

HITACHI

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FOR MESSRS. _____

DATE. Mar.06,2009

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

SP14Q002-C2A

C O N T E N T S

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* When product will be discontinued , customer will be informed by HITACHI with twelve months prior announcement.

ACCEPTED BY; _____

PROPOSED BY; Dan Cheng

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RECORD OF REVISION

DATE	SHEET No.	SUMMARY																										
Apr.23.'01	7B64PS2703- SP14Q002-C2A-2 PAGE 3-1/1	CHANGED : TRANSPARENCY 78% min → 76% min																										
	7B64PS2705- SP14Q002-C2A-2 PAGE 6-2/2	CHANGED : BRIGHTNESS TYP. 140 cd/m ² → 110 cd/m ²																										
	7B63PS2709- SP14Q002-C2A-2 PAGE 9-1/2	CHANGED : DETAIL A FFC CONDUCTIVE AND STIFFENER LENGTH..																										
	7B64PS2709- SP14Q002-C2A-2 PAGE 9-2/2	ADDED : TOUCH PANEL INTERFACE PIN CONNECTION.																										
	7B64PS2714- SP14Q002-C2A-2 PAGE 14-1/3~3/3	ADDED : 14 DIGITIZER TECHNICAL SPECIFICATION.																										
Mar.10,'04	7B64PS 2708- SP14Q002-C2A-3 PAGE 8-3/3	8.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL Revised tDLD min. 200 → 50 Revised tCH max. 200 → 30																										
May.13,'08	7B64PS 2714- SP14Q002-C2A-4 PAGE 14-1/4	14.1.2 OPERATING CONDITIONS Changed : <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 50%;">ITEM</th> <th style="width: 50%;">SPECIFICATIONS</th> </tr> </thead> <tbody> <tr> <td>Actuation Force</td> <td>TBD</td> </tr> </tbody> </table> <p style="text-align: center;">↓</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 50%;">ITEM</th> <th style="width: 50%;">SPECIFICATIONS</th> </tr> </thead> <tbody> <tr> <td>Actuation Force</td> <td>1.2N max.</td> </tr> </tbody> </table> 14.2.1 INPUT METHOD & ACTUATION FORCE Changed : <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 33%;">INPUT METHOD</th> <th style="width: 33%;">ACTUATION FORCE</th> <th style="width: 33%;">COMMENT</th> </tr> </thead> <tbody> <tr> <td>Pen</td> <td>80g max.</td> <td>R0.8, Polyacetal Pen</td> </tr> <tr> <td>Finger</td> <td>100max.</td> <td>R8, Silicone Rubber</td> </tr> </tbody> </table> <p style="text-align: center;">↓</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">INPUT METHOD</th> <th style="width: 33%;">ACTUATION FORCE</th> <th style="width: 33%;">COMMENT</th> </tr> </thead> <tbody> <tr> <td>Pen</td> <td>1.2N max.</td> <td>R0.8, Polyacetal Pen</td> </tr> <tr> <td>Finger</td> <td>1.2N max.</td> <td>R8, Silicone Rubber</td> </tr> </tbody> </table>	ITEM	SPECIFICATIONS	Actuation Force	TBD	ITEM	SPECIFICATIONS	Actuation Force	1.2N max.	INPUT METHOD	ACTUATION FORCE	COMMENT	Pen	80g max.	R0.8, Polyacetal Pen	Finger	100max.	R8, Silicone Rubber	INPUT METHOD	ACTUATION FORCE	COMMENT	Pen	1.2N max.	R0.8, Polyacetal Pen	Finger	1.2N max.	R8, Silicone Rubber
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Mar.06,'09	7B64PS 2712 SP14Q002-C2A-5 PAGE 12-1/1	12. DESIGNATION OF LOT MARK Revised reversion from REV. – to REV.B																										

3. GENERAL SPECIFICATIONS

(1) Part Name	SP14Q002-C2A
(2) Outer Dimensions	167.0(W)mm x 109.0(H)mm x 11.4(D) mm (max.)
(3) Effective Display Area	120 mm min. x 89 mm min.
(4) Dot Size	0.345(W)min. x 0.345(H)min.
(5) Dot Pitch	0.360(W)mm x 0.360(H)mm
(6) Dot Number (Resolution)	320 (W) x 240 (H)
(7) Duty Ratio	1/240
(8) LCD Type	Transmissive type F-STN with glare type upper polarizer
(9) Viewing Direction	6 O'clock
(10) Backlight Type	Cold cathode fluorescent lamp.
(11) Touch Panel	Analog resistance 4 wires Transparency : 76% min. Surface type : Anti 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	7.0	V	
Power Supply for LC Drive	VDD-VEE	0	30	V	
Input Voltage	Vi	-0.3	VDD+0.3	V	(Note 1)
Input Current	li	0	1	A	
Static Electricity	VESD0	-	±100	V	(Note 2,3,4)
	VESD1	-	±10	V	(Note 2,3,5)

Note 1 : $\overline{\text{DOFF}}$, FLM , LOAD , CP , D0~D3.

Note 2 : Make certain you are grounded when handling LCM.

Note 3 : Energy storage capacitance 200pf , discharge resistance 250Ω Ta=25°C , 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		OMMNT
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	0°C	60°C	-20°C	70°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) 1h max.
Shock	-	29.4m/s ² (3 G)	-	490.0m/s ² (50 G) (Note 5)	XYZ Directions
Corrosive Gas	Not Acceptable		Not Acceptable		

Note 1 : Ta ≤ 40°C : 85%RH max.

Ta > 40°C : Absolute humidity must be lower.

Than the humidity of 85%RH at 40°C

Note 2 : Ta at -20°C —— < 48h, at 60°C < 168h.

Note 3 : Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note 4 : 5Hz~100Hz (Except resonance frequency)

Note 5 : This module should be operated normally after finish the test.

Note 6 : When lcm will be operated at 0°C, the life time of CFL will be reduced.

Need to make sure of value of the characteristics of inverter.

Also the response time at 0°C will be slower.

Note 7 : There are possibility that color un-uniformity happened while operating at over 40°C.

5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Voltage for Logic	VDD-VSS	-	5.0-5%	5.0	5.0+5%	V
			3.3-5%	3.3	3.3+5%	
Power Supply Voltage for LC Driving	VEE-VSS	-	-23.1	-22.0	-20.9	V
Input Voltage (Note 1)	VI	H LEVEL	0.8VDD	-	VDD	V
		L LEVEL	0	-	0.2VDD	V
Power Supply Current for Logic (Note 4)	IDD	VDD-VSS=5.0V VEE-VSS= -22.0V	-	6.0	-	mA
Power Supply Voltage for LC Driving (Note 4)	IEE	VDD-VSS=5.0V VEE-VSS= -22.0V	-	5.0	-	mA
Recommended LC Driving Voltage (Note 3)	VDD-V0	Ta= 0°C , ϕ = 0°	-	22.0	-	V
		Ta=25°C , ϕ = 0°	-	21.0	-	V
		Ta=50°C , ϕ = 0°	-	19.0	-	V
Frame Frequency	fFLM	-	70	75	80	Hz

Note 1 : $\overline{\text{DOFF}}$, FLM , LOAD , CP , D0~D3.

Note 2 : Recommended LC driving voltage may fluctuate about $\pm 1.0\text{V}$ by each module.

Note 3 : Need to make sure of flickering and rippling of display when setting the frame frequency in you set. Test pattern is all "Q"

Note 4 : fFLM=75Hz , test pattern is all "Q".
VDD-V0=21.0V , Ta=25°C

5.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Lamp Voltage	VL	-	(300)	-	Vrms	Ta=25°C
Frequency	fL	-	70	85	kHz	Ta=25°C
Lamp Current	IL	4	5	6	mArms	Ta=25°C
Starting Discharge Voltage	VS (Note 2)	(1000)	-	-	Vrms	Ta=25°C

Please certainly inform HITACHI before designing lamp drive circuit according to the above specifications.

Note 1 : Please make sure that your inverter is designed to meet the above specifications.

Note 2 : Starting discharge voltage is increased when lcm is operating at lower temperature please check the characteristics of your inverter before applying to your set.

Note 3 : Average life time of CFL will be 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.

Note 5 : When ICFL is used over 5.5ma , it may cause uneven contrast near CFL location , due to heat dispersion from CFL.

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6. OPTICAL CHARACTERISTICS

6.1 OPTICAL CHARACTERISTICS

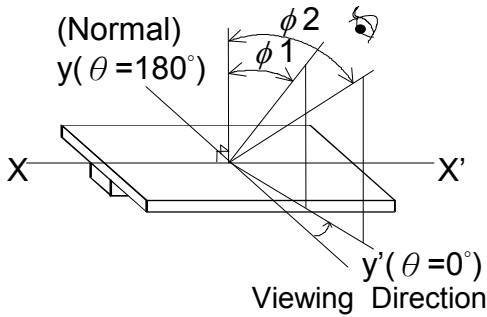
Ta=25°C (Backlight On)

ITEM	SYMBOL	CONDITIONAL	MIN.	TYP.	MAX.	UNIT	NOTE
Viewing Area	$\phi 2-\phi 1$	$K \geq 2.0$	-	40	-	deg	1,2
Contrast Ratio	K	$\phi = 0^\circ, \theta = 0^\circ$	-	25	-	-	3
Response Time (Rise)	tr	$\phi = 0^\circ, \theta = 0^\circ$	-	120	-	ms	4
Response Time (Fall)	tf	$\phi = 0^\circ, \theta = 0^\circ$	-	150	-	ms	4

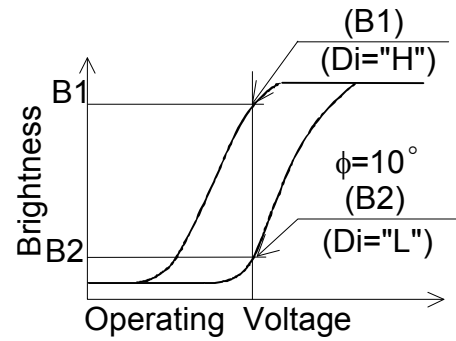
(Measure condition by HITACHI)

Note 1 : Definition of θ and ϕ

Note 3 : Definition of contrast "K"

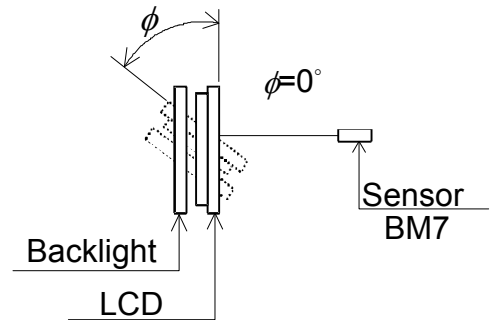
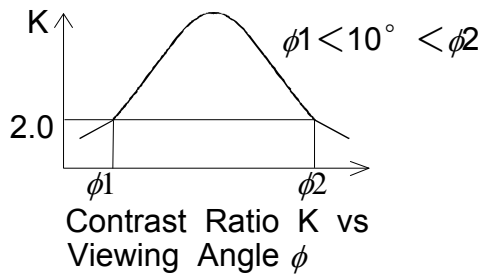


$$K = \frac{\text{Brightness on Selected Dot (B1)}}{\text{Brightness on Non-Selected Dot (B2)}}$$

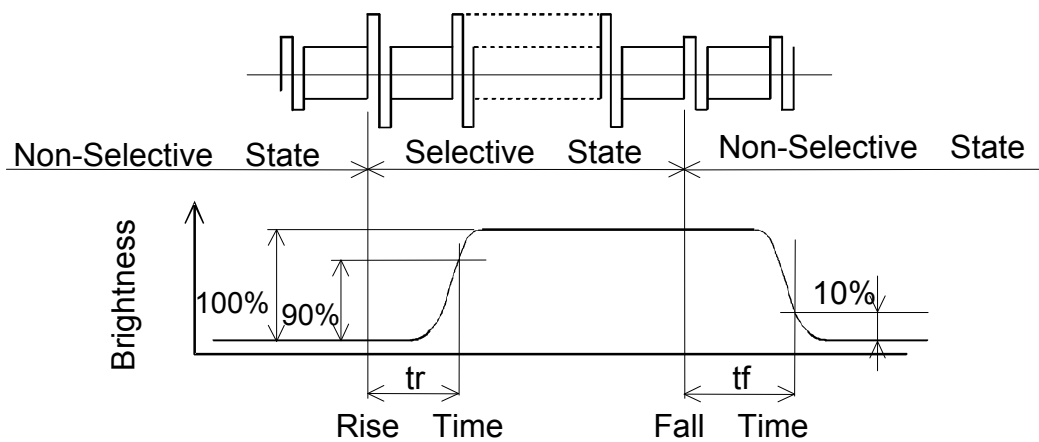


Note 2 : Definition of viewing angle

$\phi 1$ and $\phi 2$.



Note 4 : Definition of optical response



6.2 OPTICAL CHARACTERISTICS OF BACKLIGHT

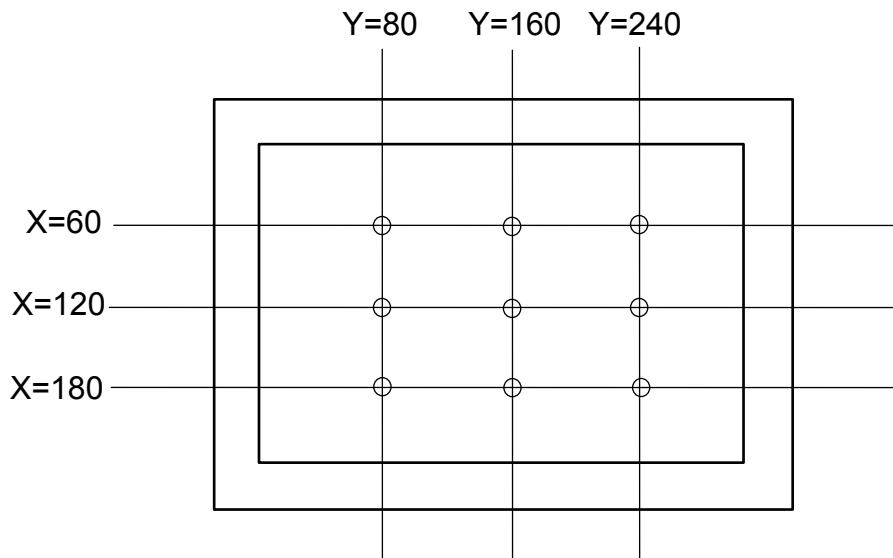
I T E M	MIN.	TYP.	MAX.	UNIT	NOTE
Brightness	-	110	-	cd/m ²	IL=5mA (Note 1,2)
Rise Time	-	5	-	MINUTE	IL=5mA Brightness 80%
Brightness Uniformity	-	-	±30	%	Undermentioned (Note 1,3)

CFL : Initial, Ta=25°C, VDD-V0=21.0V
Display data should be all "ON".

Note 1 : Measurement after 10 minutes of CFL operating.

Note 2 : Brightness control : 100%

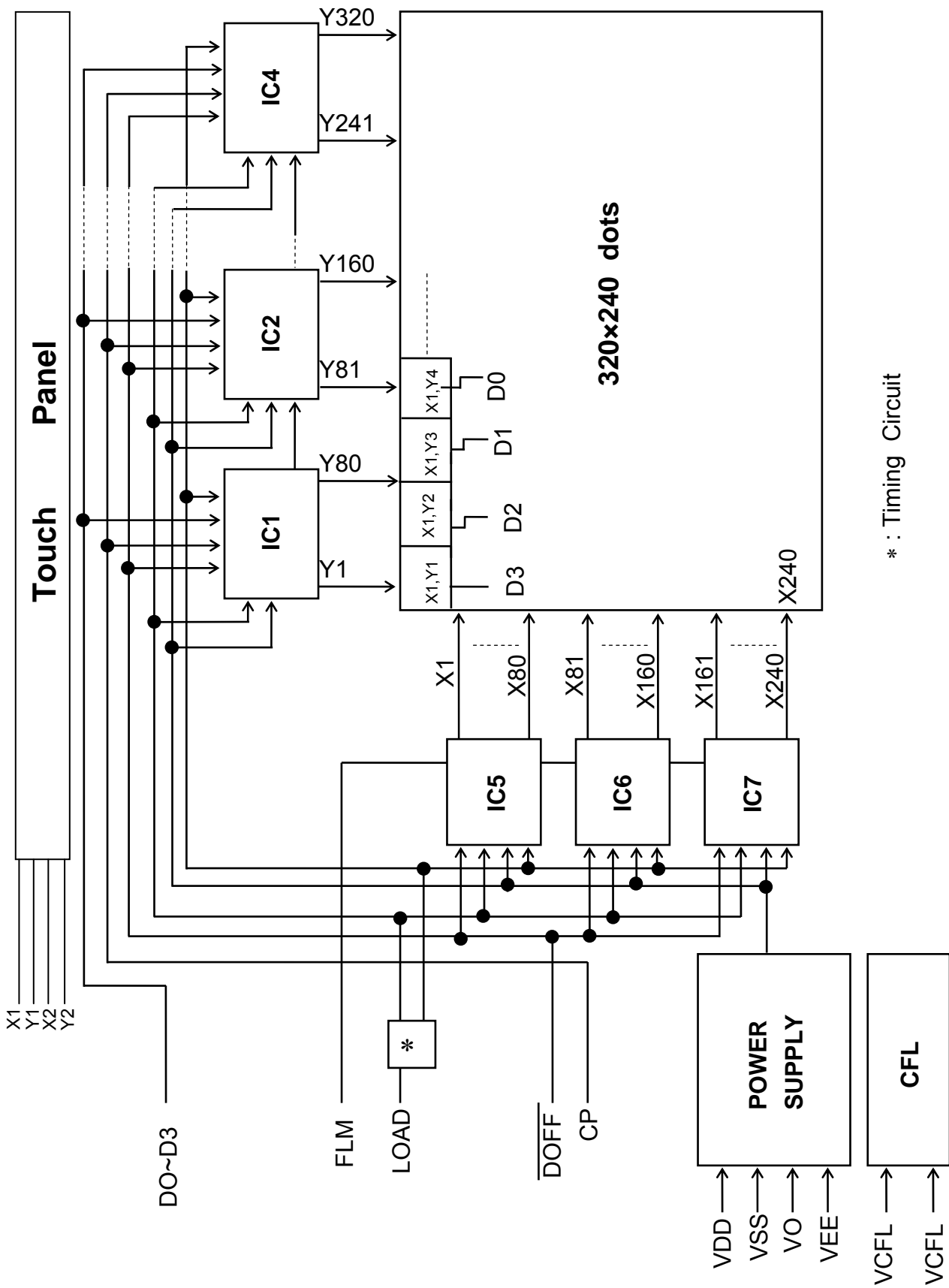
Note 3 : Measure of the following 9 places on the display.



Definition of the brightness tolerance.

$$\left(\frac{\text{Max. or Min. Brightness} - \text{Average Brightness}}{\text{Average Brightness}} \right) \times 100$$

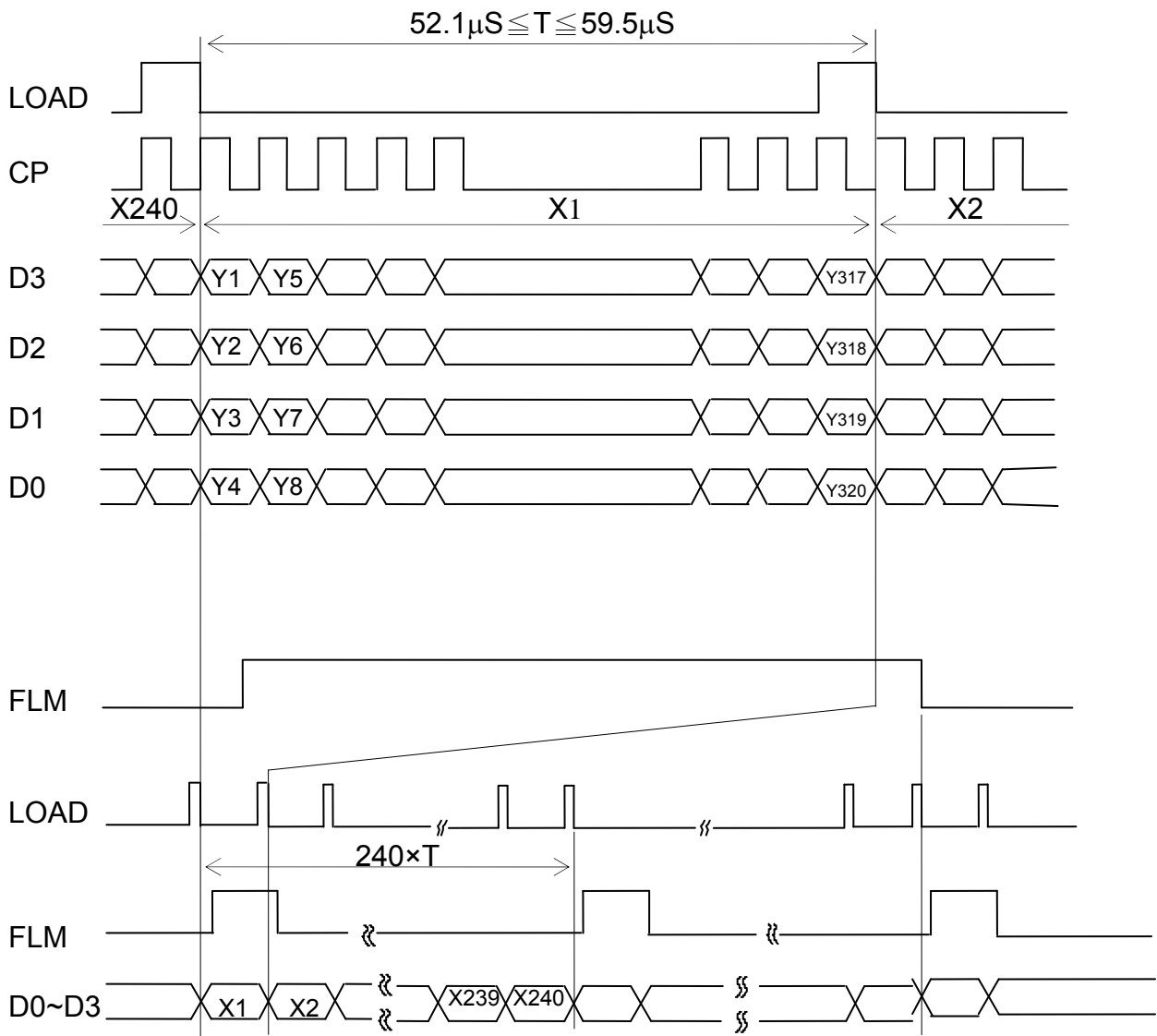
7. BLOCK DIAGRAM



* : Timing Circuit

8. INTERFACE TIMING CHART

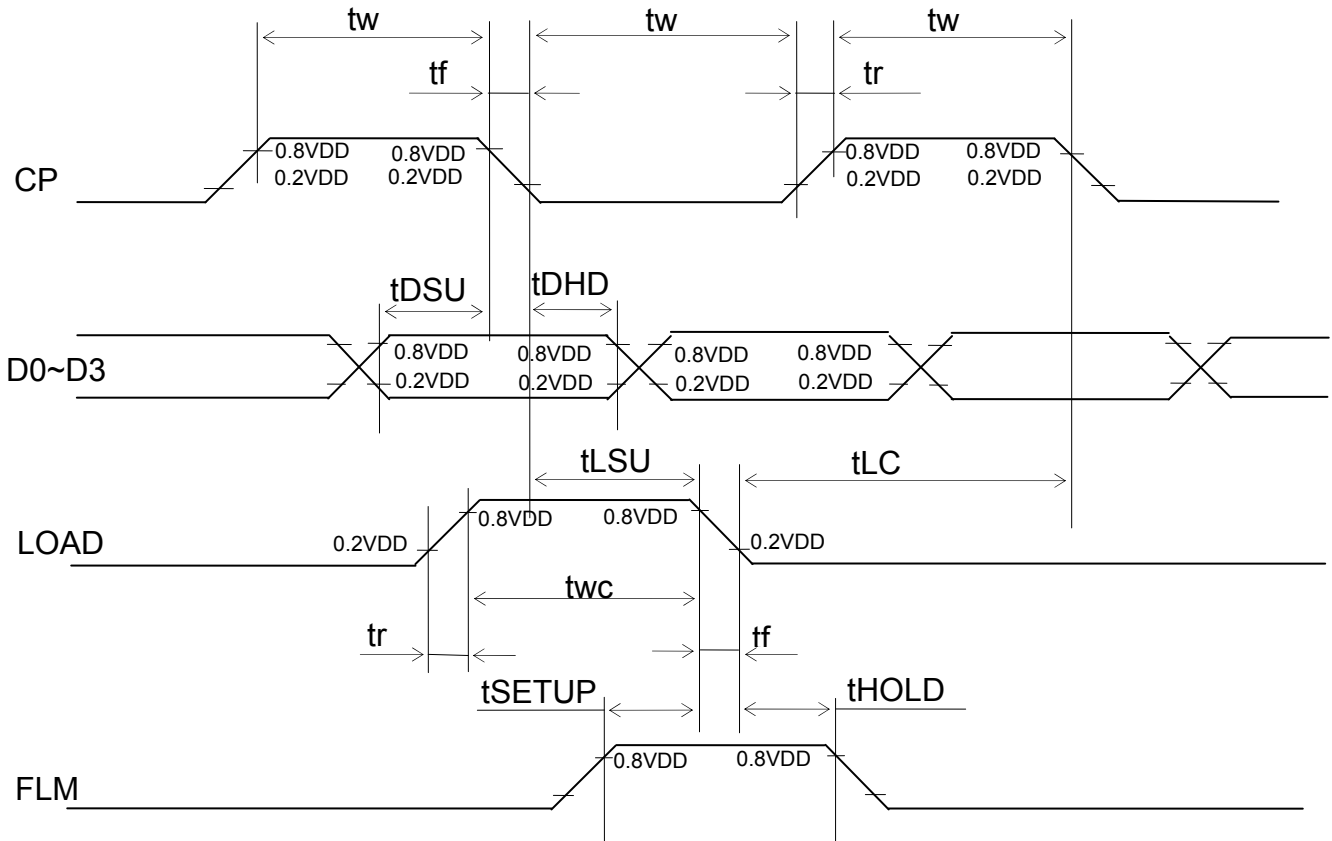
8.1 INTERFACE TIMING CHART



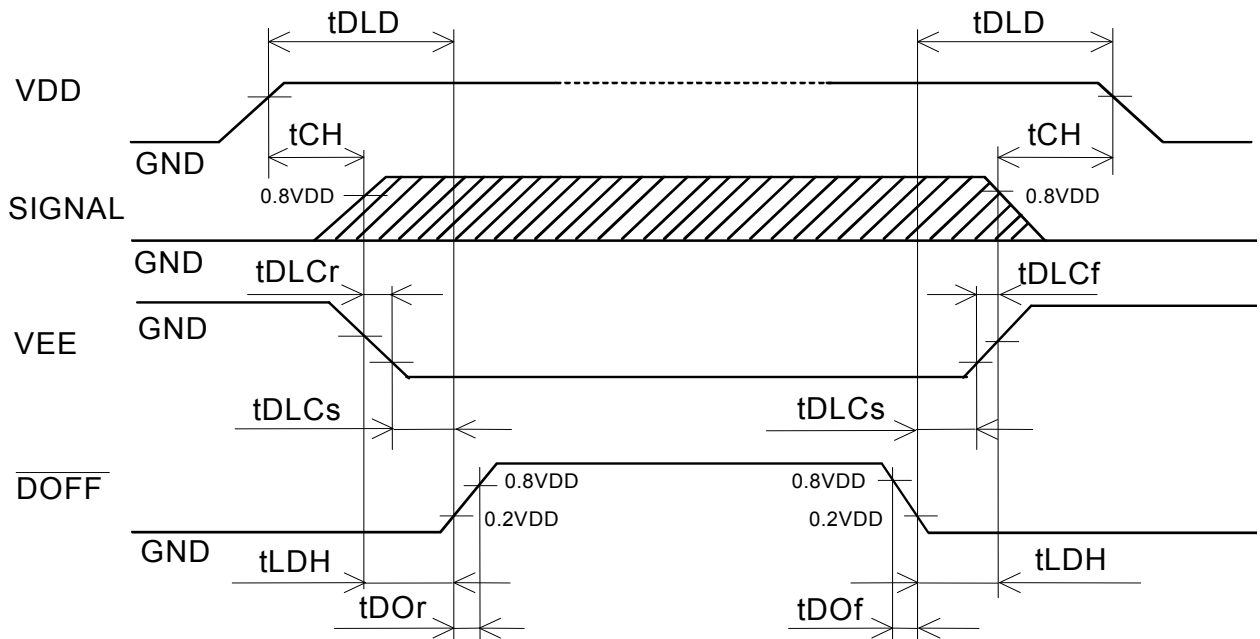
8.2 TIMING CHARACTERISTICS

$0^{\circ}\text{C} \leq T_a = 50^{\circ}\text{C}, V_{DD} = 5.0\text{V} \pm 5\%$

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Clock Frequency	fCP	-	-	6.5	MHz
Clock Pulse Width	tW	45	-	-	ns
Clock Rise, Fall Time	tr,tf	-	-	15	ns
Data Set Up Time	tDSU	30	-	-	ns
Data Hold Time	tDHD	30	-	-	ns
Load Set Up Time	tLSU	80	-	-	ns
Load Clock Time	tLC	120	-	-	ns
"Frame" Set Up Time	tSETUP	100	-	-	ns
"Frame" Hold Time	tHOLD	100	-	-	ns
"Load" Pulse Width	tWC	125	-	-	ns



8.3 POWER ON/OFF TIMING SEQUENCE



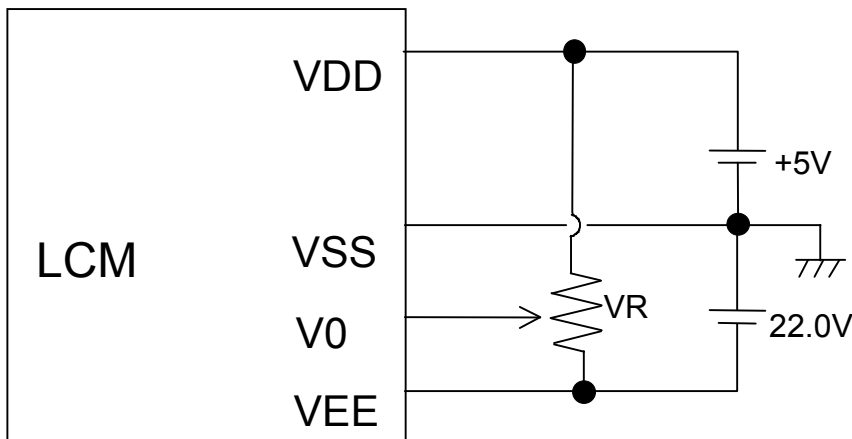
SYMBOL	MIN.	MAX.	UNIT	COMMENT
tDLD	50	-	ms	(Note 1)
tCH	0	30	ms	
tLDH	0	-	ms	
tDOr	-	100	ns	(Note 2)
tDOF	-	100	ns	
tDLCr	0	-	ms	
tDLCf	0	-	ms	
tDLCs	20	-	ms	

Note 1 : Please keep the specified sequence because wrong sequence may cause permanent damage to the LCD panel.

Note 2 : HITACHI recommends you to use $\overline{\text{DOFF}}$ function.

Display quality may deteriorate if you don't use $\overline{\text{DOFF}}$ function.

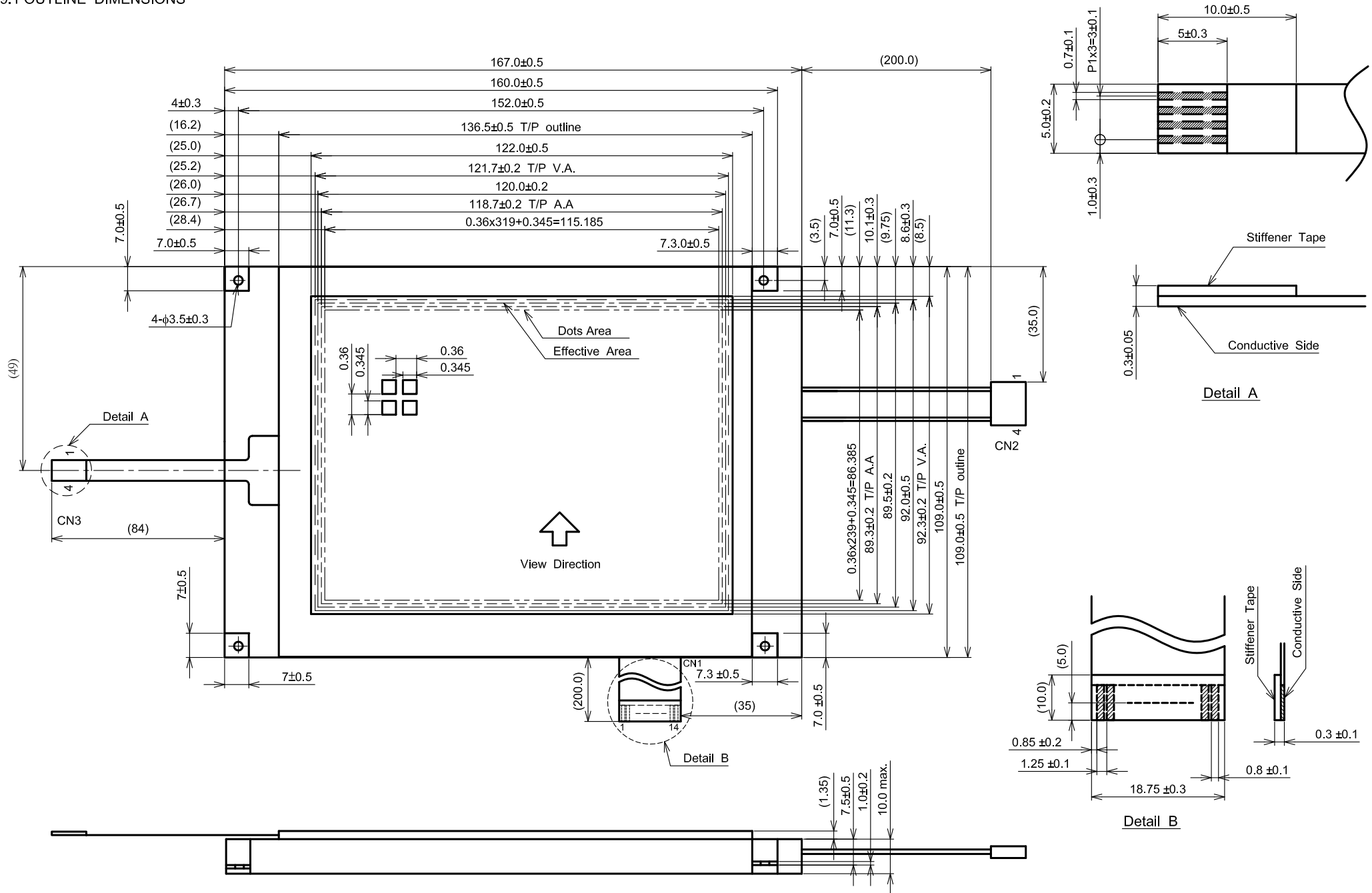
8.4 POWER SUPPLY FOR LCM



Note 1 : VR : 10kOHM

Note 2 : We recommend to ADD fuse (1A) to VDD line.

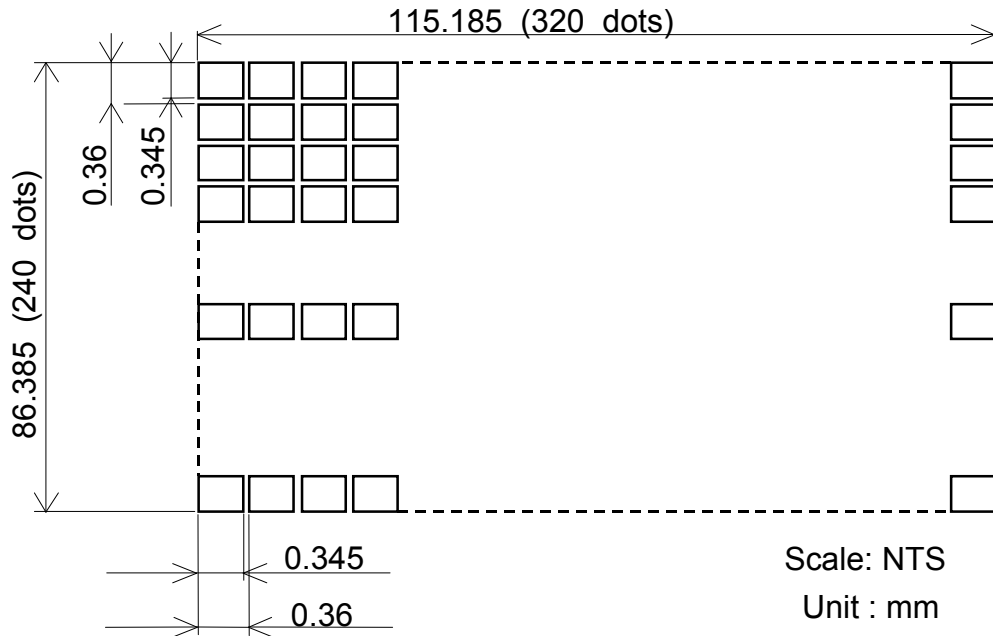
9. OUTLINE DIMENSIONS
9.1 OUTLINE DIMENSIONS



Note 1 : Measurement when adding 9.8×10^4 Pa at the measuring point.

Scale : NTS
Unit : mm

9.2 DISPLAY PATTERN



9.3 INTERFACE PIN CONNECTION

FFC : PITCH 1.25mm 14 PINS

INTERFACE	PIN No.	SIGNAL	LEVEL	FUNCTION	
LCM	CN1	1	D0	H/L	Display data
		2	D1		
		3	D2		
		4	D3		
		5	$\overline{\text{DOFF}}$	H/L	H : ON / L : OFF
		6	FLM	H	First line marker
		7	N.C	-	-
		8	LOAD	H→L	Data latch
		9	CP	H→L	Data shift
		10	VDD	-	Power supply for logic
		11	VSS	-	GND
		12	VEE	-	Power supply for LC
		13	V0	-	Operating voltage LC driving
		14	VSS	-	GND

RECOMMEND SUITABLE CONNECTOR : (MOLEX) 5597-14APB

INTERFACE	PIN No.	SIGNAL	LEVEL	FUNCTION	
CFL	CN2	1	VCFL	-	Power supply for CFL
		2	N.C	-	-
		3	N.C	-	-
		4	VCFL	-	CFL GND

CFL I/F : J.A.E./ IL - G - 4S - S3C2

FPC : PITCH 1.0mm 4PINS

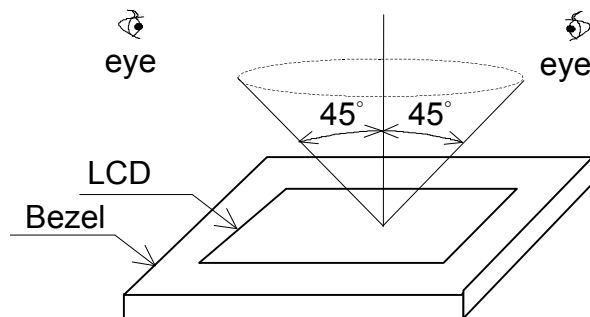
INTERFACE	PIN No.	SIGNAL	FUNCTION	
T/P	CN3	1	X1	Analog signal from digitizer right
		2	Y1	Analog signal from digitizer up
		3	X2	Analog signal from digitizer left
		4	Y2	Analog signal from digitizer bottom

Recommend suitable connector : (HIROSE) FH12-10(4)SA-ISH

10. APPEARANCE STANDARD

10.1 APPEARANCE INSPECTION CONDITIONS (IN THE EFFECTIVE VIEWING AREA) VISUAL INSPECTION SHOULD BE UNDER THE FOLLOWING CONDITION.

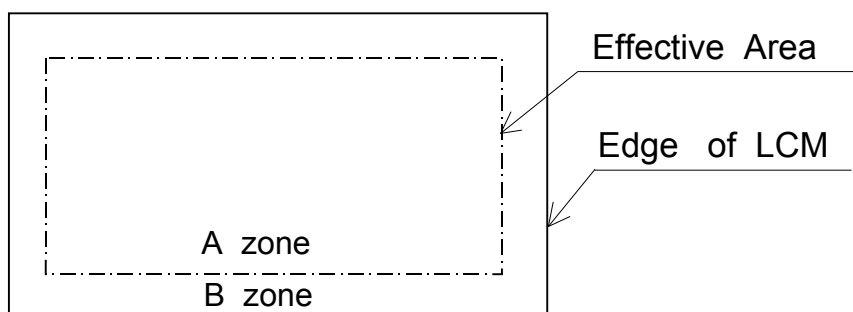
- (1) In the dark room.
- (2) With CFL panel lighted with prescribed inverter circuit.
- (3) With eye to LCD distance is 25cm.
- (4) Viewing angle within 45 degrees from the perpendicular to the center LCD.



10.2 DEFINITION OF EACH ZONE

A zone : Within the viewing area specified at page 9-1/2 of this document.

B zone : Area between the edge line of LCD glass and the viewing area line specified at page 9-1/2 of this document.



10.3 APPEARENCE SPECIFICATION

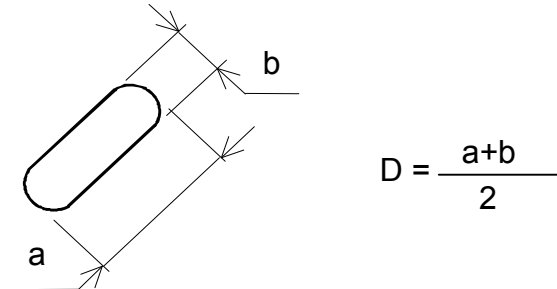
*) If a problem occurs in respect to any of these items , responsables of both parties (customer and HITACHI) will discuss in more detail.

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	-
		$D \leq 0.2$		Ignore			
		$0.2 < D \leq 0.3$		12			
		$0.3 < D \leq 0.5$		3			
		$0.5 < D$		None			
	Stains, Foreign Materials, Dark Spot	Filamentous			O	-	
		Length L(mm)	Width W(mm)	Maximum Number Acceptable			
		$L \leq 2.0$	$W \leq 0.03$	Ignore			
		$L \leq 3.0$	$0.03 < W \leq 0.05$	6			
		-	$0.05 < W$	Judged by "round" shape			
		ROUND			O	-	
		Average Diameter D(mm)	Maximum Number Acceptable	Minimum Size			
		$D < 0.2$	Ignore	-			
		$0.2 \leq D < 0.33$	8	10mm			
		$0.33 \leq D$	None	-			
	Total	Filamentous + Round = 10					
	Those wiped out easily are acceptable				O	O	
	Color Tone	To be judged by HITACHI limit sample			O	-	
	Color Uniformity	Same as Above			O	-	
	Pinhole Color Uniformity	Average Diameter D(mm)		Maximum Number Acceptable		O	-
		$D \leq 0.15$		Ignore			
		$0.15 < D \leq 0.3$		10			
		$D \leq 0.015$		Ignore			
	Contrast Irregularity (Spot)	Average Diameter D(mm)	Contrast	Maximum Number Acceptable	Minimum Size	O	-
		$D \leq 0.25$	To be judged by HITACHI	Ignore	-		
$0.25 < D \leq 0.35$		10		20mm			
$0.35 < D \leq 0.5$		4		20mm			
$0.5 < D$		None		-			

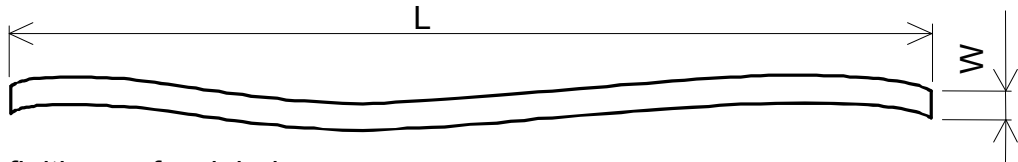
No.	ITEM	CRITERIA				A	B
L C D	Contrast Irregularity (Line) (Filamentous)	Width D(mm)	Length L(mm)	Maximum Number Acceptable	Minimum Size	0	-
		$W \leq 0.25$	$L \leq 1.2$	2	20mm		
		$W \leq 0.2$	$L \leq 1.5$	3	20mm		
		$W \leq 0.15$	$L \leq 2.0$	3	20mm		
		$W \leq 0.1$	$L \leq 3.0$	4	20mm		
	Total	6					
	Rubbing Scratch	To be judged by HITACHI standard				0	-

No.	ITEM	CRITERIA		
C F	Dark Spots, White Spots Foreign Materials (Spot)	$D \leq 0.4$		Ignore
		$D > 0.4$		None
L	Foreign Materials (Line)	$W \leq 0.2$	$L < 2.5$	≤ 1
		$W \leq 0.2$	$L > 2.5$	None
B / L	Scratches	$W > 0.2$		None
		$W \leq 0.1$		Ignore
		$0.1 < W \leq 0.2$	$L \leq 11.0$	≤ 1
		$0.1 < W \leq 0.2$	$L \geq 11.0$	None
		$W < 0.2$		None

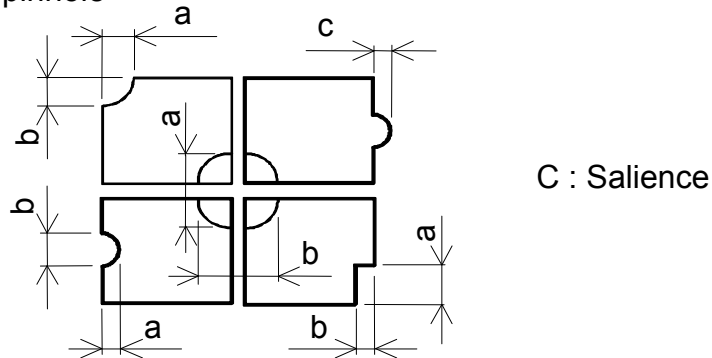
Note 1 : Definition of average diameter D



Note 2 : Definition of length L and width W



Note 3 : Definition of pinhole



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 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 ($5V \pm 0.5\%$).

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 product is preferable in the place of high humidity for a long period of time. For their storage in the place where temperature is 35 degree 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 polarizers are made of organic substances which will be deteriorated by a chemical reaction with such chemicals as acetone, toluene, ethanol and isopropyl alcohol. 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 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 adherence may cause deformation or faded color on the spot.
- (6) Foggy dew deposited on the surface and contact terminals due to coldness will be caused 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.)

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(8) In general the quality of glass is fragile so that it tends to be cracked or chipped in handling, specially on its periphery. Be careful not to give it sharp shock caused by dropping down, etc.

11.5 CAUTION FOR OPERATION

- (1) It is an indispensable condition to drive LCDs 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 LCDs 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 LCDs show dark bull color in them. However those phenomena do not mean malfunction or out of order with LCDs 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 degree C 50%RH or less is required.

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 polyethylene 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) Storage 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

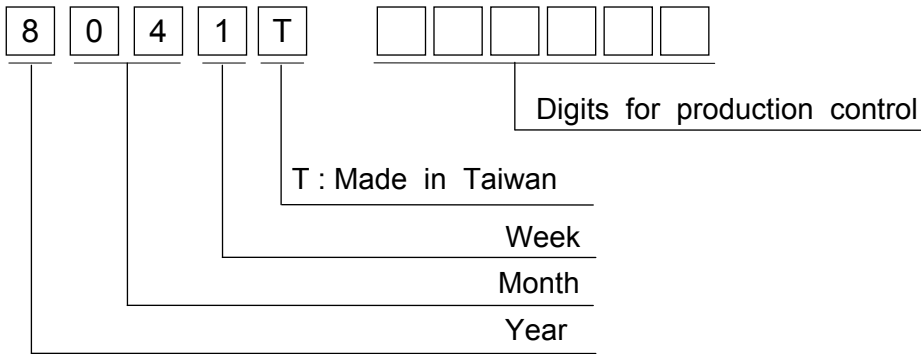
- (1) It is recommendable to crush damaged or unnecessary LCDs into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol , which should be burned up later.
- (2) When any liquid leaked out of a damaged glass cell comes in contact with your hands , please wash it off well with soap and water.

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12. DESIGNATION OF LOT MARK

12.1 LOT MARK

Lot mark is consisted of 5 digits for production lot and 6 digits for production control.



Year	Figure in lot mark
2009	9
2010	0
2011	1
2012	2
2013	3

Month	Figure in lot mark	Month	Figure in lot mark
Jan.	01	Jul.	07
Feb.	02	Aug.	08
Mar.	03	Sep.	09
Apr.	04	Oct.	10
May	05	Nov.	11
Jun.	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

12.2 SERIAL No.

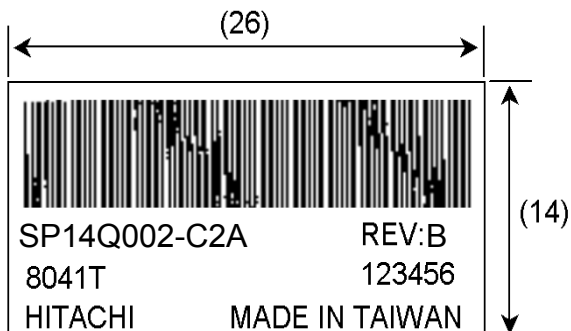
Serial No. is consisted of 6 digits number (000001~999999).

12.3 LOCATION OF LOT MARK

Label is bring attached on the back side of module.

12.4 REVISION(Rev.) CONTROL

Rev No.	ITEM
—	Mcount IC:MN73099HED(Panasonic) Transistor:2SA1036K(ROHM)
B	Mcount IC:IT7001M(ITE) Transistor:2SA1576(ROHM)



13. PRECAUTION FOR USE

13.1 A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

13.2 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 request , please contact HITACHI.

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14. DIGITIZER TECHNICAL SPECIFICATION

14.1 RATINGS

14.1.1 ABSOLUTE MAXIMUM RATINGS

ITEM	SPECIFICATION	COMMENT
Operating Voltage	7V	Without Condensation
Contact Current	20mA	
Operating Temperature **	0~50°C 80%RH max.	
Storage Temperature **	-20~70°C 90%RH max.	

14.1.2 OPERATING CONDITIONS

ITEM	SPECIFICATION
Operating Voltage	5VDC
Contact Current	10 ~ 20 mA
Actuation Force	1.2N max.

14.2 MECHANICAL STRENGTH

14.2.1 INPUT METHOD & ACTUATION FORCE

INPUT METHOD	ACTUATION FORCE	COMMENT
Pen	1.2N max.	R0.8, Polyacetal Pen
Finger	1.2N max.	R8, Silicone Rubber

14.2.2 SURFACE HARDNESS

2H

14.3 OPTICAL CHARACTERISTICS

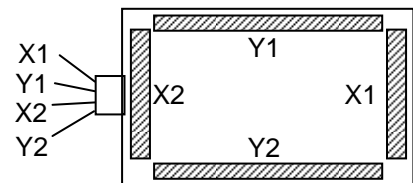
14.3.1 TRANSPARENCY : 76%.min.

14.3.2 WAVE LENGTH : 450 ~ 700nm

14.4 ELECTRICAL CHARACTERISTICS

14.4.1 CONDUCTIVE RESISTANCE

TERMINAL	CONDUCTIVE RESISTANCE
X1-X2	150~1300Ω
Y1-Y2	150~1300Ω



14.4.2 INSULATION RESISTANCE

TERMINAL	INSULATION RESISTANCE	TESTING VOLTAGE
X-Y	20MΩ	25VDC

14.4.3 BOUNCE CHATTERING

10msec max.

14.4.4 CAPACITANCE

TBD

14.4.5 RESISTANCE FACTOR

TERMINAL	
X1-X2	10% max.
Y1-Y2	10% max.

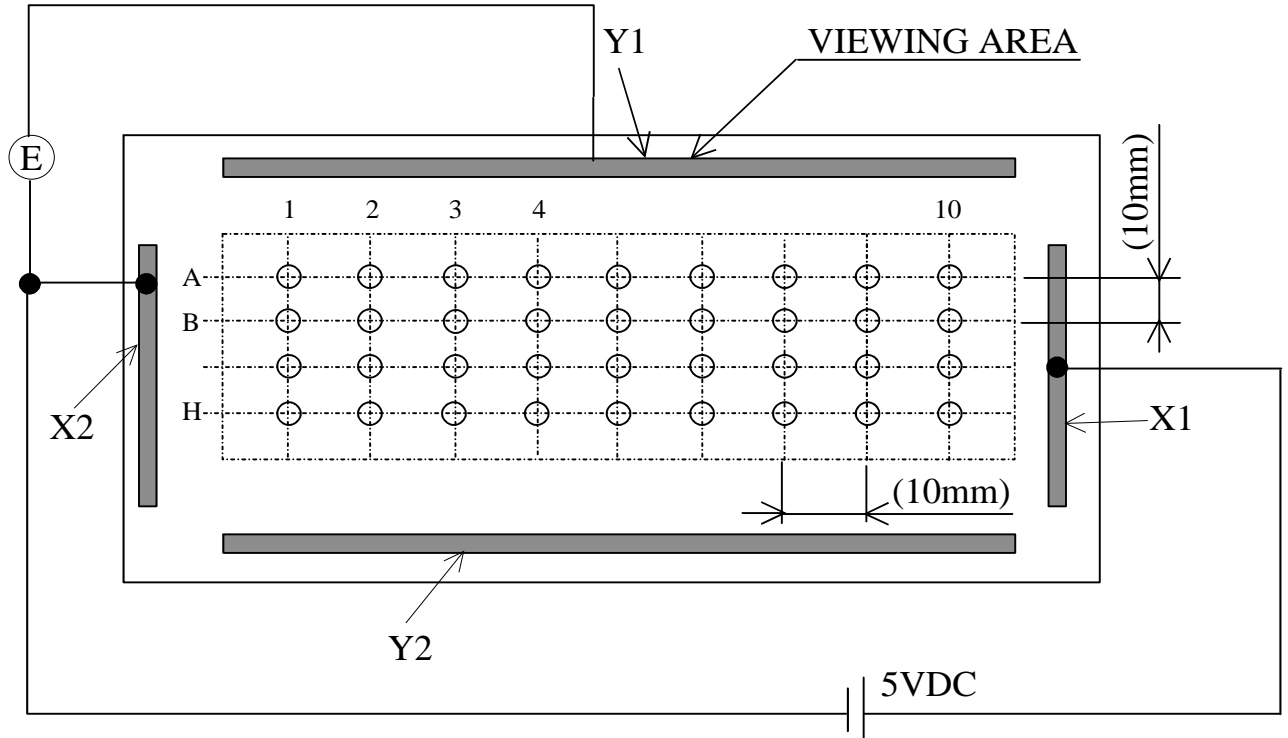
14.4.6 LINEARITY

(1) LINEARITY

Linearity deviation : 2% max.

(2) TESTING CIRCUIT

(a) Y axis linearity testing method , 100g , VX1-VX2=5V , VOUT=VY1.

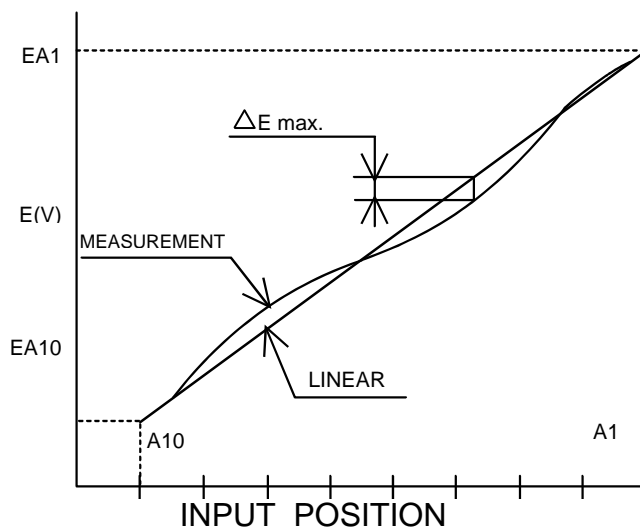


(b) X axis linearity method , VY1 -VY2=5V , VOUT=VX1

(3) CALCULATION

(a) Y axis linearity

$$\text{LINEARITY} = \frac{\Delta E \text{ max.}}{E A1 - E A10} \times 100(\%)$$



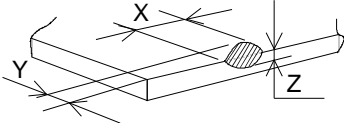
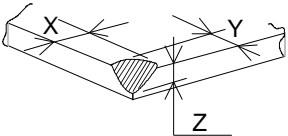
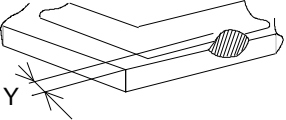
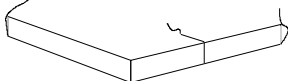
14.5 ENVIRONMENTAL TESTING

ITEM	CONDITIONS	CRITERIA
High Temperature Storage	60°C : 120h & 25°C : 24h	After testing must to Meet the specifications of the electrical, mechanical & optical characteristics.
Low Temperature Storage	-20°C : 120h & 25°C : 24h	
Temperature Cycle	-20°C \leftrightarrow 70°C : 10 Cycles Within (30) (60) (30) : MINUTES & 25°C : 24h (Without condensation)	
Humidity Storage	60°C , 90%RH. 120h	
Durability for Keystroke	150g , R8, HS40 SILICON RUBBER (Speed : 330mm/sec) : 1000000 ACTIVATIONS	

14.6 APPEARANCE SPECIFICATION

No.	ITEM	CRITERIA			A	B
T / P	Hair Flaws	Filamentous			O	-
		Length L(mm)	Width W(mm)	Maximum Number Acceptable		
		$L \leq 12$	$W \leq 0.05$	Ignore		
		$L \leq 5$	$0.05 < W \leq 0.1$	3		
		$L > 2$	$0.1 < W$	None		
	Dot-Shaped Impurities	Average Diameter D(mm)		Maximum Number Acceptable	O	-
		$D \leq 0.1$		Ignore		
		$0.1 < D \leq 0.3$		5		
		$0.3 < D$		None		
	Scratch	Filamentous			O	-
		Length L(mm)	Width W(mm)	Maximum Number Acceptable		
		$L \leq 12$	$W \leq 0.05$	Ignore		
		$L \leq 12$	$0.05 < W \leq 0.1$	5		
$L > 12$		$0.1 < W$	None			

14.6.1 GLASS INDENTATION

ITEM	SPECIFICATIONS						
Common Indentation	 <table border="1" data-bbox="1062 250 1355 349"> <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="927 394 1305 521">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="1088 573 1378 672"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>≤ 2.0</td> <td>≤ 5.0</td> <td>$\leq t$</td> </tr> </table> <p data-bbox="927 689 1305 770">But, indentation can not including seal area.</p>	X	Y	Z	≤ 2.0	≤ 5.0	$\leq t$
X	Y	Z					
≤ 2.0	≤ 5.0	$\leq t$					
Indentation within Pattern	 <p data-bbox="879 853 1410 987">$Y \leq 1$ is ignore. But, must to meet the specification of conducting pattern indentation.</p>						
Proceeding Crack	 <p data-bbox="1139 1128 1219 1160">None</p>						

14.6.2 BLISTERING (PUFFNES): 0.4mm max.

