FOR MESSRS : DATE : May.07,2004

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

SP06Q002-T

CONTENTS

* When product will be discontinued, customer will be informed by HITACHI with twelve months prior announcement.
* This product is inhibited to apply in any life support instrument.

ACCEPTED BY;

PROPOSED BY; Jimmy. Ho

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revised :

Power Supply Current for LED :

CONDITION : T.B.D → VLED=5.0V

(8) LCD Type	Transflective type B/W F-STN (Positive Mode)
(9) Viewing Direction	6 O'clock
(10) Backlight	LED(Color : Amber)

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Note 3 : 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	-20℃	70℃	-30℃	80℃	(Note 2,3,4)
Humidity	Note 1		Note 1		Without condensation
Vibration	-	2.45 m/s^2	-	11.76 m/s^2 (Note 5)	1h max. (Note 6)
Shock	-	29.4 m/s^2	-	490 m/s^2 (Note 5)	XYZ directions 11ms (Note 6)
Corrosive Gas	Not acceptable		Not acceptable		

Note 1 : Ta≦40℃: 85%RH max.
Ta＞40℃: Absolute humidity must be lower . Than the humidity of 85%RH at 40℃

Note 2 : Ta at -30℃----＜ 48h , at 80℃----＜ 168h.

Note 3 : Background color changes slightly depending on ambient temperature . This phenomenon is reversible.

Note 4 : When this LCM is operated under low temperature, the response time will be slower.
Note 5 : This module should be operated normally after finish the test.
Note 6 : The module do not have mounting hole.
It should be fixed by the may of sandwiching-like method.

For Logic	IDD	Note (2)		(3.1)		mA
Power Supply Current for LC Driving	ICH	VDD-VSS=3.3V Note (2)	-	(2.0)	-	mA
Recommended LC Driving Voltage (Note 3 5)	VCH-VSS	Ta= 0℃ , ϕ=0°	-	(19.1)	-	V
		Ta=25℃ , ϕ=0°	-	(18.3)	-	V
		Ta=50℃ , ϕ=0°	-	(14.5)	-	V
Frame Frequency (Note 4)	fFLM	-	70	75	80	Hz

Note 1 : $\overline{DOFF}$, FLM , CL1 , CL2, D0~D3.

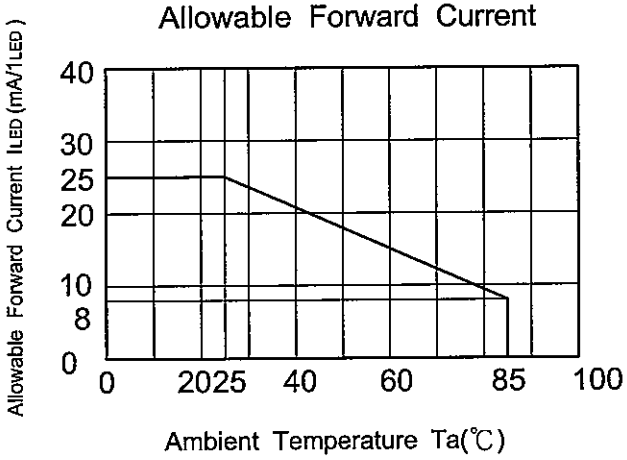
Note 2 : fFLM=75Hz , Test pattern is all "Q".
VCH-VSS=(18.3)V, Ta=25℃.

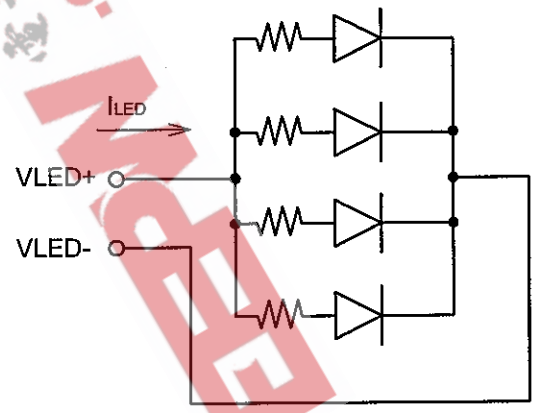
Note 3 : Recommended LC driving voltage fluctuate about ±1.0V by each module.
Test pattern is all "Q".

Note 4 : Need to make sure of flickering and rippling of display when setting the frame frequency in your set.

Note 5 : VDD=3.3V VSH=2.8V
VSL=GND
VM= $\frac{VSH-VSL}{2}$

Ambient Temperature vs.
Allowable Forward Current





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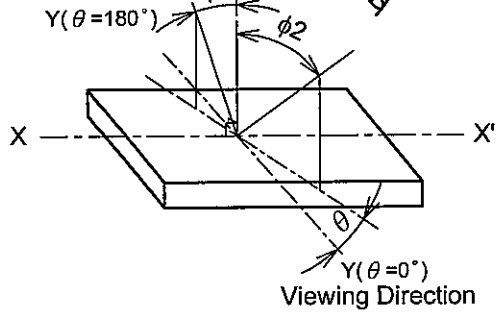
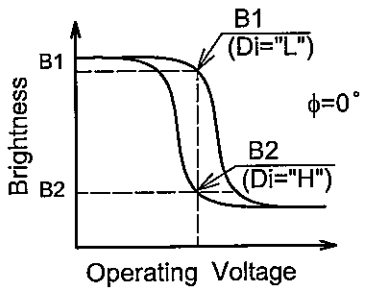
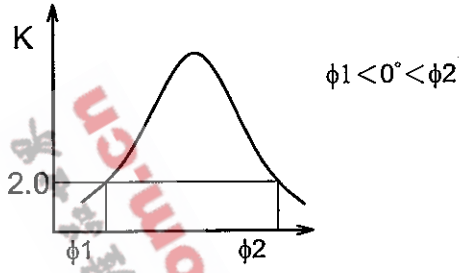


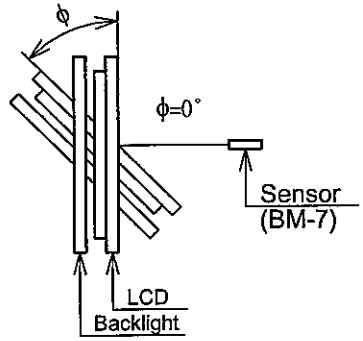
$$K = \frac{\text{Brightness on non-selected dot (B1)}}{\text{Brightness on selected dot (B2)}}$$



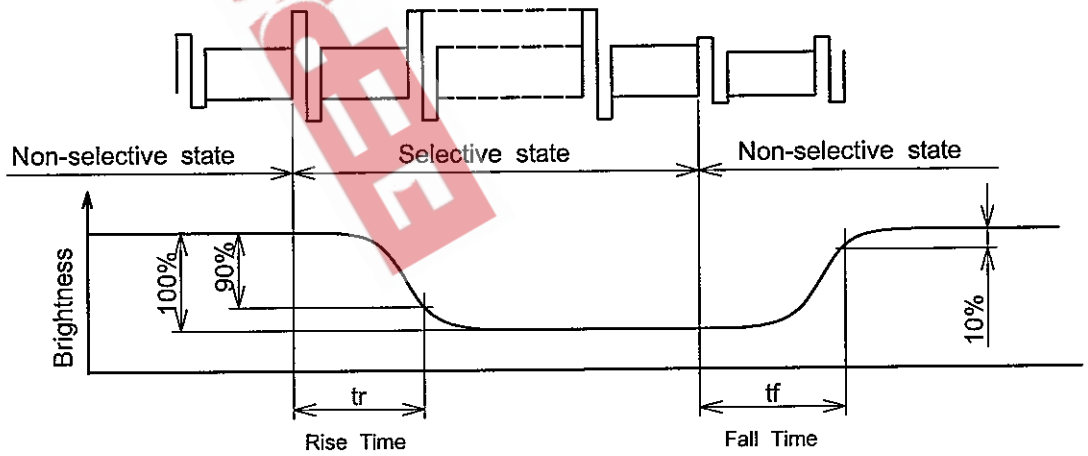
Note 2 : Definition of viewing angle ϕ1 and ϕ 2

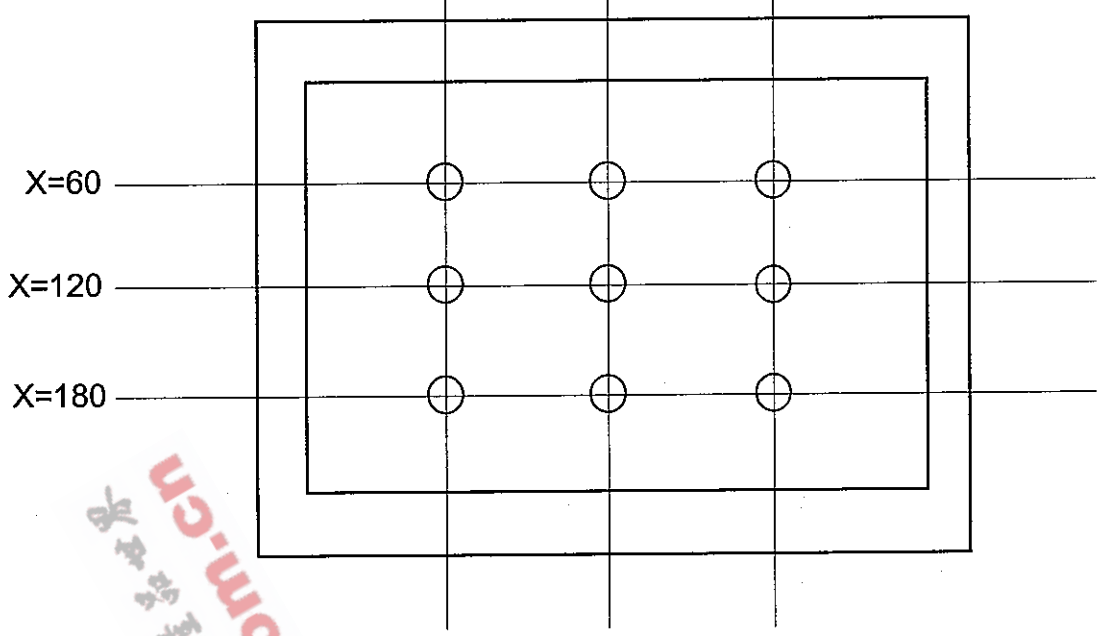


Contrast ratio K vs viewing angle ϕ



Note 4 : Definition of optical response





Note 2 : Definition of brightness tolerance.

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

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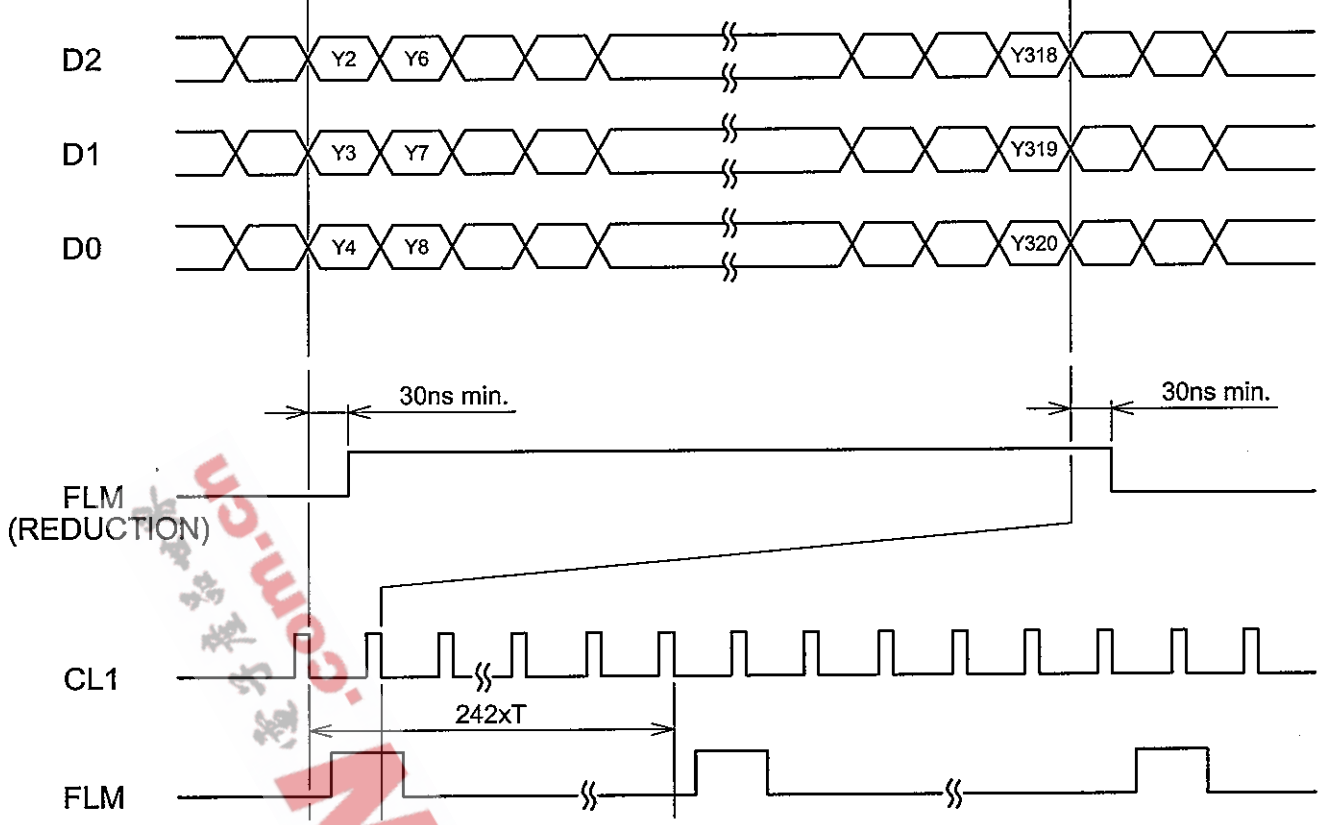

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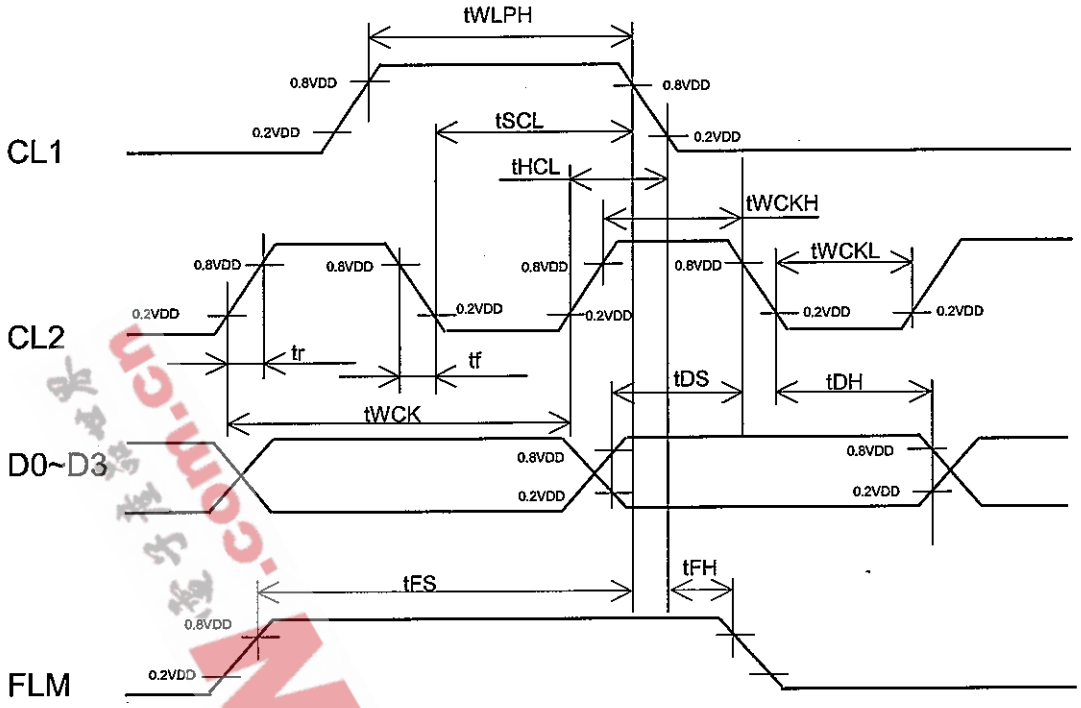
"FLM" Hold Time	tFH	30	-	-	ns	-



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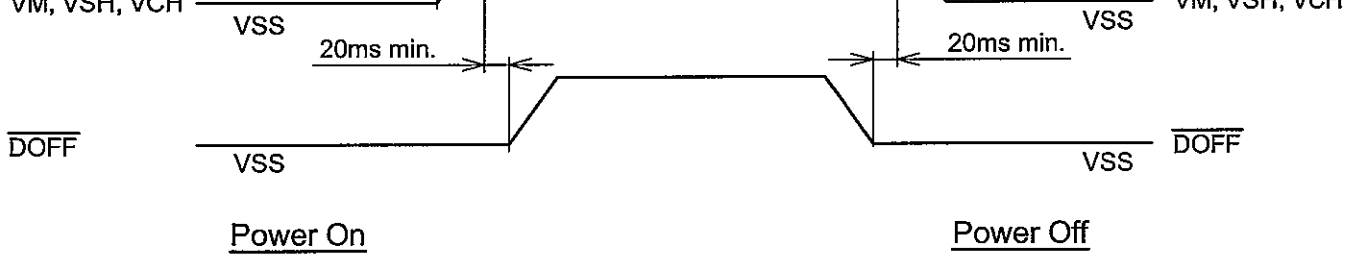


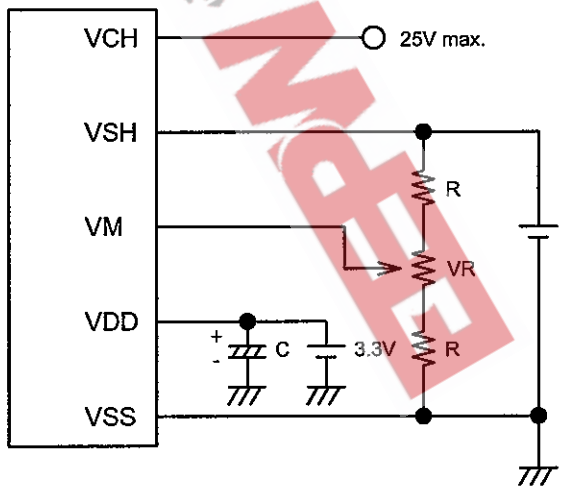
Power On

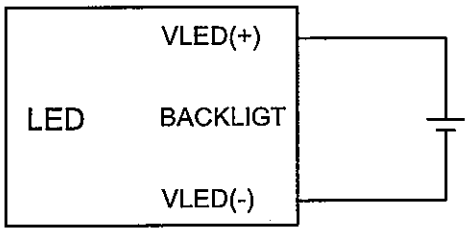
Power Off

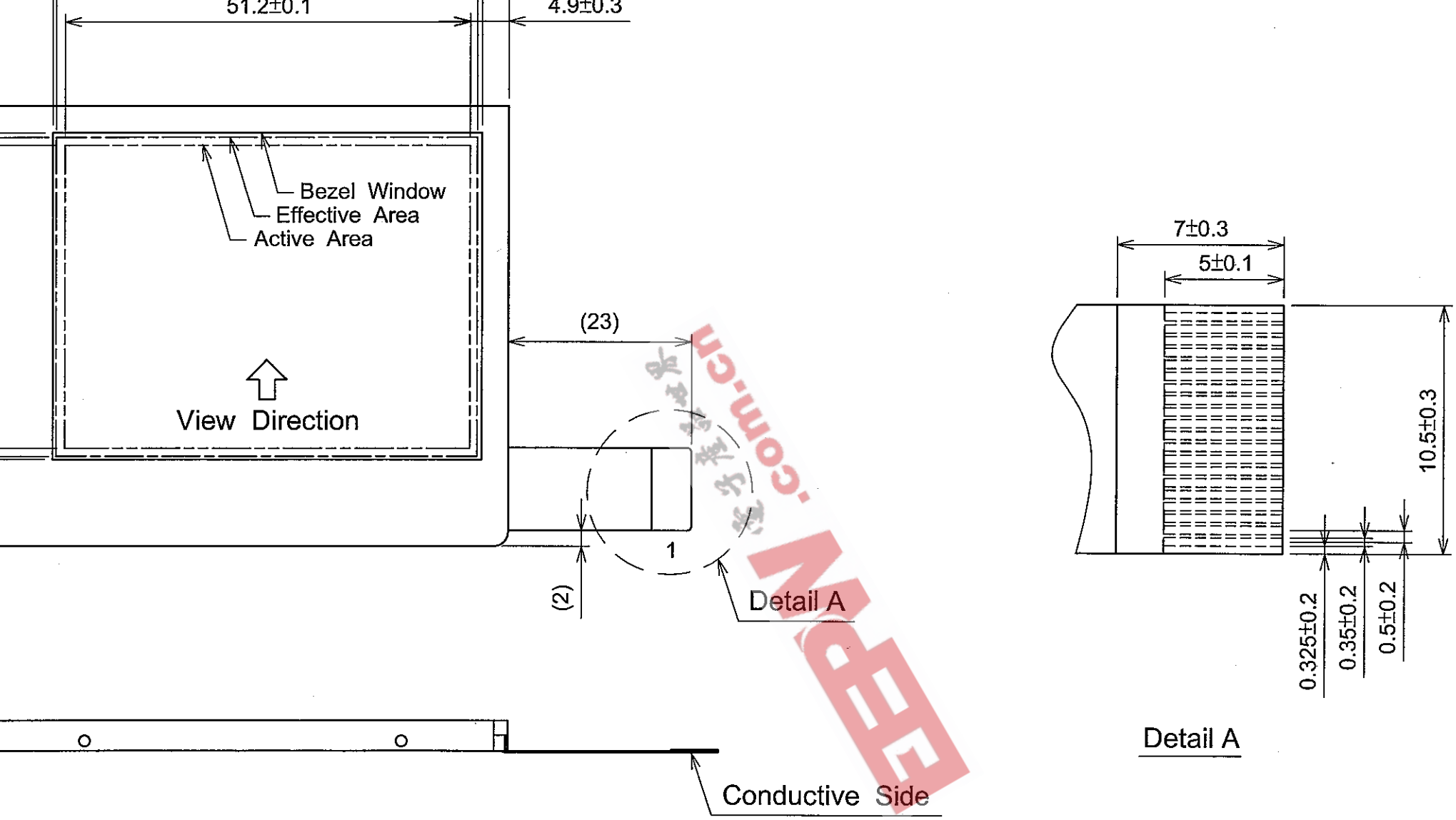
Note 1 : $\overline{\text{DOFF}}$ function takes priority even if the input signal status becomes irregular immediately after VDD power-on.

Note 2 : Please keep the specified sequence because wrong sequence may cause permanent damage to the LCM.

8.4 POWER SUPPLY FOR LCM







Pa at the measuing point.

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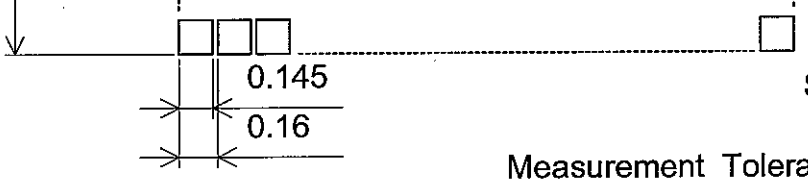
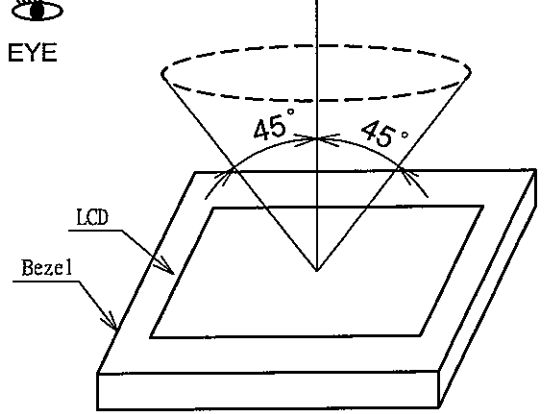


Scale : NTS
Unit : mm
Measurement Tolerance : ±0.1

9.3 INTERFACE PIN CONNECTION

9.3.1 CN1 : LCM I/F (0.5mm PITCH , 20PINS FPC)

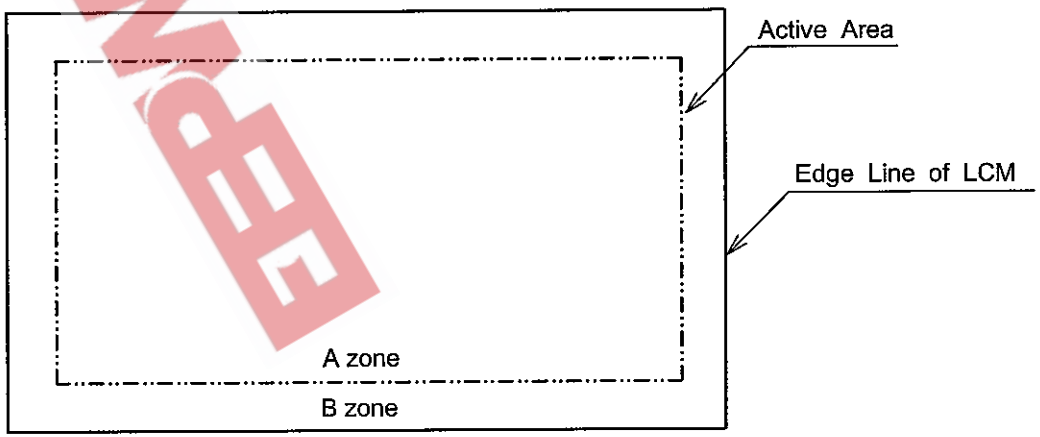
PIN No.	SYMBOL	FUNCTION
1	V_{LED}(-)	Power supply for LED backlight
2	V_{LED}(+)	Power supply for LED backlight
3	D0	Input data signal
4	D1	Input data signal
5	D2	Input data signal
6	D3	Input data signal
7	VSH	Power supply for LCD (Seg driver)
8	VM	Power supply for LCD
9	VSS	Ground
10	CL2	Clock pulse for Seg shift
11	VSS	Ground
12	CL1	1) Latch pulse of display data 2) Shift clock for Com driver
13	$\overline{DOFF}$	Hi : Display on ; Low : Display off
14	VDD	Power supply for logic
15	FLM	Frame start signal data signal of the shift register of the Com driver
16	VCH	Power supply for LCD (Com driver)
17	NC	GND
18	NC	GND
19	NC	GND
20	NC	GND



10.2 DEFINITION OF EACH ZONE

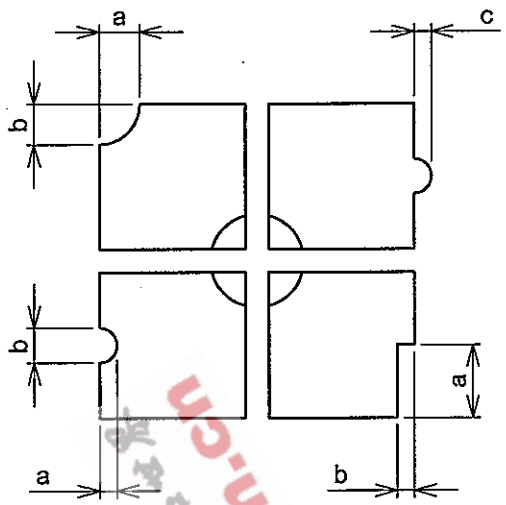
A zone : Within the active area specified at page 9-1/2 of this document.

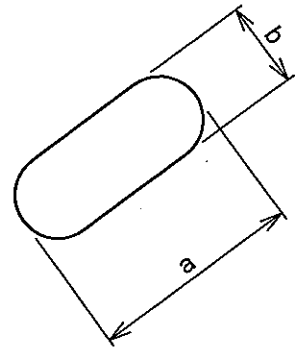
B zone : Area between the edge line of LCM and the active area line specified at page 9-1/2 of this documet.



		0.2<D≦0.3		12	○	-
		0.3<D≦0.5		3		
	(Note 1)	0.5<D		None		
LCD	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		
		-	0.05<W	None		
		Round			○	*
		Average diameter D(mm)	Maximum number 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			
	(Note 1 2)	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		
	(Note 1)	0.3<D		None		
	Contrast Irregularity (Spot)	Average diameter D(mm)	Contrast	Maximum number acceptable	Minimum space	
		D≦0.25	To be Judge by HITACHI standard	Ignore	-	
		0.25<D≦0.35		10	20mm	
		0.35<D≦0.5		4	20mm	
	(Note 1)	0.5 <D		None	-	

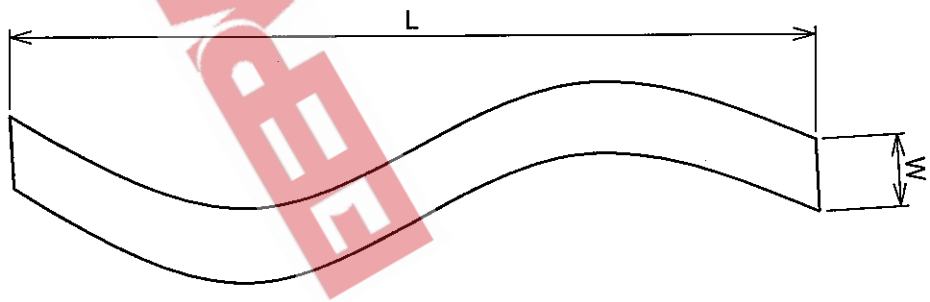
Note 1 :





$\frac{a+b}{2}$ = D...Average Diameter
c...Salient

Note 2 : Definition of length L and width W



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kept, C-MOS LSI of LCD modules may be damaged due to latch up problem.

11.4 PACKING

(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 pell-off. Please keep the temperature and humidity within the specified range for use and storage.

(2) Since upper polarizers and lower aluminum 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 polyester and aluminum plates are made of organic substances which will deteriorated by a chemical reaction with such chemicals as acetone, Toulon, 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 other than the above.

will be cause for polarizer damage, stain and dirt on product.
When necessary to take out the products from some place at low temperature for test, etc. It is required for them to be warmed up in a container once at the temperature higher than that of room.

(7) Touching the display area and contact terminals with bare hands and contaminating them are prohibited , because the stain on the display area and poor insulation between terminals are often caused by being touched by bare hands.
(There are some cosmetics detrimental to polarizers.)

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

resulting in terminal open circuit.
Please operate the LCD module under the relative condition of 40℃ 85%RH.

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 -30℃ to 80℃

(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 should be burned up later.

(2) When any liquid leaked out of a damage glass cell comes in contact with your hands, please wash it off well with soap and water.

YEAR	FIGURE IN LOT MARK
2003	3
2004	4
2005	5
2006	6
2007	7

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 REVISION

REV. No.	ITEM	LOT No.	PRODUCTION CONTROL No.
A			000001~

12.3 LOCATION OF LOT MARK

On the back side of LCM.

(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.