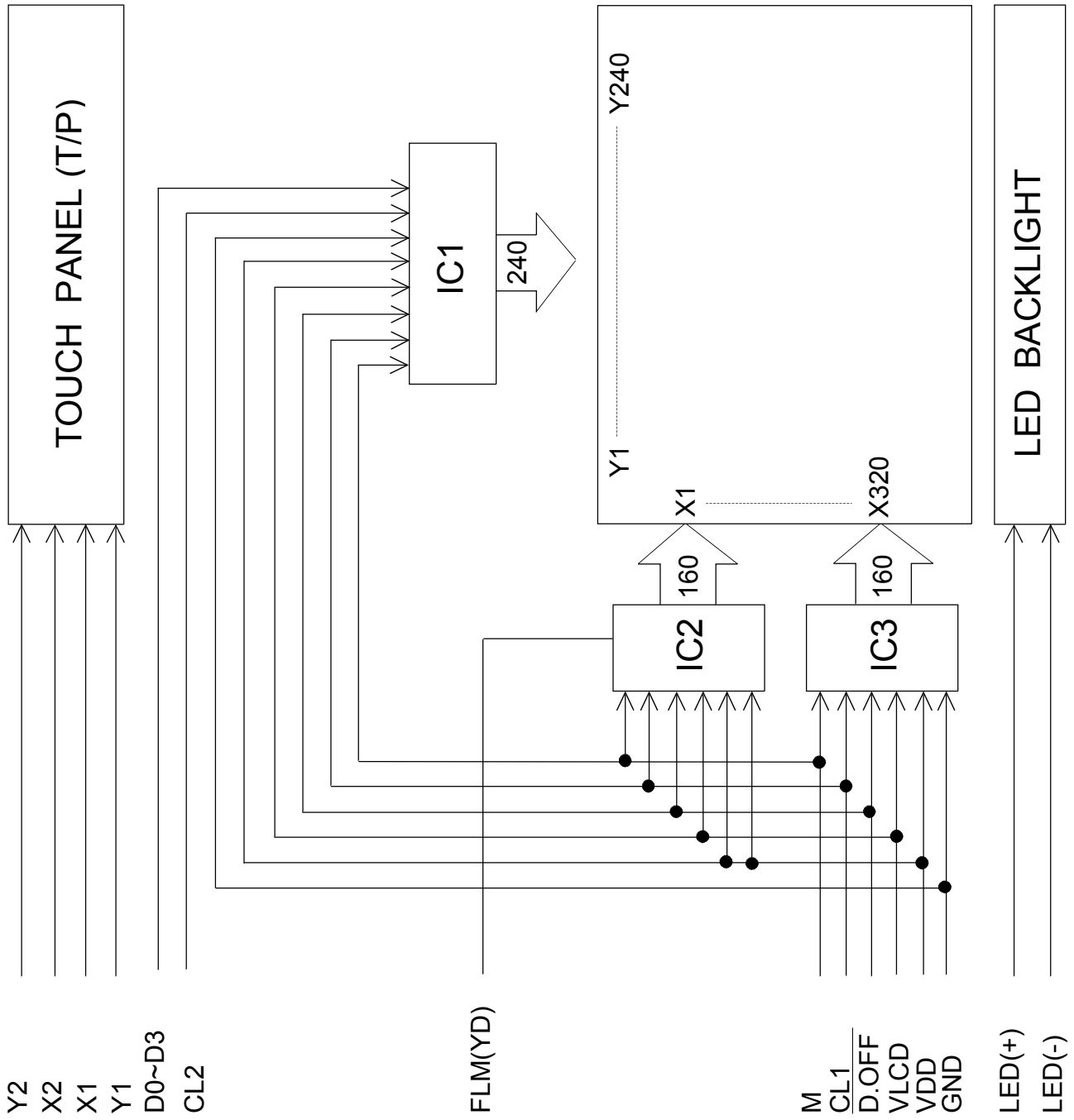


CONTRAST RATIO K VS VIEWING ANGLE ϕ

NOTE 4. DEFINITION OF OPTICAL RESPONSE

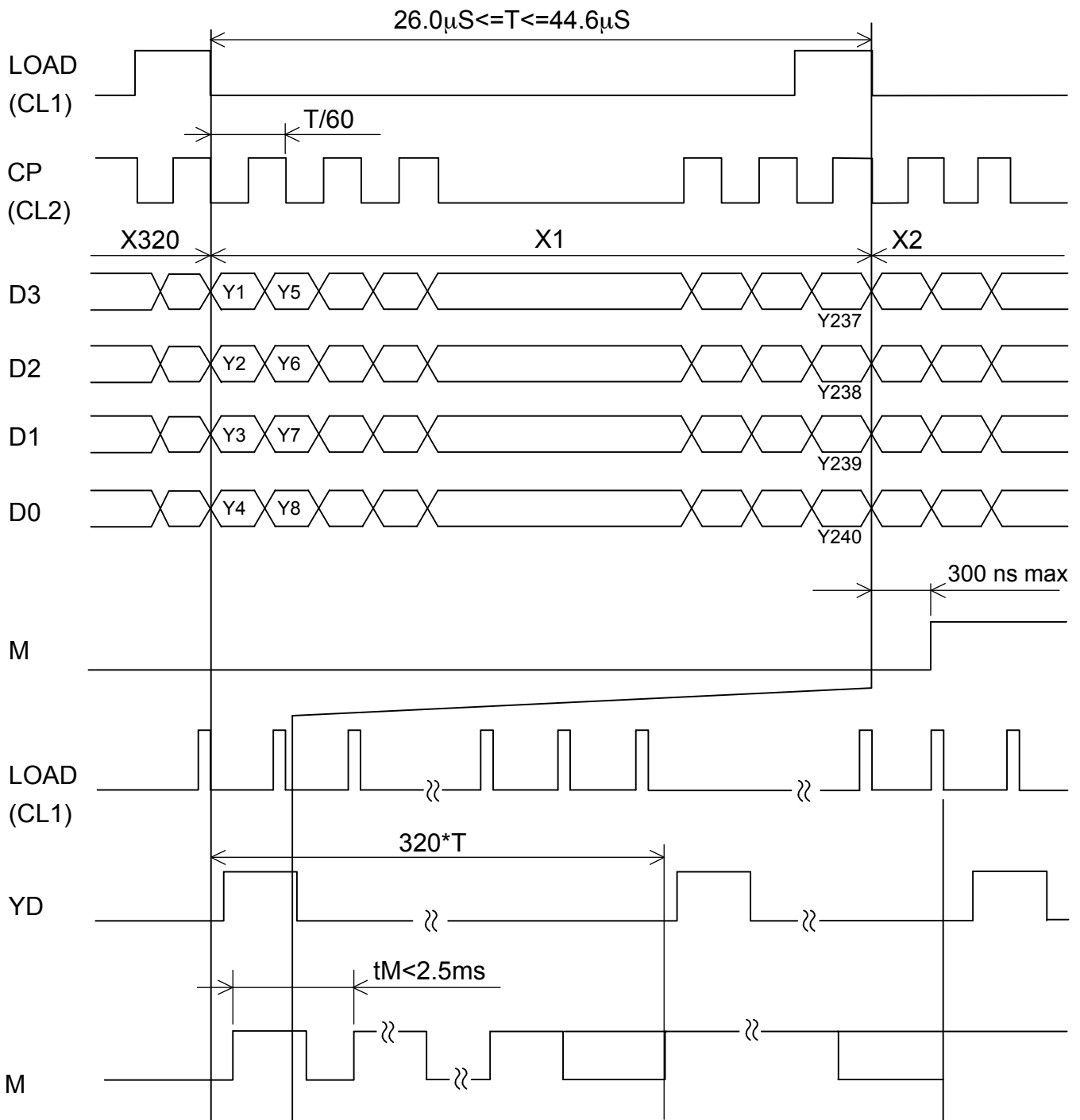


7. BLOCK DIAGRAM



8. INTERFACE TIMING CHART

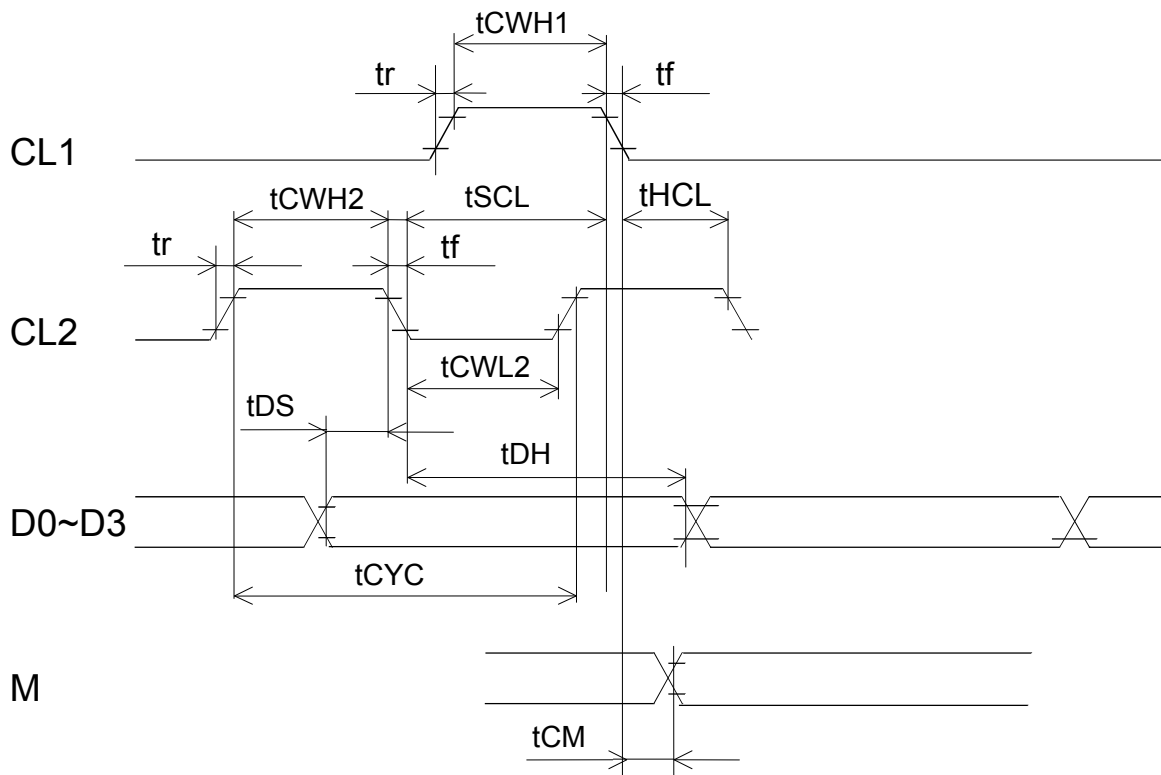
8.1 TIMING CHART



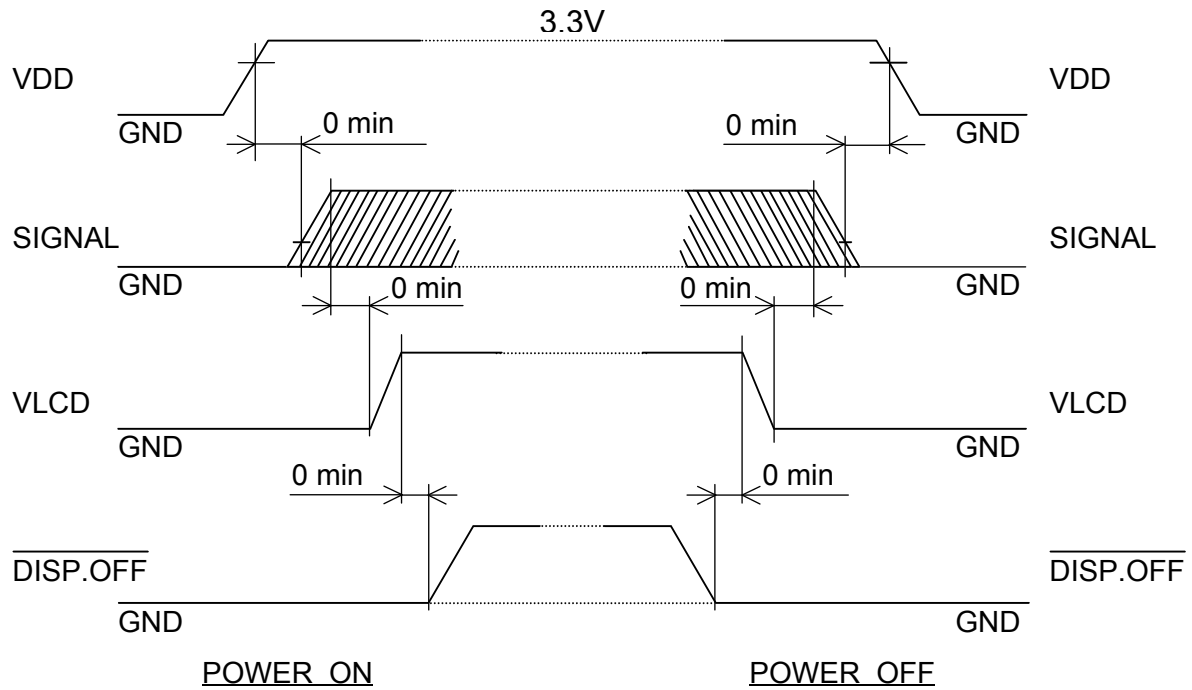
NOTE 1. DO NOT INPUT OVER 320 PULSES TO LOAD.

8.2 TIMING CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UMIT
CL1 PULSE WIDTH "H"	tCWH1	20	-	-	ns
CL2 PULSE WIDTH "H"	tCWH2	15	-	-	ns
CL2 PULSE WIDTH "L"	tCWL2	15	-	-	Ns
CLOCK CIRCLE TIME	tCYC	60	-	-	ns
CLOCK SET UP TIME	tSCL	100	-	-	ns
CLOCK HOLD TIME	tHCL	100	-	-	ns
CLOCK RISE FALL TIME	tr,tf	-	-	50	ns
DATA SET UP TIME	tDS	8	-	-	ns
DATA HOLD TIME	tDH	19	-	-	ns
M PHASE DIFFERENCE	tCM	-	-	300	

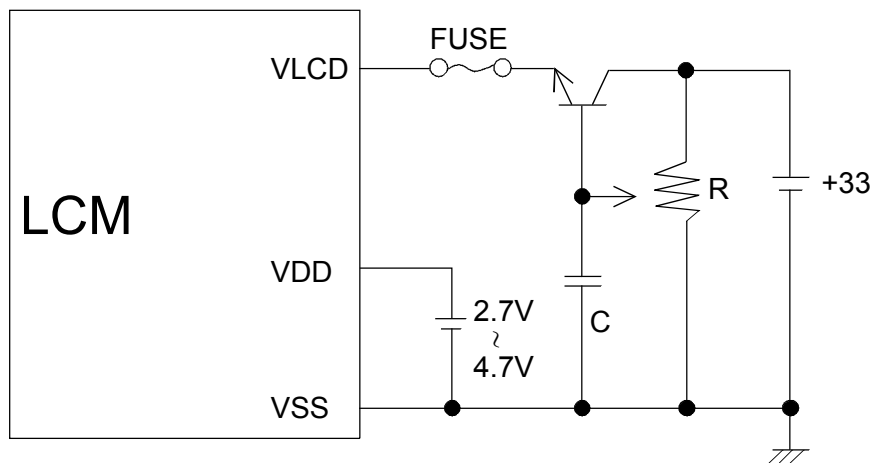


8.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

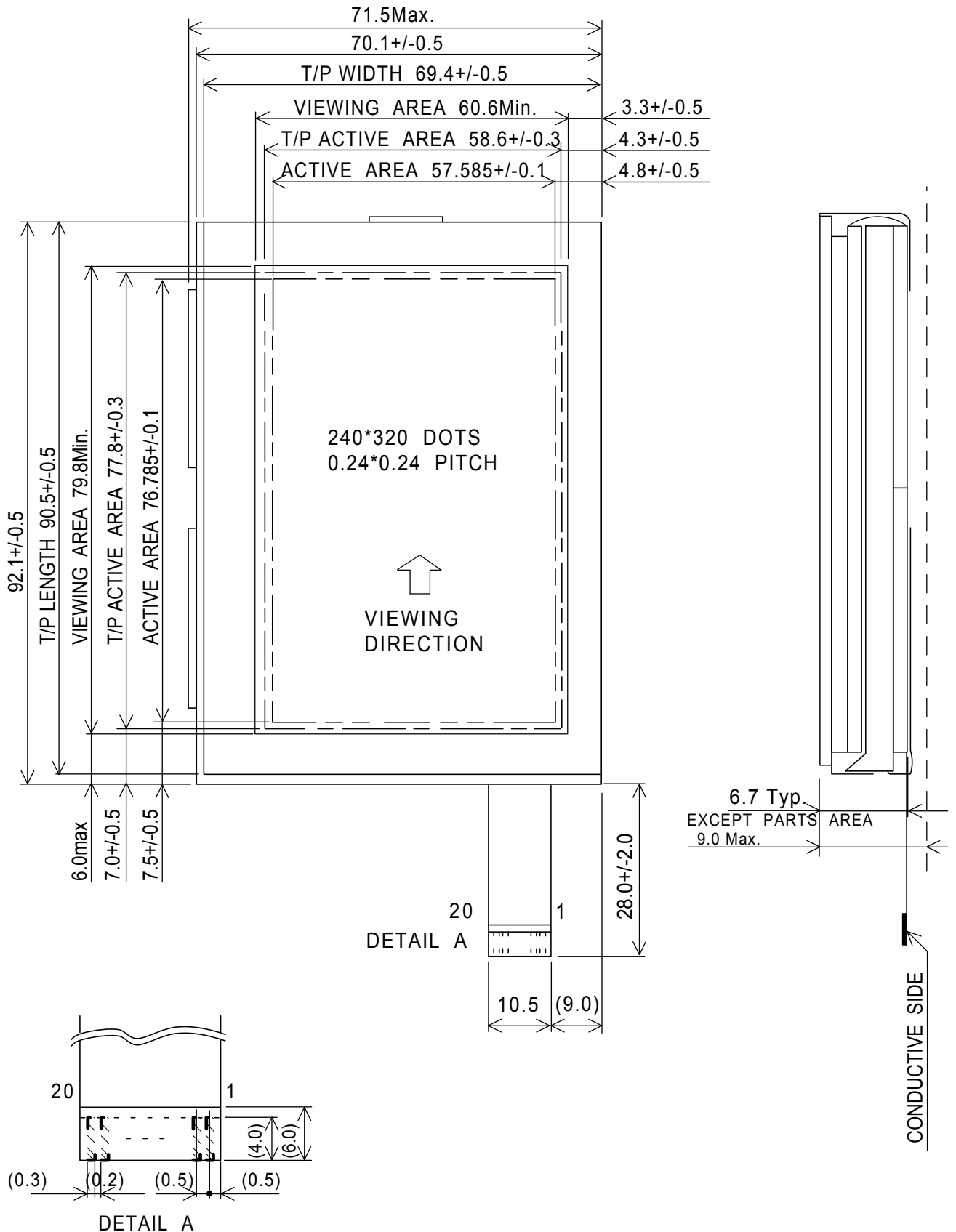


THE MISSING PIXELS MAY OCCUR WHEN THE LCM IS DRIVEN EXCEPT ABOVE POWER INTERFACE TIMING SEQUENCE.

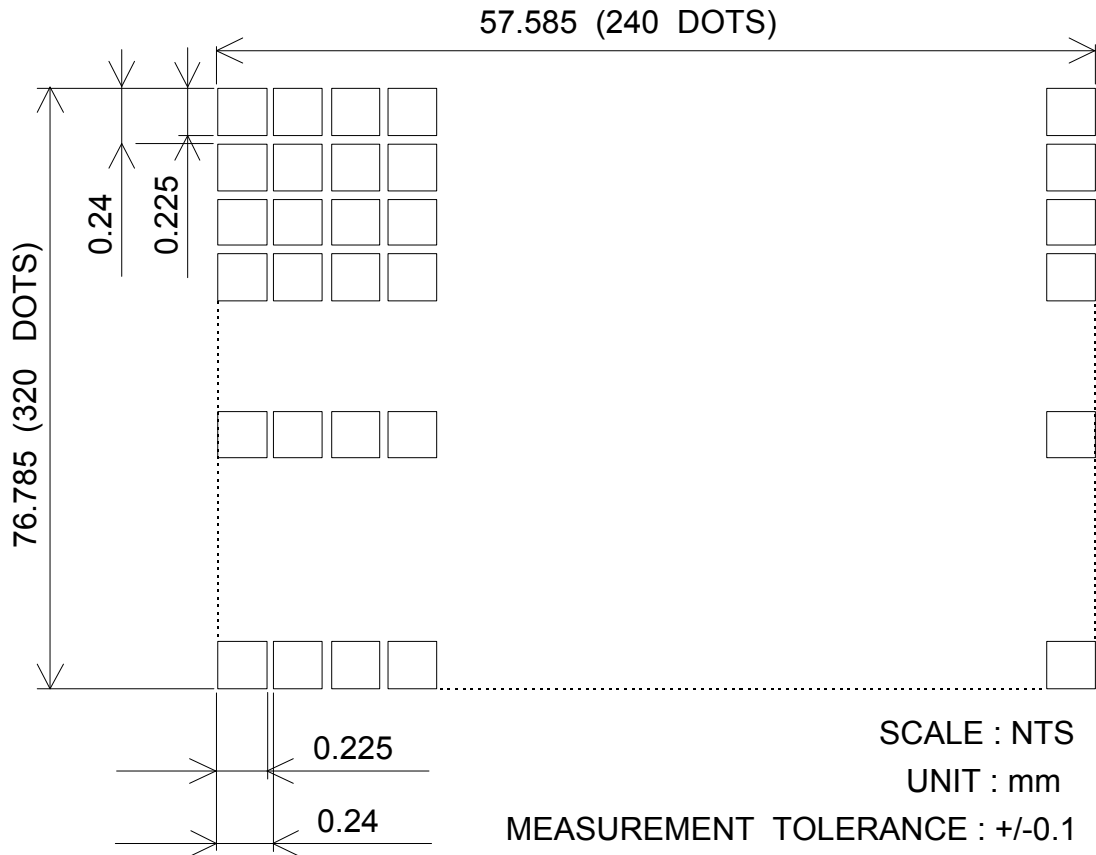
8.4 POWER SUPPLY FOR LCM



9. DIMENSIONAL OUTLINE
 9.1 DIMENSIONAL OUTLINE



9.2 DISPLAY PATTERN



9.3 INTERNAL PIN CONNECTION

CN1 : FPC

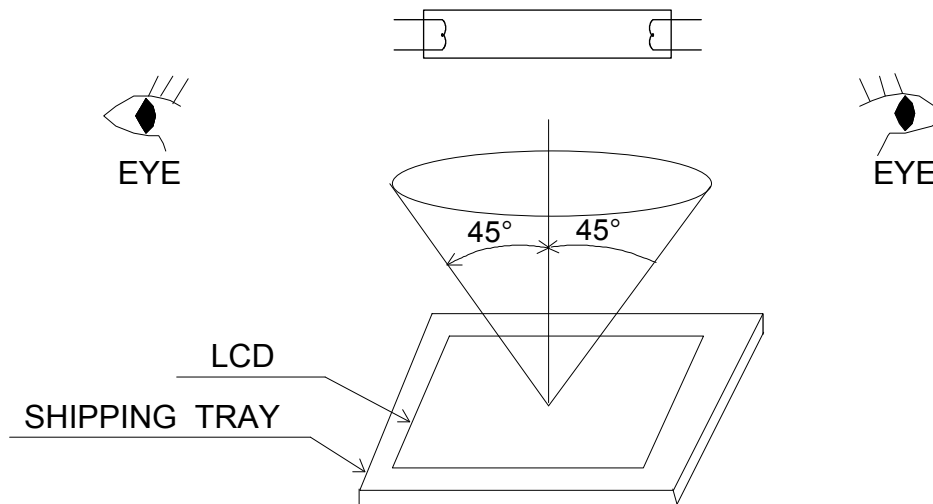
CN1

PIN No.	SIGNAL	LEVEL	FUNCTION
1	VDD	H	POWER SUPPLY FOR LOGIC
2	S.GND	-	SHIELD GROUND
3	VLCD	H	POWER SUPPLY FOR LCD
4	FLM	H	FIRST LINE MARKER
5	DISP.OFF	H/L	H:ON / L:OFF
6	M	H/L	SWITCH SIGNAL TO CONVERT LIQUID CRYSTAL DRIVE WAVEFORM INTO AC
7	CL1	H→L	DATA LATCH
8	CL2	H→L	SHIFT CLOCK
9	VSS	-	LOGIC GROUND
10	D0	H/L	DISPLAY DATA
11	D1	H/L	DISPLAY DATA
12	D2	H/L	DISPLAY DATA
13	D3	H/L	DISPLAY DATA
14	VSS	-	LOGIC GROUND
15	LED(+)	-	POWER SUPPLY FOR LED
16	LED(-)	-	POWER SUPPLY FOR LED
17	Y2	-	ANALOG SIGNAL FROM TOUCH PANEL
18	X1	-	ANALOG SIGNAL FROM TOUCH PANEL
19	Y1	-	ANALOG SIGNAL FROM TOUCH PANEL
20	X2	-	ANALOG SIGNAL FROM TOUCH PANEL

10. QUALITY STANDARD

10.1 APPEARANCE INSPECTION CONDITIONS (IN THE EFFECTIVE VIEWING AREA)

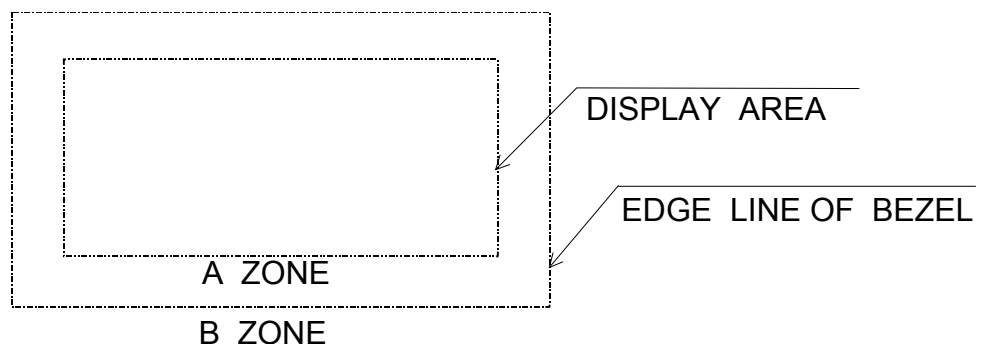
VISUAL INSPECTION UNDER SINGLE 20W FLUORECENT LAMP WITH EYES TO LCD DISTANCE 25cm AND LAMP TO LCD DISTANCE 25 TO 30cm. VIEWING ANGLE SHOULD BE SMALLER THAN 45° . THE LINE OF SIGHT FOR INSPECTION SHALL BE INSIDE THE HALF SECTION OF A CONE WHICH CONSISTED OF LINE SEGMENT 45° TO THE AXIS WITH VERTEX AT CENTER OF LCD. THE CONE AXIS PERPENDICULAR TO THE LCD AND PASSING THROUGH THE FLUORESCENT LAMP.



10.2 DEFINITION OF EACH ZONE

A ZONE : WITHIN THE DISPLAY AREA SPECIFIED AT PAGE 9-1/2 OF THIS DOCUMENT.

B ZONE : AREA BETWEEN THE EDGE LINE OF BEZEL AND THE DISPLAY AREA LINE SPECIFIED AT PAGE 9-1/2 OF THIS DOCUMENT.



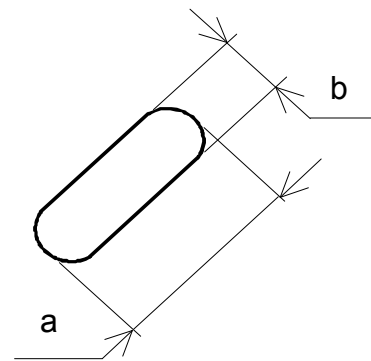
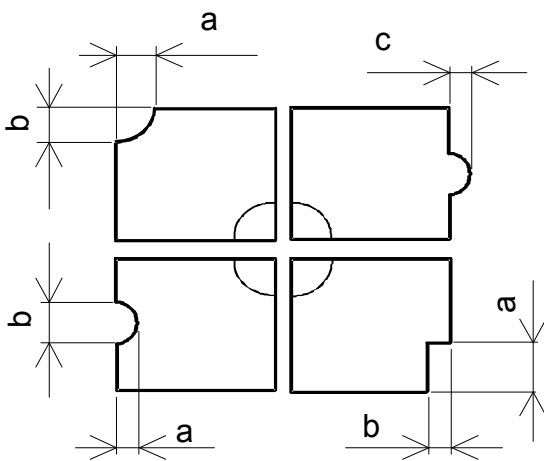
10.3 APPEARENCE SPECIFICATION

*) 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	
L	SCRATCHES	DISTINGUISHED ONE IS NOT ACCEPTABLE (TO BE JUDGE BY HITACHI LIMIT SAMPLE)		*	-	
	DENT	SAME AS ABOVE		*	-	
	WRINKLES IN POLARIZER	SAME AS ABOVE		*	-	
	BUBBLES	AVERAGE DIAMETER D(mm)	MAXIMUM NUMBER ACCEPTABLE	○	-	
NOTE (1)	D<=0.2	IGNORE				
	0.2<D<=0.3	12				
	0.3<D<=0.5	3				
	0.5<D	NONE				
C D	STAINS, FOREIGN MATERIALS DARK SPOT	FILAMENTOUS		○	*	
		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
	NOTE (1) (2)	-	0.05<W	NONE	○	*
		ROUND				
		AVERAGE DIA- METER D(mm)	MAXIMUM NUM- BER ACCEPTABLE	MINIMUM SPACE		
		D<0.2	IGNORE	-		
		0.2 <=D<0.33	8	10 mm		
		0.33 <=D	NONE	-		
		THE WHOLE NUMBER	FILAMENTOUS + ROUND = 10			
		THOSE WIPED OUT EASILY ARE ACCEPTABLE		○		
COLOR TONE	TO BE JUDGED BY HITACHI LIMIT SAMPLE		○	-		
COLOR UNIFORMITY	SAME AS ABOVE		○	-		
PINHOLE	AVERAGE DIAMETER D(mm)	MAXIMUM NUMBER ACCEPTABLE		○	-	
	D<=0.15	IGNORE				
	0.15<D<=0.3	10				
	C<=0.01	IGNORE				
CONTRAST IRREGULARITY (SPOT)	AVERAGE DIAMETER D (mm)	CONTRAST	MAXIMUM NUMBER ACCEPTABLE	MINIMUM SPACE		
	D<=0.2	TO BE	IGNORE	-		
	5	JUDGE BY	10	20mm		
	0.25<D<=0.3		HITACHI	4	20mm	
	5	0.35<D<=0.5		NONE	-	
NOTE (1)	0.5 <D					

No.	ITEM	CRITERIA				A	B
		WIDTH	LENGTH	MAXIMUM ACCEPTABLE NUMBER	MINIMUM SPACE		
L C D	CONTRAST IRREGULARITY (LONE) (A PAIR OF SCRATCH)	W(mm)	L(mm)			○	-
		W<=0.25	L<=1.2	2	20mm		
		W<=0.2	L<=1.5	3	20mm		
		W<=0.15	L<=2.0	3	20mm		
		W<=0.1	L<=3.0	4	20mm		
	NOTE (2)	THE WHOLE NUMBER <=6					
	RUBBING SCRATCH	TO BE JUDGED BY HITACHI LIMIT STANDARD				○	-

NOTE (1)



$\frac{a+b}{2}$ = D...AVERAGE DIAMETER
C...SALIENT

(2) DEFINITION OF LENGTH L AND WIDTH W



11. PRECAUTION IN DESIGN

11.1 LC DRIVING VOLTAGE (VLCD) AND VIEWING ANGLE RANGE.

SETTING VLCD 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 VOTAGE IS APPLIED AND REACHES TO SPECIFIED VOLTAGE (3.3+/-10%). IF ABOVE SEQUENCE IS NOT KEPT, C-MOS LSI 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° 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 CHAMICALS OTHER THAN THE ABOVE.

KAOHSIUNG HITACHI ELECTRONICS CO.,LTD.	DATE	Oct.12.'99	Sh. No.	7B64PS 2711-SP10Q003-T-4	PAGE	11-1/3
---	------	------------	------------	--------------------------	------	--------

- (4) LIGHTLY WIPE TO CLEAR 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 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 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 PERIPHERY. BECAUSE BE CAREFUL NOT TO GIVE IT SHARP SHOCK CAUSED BY DROPPING DOWN, ETC.

11.5 CAUTION FOR HANDING

THIS LCM (240*320) HAS NO METAL FRAME AND FRONT BEZEL TO PROTECT TCP(TAPE CARRIER PACKAGE). TCP DRIVER IS VERY WEAK AGAINST ANY MECHANICAL STRESS. IF SUCH STRESS APPLIED, OPEN CIRCUIT OF TCP DRIVER MAY OCCUR. AND IT CAN'T BE REPAIRED. PLEASE NOTICE THAT THIS LCM SHOULD BE HANDLED WITH ENOUGH CARE AS FOLLOWS.

- (1) WHEN HANDLING, HOLD LCD GLASS TO AVOID DAMAGEING TCP. DO NOT HOLD PCB(PRINTED CIRCUIT BOARD).
- (2) AFTER INCOMING INSPECTION OF THIS LCM, WHEN TAKING OFF INTERFACE CABLE, BE CAREFUL NOT TO MAKE ANY MECHANICAL STRESS TO TCP, SUCH AS BENDING AND TWISTING.

KAOHSIUNG HITACHI ELECTRONICS CO.,LTD.	DATE	Oct.12.'99	Sh. No.	7B64PS 2711-SP10Q003-T-4	PAGE	11-2/3
---	------	------------	------------	--------------------------	------	--------

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°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 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 ROM US.)

11.8 SAFETY

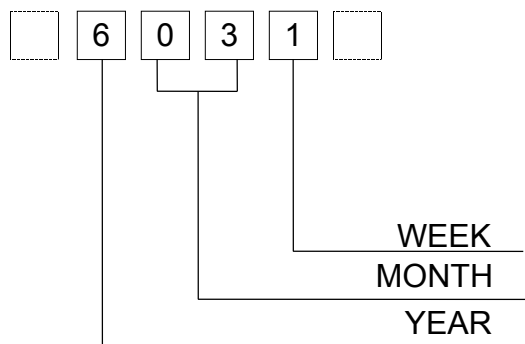
- (1) IT IS RECOMMENDABLE TO CRASH DAMAGED OR UNNECESSARY LCDS INTO PIECES AND WASH OFF LIQUID CRYSTAL BY EITHER OF SOLVENTS SUCH AS ACETONE AND ETHANOL, WHICH SHOUD BE BURNED UP LATER.
- (2) WHEN ANY LIQUID LEAKED OUT OF A DAMAGED GLASS CELL COMES IN CONTACT WITH YOUR HANDS, PLEASE WASH IT OFF WELL WITH SOAP AND WATER.

KAOHSIUNG HITACHI ELECTRONICS CO.,LTD.	DATE	Oct.12.'99	Sh. No.	7B64PS 2711-SP10Q003-T-4	PAGE	11-3/3
---	------	------------	------------	--------------------------	------	--------

12. DESIGNATION OF LOT MARK

LOT MARK

LOT MARK IS CONSISTED OF 4 DIGHT NUMBER.



YEAR	FIGURE IN LOT MARK
1998	8
1999	9
2000	0
2001	1
2002	2

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
22~28	4
29~31	5

LOCATION OF LOT MARK : ON THE BACK SIDE OF LCM

6 0 3 1 T

T : MADE IN TAIWAN.

13. PRECAUTION 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.

14. DIGITIZER TECHNICAL SPECIFICATION

14.1 RATINGS

14.1.1 ABSOLUTE MAXIMUM RATINGS

ITEM	SPECIFICATIONS	COMMENT
OPERATING VOLTAGE	7VDC max	
CONTACT CURRENT	25mA max	
OPERATING TEMPERATURE	-0~60°C(20~90%RH)	WITHOUT CONDENSATION
STORAGE TEMPERATURE	-20~70°C(20~95%RH)	

14.1.2 OPERATING CONDITIONS

ITEM	SPECIFICATIONS
OPERATING VOLTAGE	5VDC
CONTACT CURRENT	10~25mA
ACTUATION FORCE	10~60g (TIP RADIUS 0.8, POLYACETAL PEN)

14.2 MECHANICAL STRENGTH

14.2.1 INPUT METHOD & ACTUATION FORCE

INPUT METHOD	ACTUATION FORCE	COMMENT
PEN	5~60 g	R0.8, POLYACETL PEN
FINGER	5~80 g	R0.8, SILICONE RUBBER

14.2.2 SURFACE HARDNESS

2H MIN. TEST METHOD : JIS-K5400.

14.3 OPTICAL CHARACTERISTICS

14.3.2 LIGHT TRANSMISSION : OVER 80%.

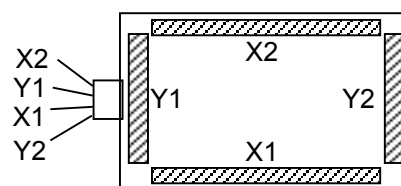
14.3.2 HAZE : 4~8%

14.3.3 NEWTON RING : NONE APPEARANCE.

14.4 ELECTRICAL CHARACTERISTICS

14.4.1 CIRCUIT RESISTANCE (CLOSED)

TERMINAL	CONDUCTIVE RESISTANCE
X1-X2	350~1100Ω
Y1-Y2	250~600Ω



14.4.2 CIRCUIT RESISTANCE (OPEN)

TERMINAL	INSULATION RESISTANCE
X-Y	20MΩ Min

OPERATING VOLTAGE : 25VDC

14.4.3 BOUNCE CHATTERING

10msec MAX.

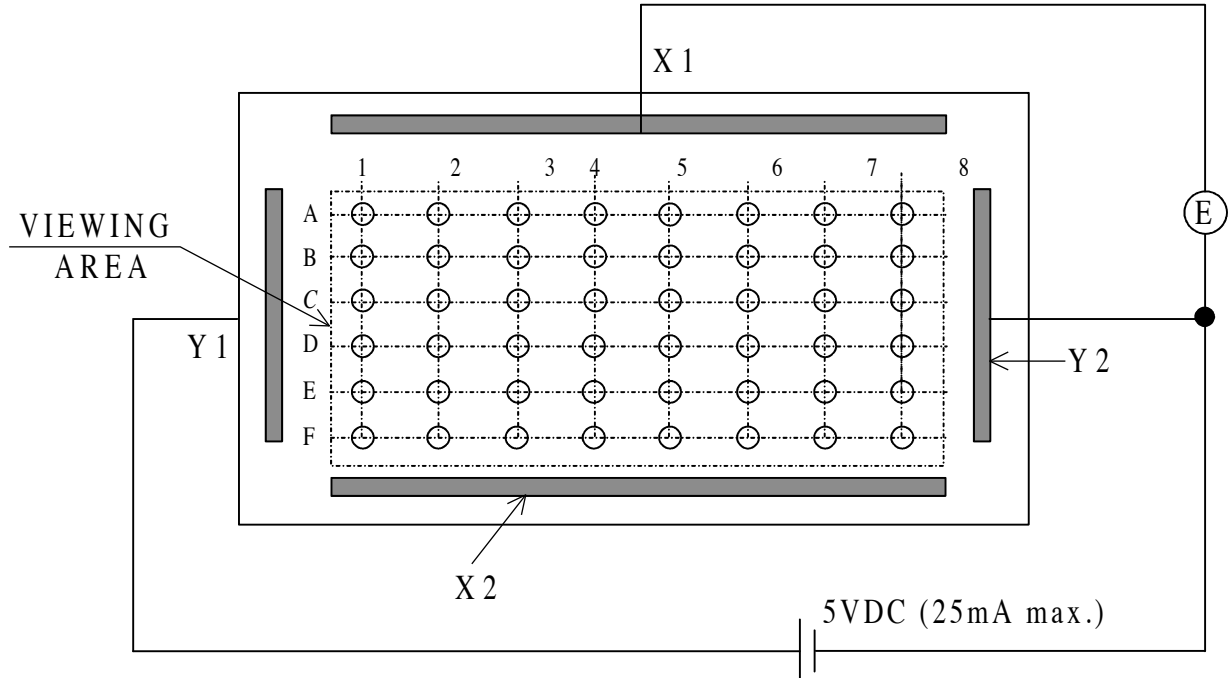
14.4.4 LINEARITY

(1) LINEARITY

LINEARITY : 1.5% max

(2) TESTING CIRCUIT

(a) Y AXIS LINEARITY TESTING METHOD (WITH TIP RADIUS 0.8, POLYACETAL PEN). VX1-X2=5V , VOUT=VY1.

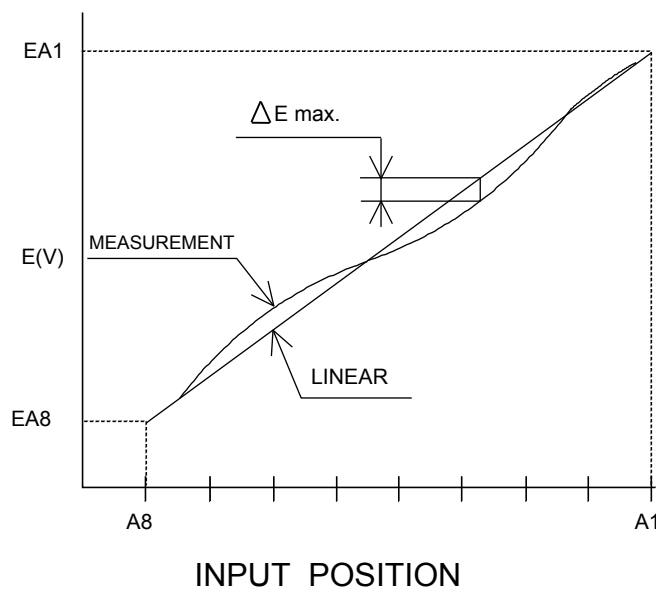


(b) X AXIS LINEARITY METHOD VY1-Y2=5V, VOUT=VX1

(3) CALCULATION

(a) X AXIS LINEARITY

$$\text{LINEARITY} = \frac{\Delta E \text{ max.}}{E A1 - E A8} * 100(\%)$$



14.5 ENVIRONMENTAL TESTING

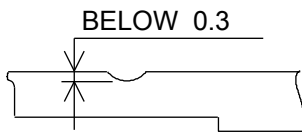
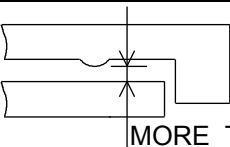

ITEM	CONDITIONS	CRITERIA
HIGH TEMPERATURE STORAGE	70°C : 240h & 25°C : 24h	AFTER TESTING MUST TO MEET THE SPECIFICATIONS OF THE ELECTRICAL, MECHANICAL & OPTICAL CHARACTERISTICS.
LOW TEMPERATURE STORAGE	-20°C : 240h & 25°C : 24h	
TEMPERATURE CYCLE	-30°C ↔ 80°C : 10 CYCLES (30) (60) (30) : MINUTES & 25°C : 24h (WITHOUT CONDENSATION)	
HUMIDITY STORAGE	60°C , 90%RH. 240h & 25°C, 24h	
DURABILITY FOR PEN HITTING	250g (SPEED : 3 TIMES / SEC) 0.8R, POLYACETAL PEN 1 MILLION ACTIVATIONS	
DURABILITY FOR PEN SELECTIONS	250g , 0.8R, POLYACETAL PEN 100 THOUSAND JAPANESE WORD IN A 20mm*20mm PLACE (SPEED : 3000 WORDS/HR)	

14.6 APPEARANCE SPECIFICATION

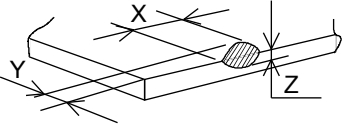
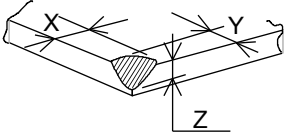
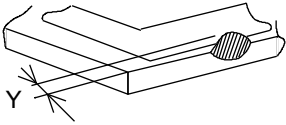
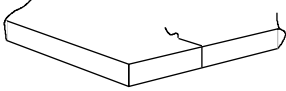
14.6.1 VIEWING AREA

PLEASE REFER PAGE 10-2/3 , 10.3 APPEARANCE SPECIFICATION

14.6.2 OUT OF VIEWING AREA

CONDUCTING PRINT PATTERN INDENTATION	
CONDUCTING PRINT PATTERN GAP	
WITHIN VIEWING AREA CONDUCTING PASTE ENTRANCE	

14.6.3 GLASS INDENTATION

ITEM	SPECIFICATIONS							
COMMON INDENTATION		<table border="1" data-bbox="1023 309 1315 409"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>≤ 5.0</td> <td>≤ 3.0</td> <td>$\leq t$</td> </tr> </table> <p data-bbox="967 427 1433 555">BUT, INDENTATION CAN NOT INCLUDING SEAL AREA. t : GLASS THICKNESS.</p>	X	Y	Z	≤ 5.0	≤ 3.0	$\leq t$
X	Y	Z						
≤ 5.0	≤ 3.0	$\leq t$						
CORNER BROKEN		<table border="1" data-bbox="1046 589 1339 689"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>≤ 3.0</td> <td>≤ 3.0</td> <td>$\leq t$</td> </tr> </table> <p data-bbox="967 707 1433 786">BUT, INDENTATION CAN NOT INCLUDING SEAL AREA.</p>	X	Y	Z	≤ 3.0	≤ 3.0	$\leq t$
X	Y	Z						
≤ 3.0	≤ 3.0	$\leq t$						
INDENTATION WITHIN PATTERN		<p data-bbox="895 837 1442 1010">Y≤ 1 IS IGNORE. BUT, MUST TO MEET THE SPECIFICATION OF CONDUCTING PATTERN INDENTATION.</p>						
PROCEEDING CRACK		<p data-bbox="1114 1133 1209 1167">NONE</p>						

14.6.4 OTHERS

- (1) THERE IS NOT ANY WRINKLE ON THE PET FILM.
- (2) THERE IS NOT ANY FISH-EYE AND NEWTON RING.