

HOSIDEN CORPORATION

HLM 7259 - 0100100

**PASSIVE MONOCHROME
HIGH GRADE LCD DISPLAY**

240 x 64 DOTS



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1. FEATURES

Display Format	240 x 64 Dots (Graphic Type)
Display Mode	STN Negative Transmissive type, F-STN Mode with CFL Backlight
Screen Area	113,96 x 35,0 mm
Contrast Ratio	30:1 (typ.)
Brightness	160 cd/m ² (typ) / If = 5 mA
Driving Method	1/64 duty
Power Supply	+5V (V _{CC}) / -9V (V _{EE})
Interface	5V CMOS Level
Backlight	CFL edgelight system

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Value	Unit	Remark
Supply Voltage (Logic)	V _{DD} -V _{SS}	7 max.	V	
Supply Voltage	V _{DD} -V _{EE}	22 max.	V	
Input Voltage	V _{in}	V _{SS} ≤ V _{IN} ≤ V _{DD}	V	
Storage Temperature	T _{stg}	-20 ... 65	°C	90% RH max
Operating Temperature	Top	-5* ... 60	°C	*see 9.CFL Unit

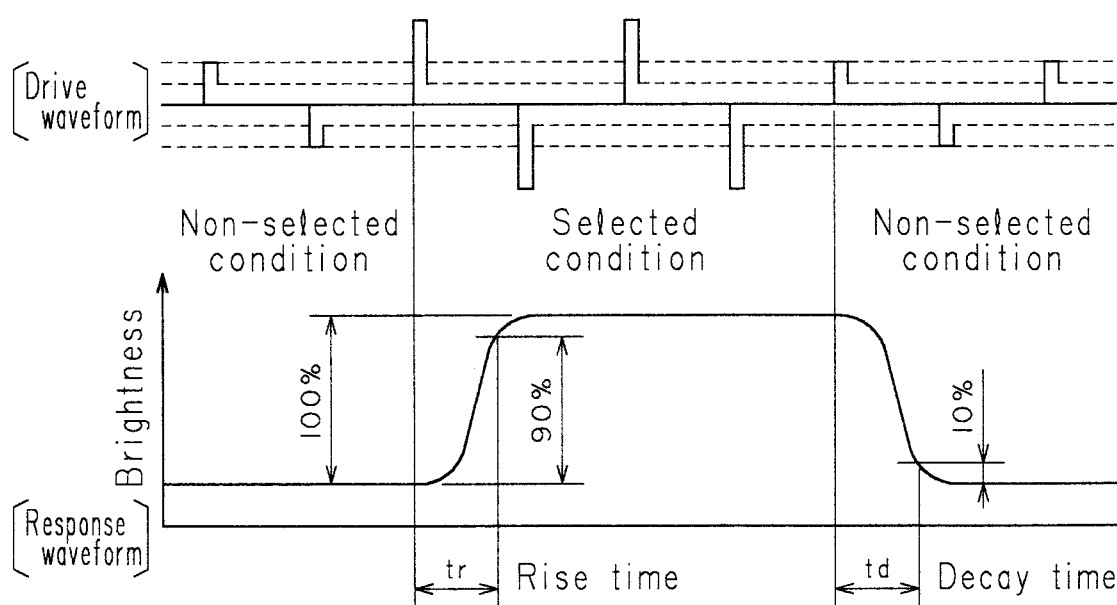
3. MECHANICAL CHARACTERISTICS

Item	Standard Value	Unit	Remark
Module Size	157 x 57 x 14	mm	
Viewing Area	114,0 x 35,0	mm	
Active Area	107,97 x 28,77	mm	
Dot Size	0,42 x 0,42	mm	
Dot Pitch	0,45 x 0,45	mm	
Weight	122 (typ.)	grams	

4. OPTICAL CHARACTERISTICS

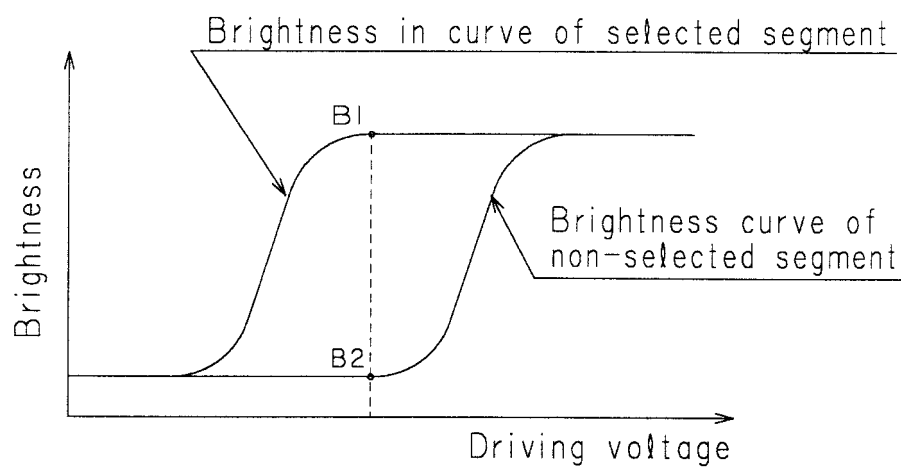
Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Response Rise Time	T_r	$T_a=25^{\circ}\text{C}$	-	120	170	ms	Note 1
	T_d	$\theta=25^{\circ}, \phi=0^{\circ}$	-	100	150	ms	Note3
Contrast Ratio	CR	$T_a=25^{\circ}\text{C}, \theta=25^{\circ}, \phi=0^{\circ}$	-	30	-		Note2,3
Viewing Angle	$\theta_1 + \theta_2$	$T_a=25^{\circ}\text{C}, \phi=0^{\circ}, \text{CR} \geq 1,4$	50	-	-	deg	Note 3
Frame Frequency			-	70	-	Hz	
Brightness		$I_f = 5 \text{ mA}$	-	160		cd/m^2	
Viewing Direction				6:00		o'clock	

NOTE 1 : Definition of optical response time

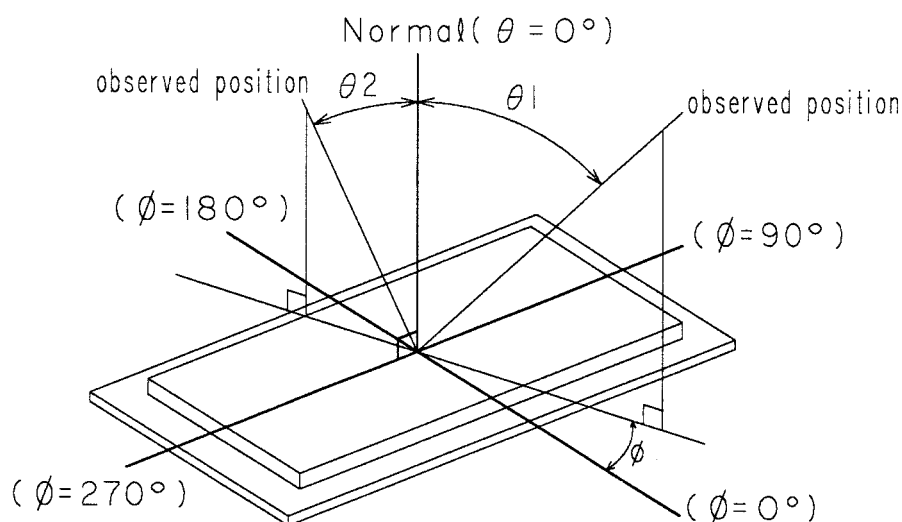


NOTE 2 : Definition of contrast ratio CR

Definition
$$CR = \frac{\text{Brightness in selected segment (B1)}}{\text{Brightness in non-selected segment (B2)}}$$



NOTE 3 : Definition of viewing direction θ and ϕ



5. ELECTRICAL CHARACTERISTICS (LCD)

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage (Logic)	V _{DD}	V _{DD} ± 10%	4,5	5	5,5	V
Supply Voltage (LCD)	V _{DD-V_O}	θ=25°, φ=0° Ta=0°C	13,7	14,4	15,1	V
		θ=25°, φ=0° Ta=25°C	13,0	13,7	14,4	V
		θ=25°, φ=0° Ta=50°C	12,6	13,3	14,0	V
Supply current (Logic)	I _{DD}	V _{DD} =5V, V _O =-8,7V		1,1	1,7	mA
Supply Current (LCD)	I _{EE}	Frame Signal = 70Hz	-	1,0	1,6	mA

6. INTERFACE

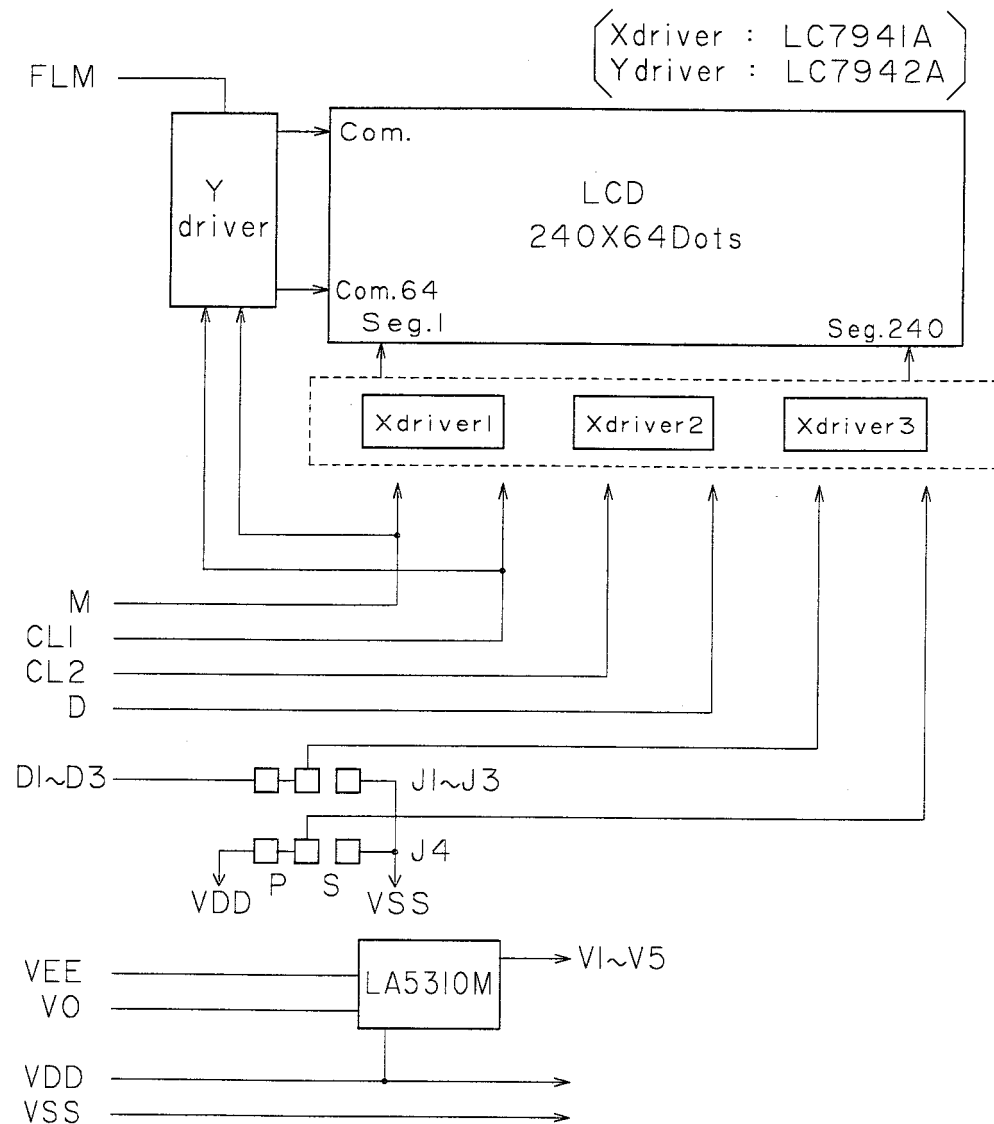
2 mm pitch PCB eyelets

Suitable connectors for through hole (90/180°)
are available on request

Pin No.	Signal Name	Function
1	D0	Parallel Data 0 *1
2	D1	Parallel Data 1 *1
3	D2	Parallel Data 2 *1
4	D3	Parallel Data 3 *1 / Serial Data
5	FLM	Frame Signal (Sync. of display)
6	M	LCD drive signal (AC signal)
7	CL1	Display Data Latch Clock
8	CL2	Display Data Shift Clock
9	NC	Not connected
10	V _{DD}	+5V Logic Supply Voltage
11	V _{SS}	Ground
12	V _{EE}	Power supply voltage for LCD drive
13	V _O	Control for LCD drive voltage

*1 Note : Default Interface is 4 bit parallel. Alternate Interface is 1 bit serial
For 1 bit serial interface please use D3 pin
See section 7. BLOCK DIAGRAM

7. BLOCK DIAGRAM



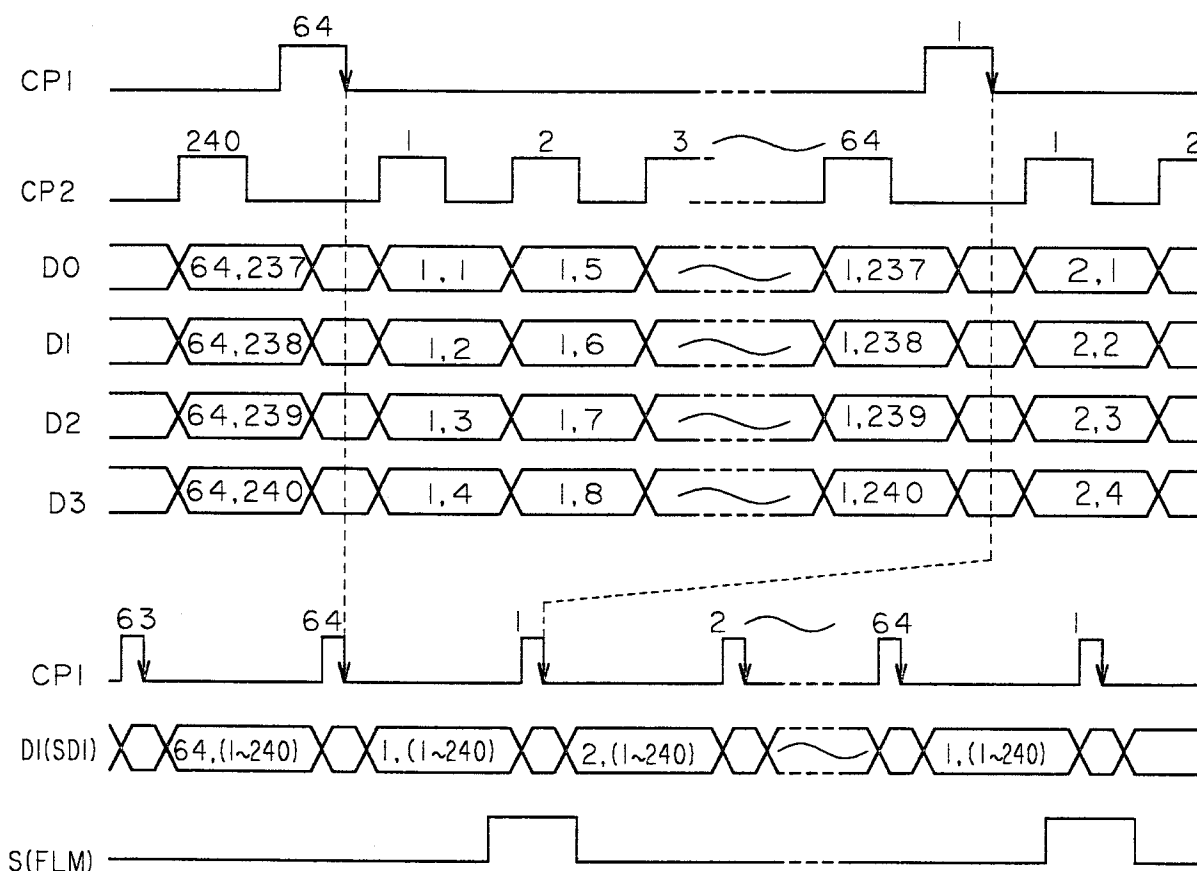
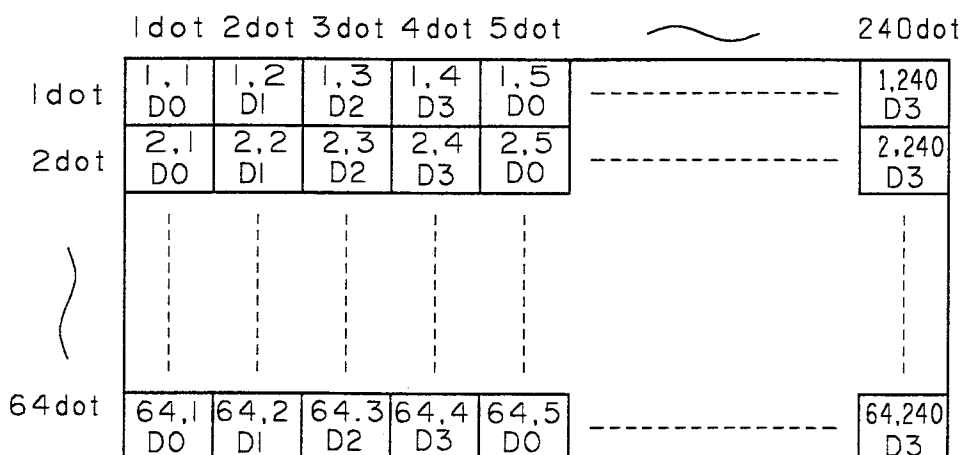
J1 ... J3 : Jumpers to set 4 bit / 1 bit data bus
 J4 : Jumper to select 4 bit / 1 bit operation
 LA5310M : BIAS voltage generation circuit

To avoid latch-up effects the power on/off sequencing should be as following :

ON : Logic voltage (VDD) should be applied before or at same time with LCD voltage (VEE)

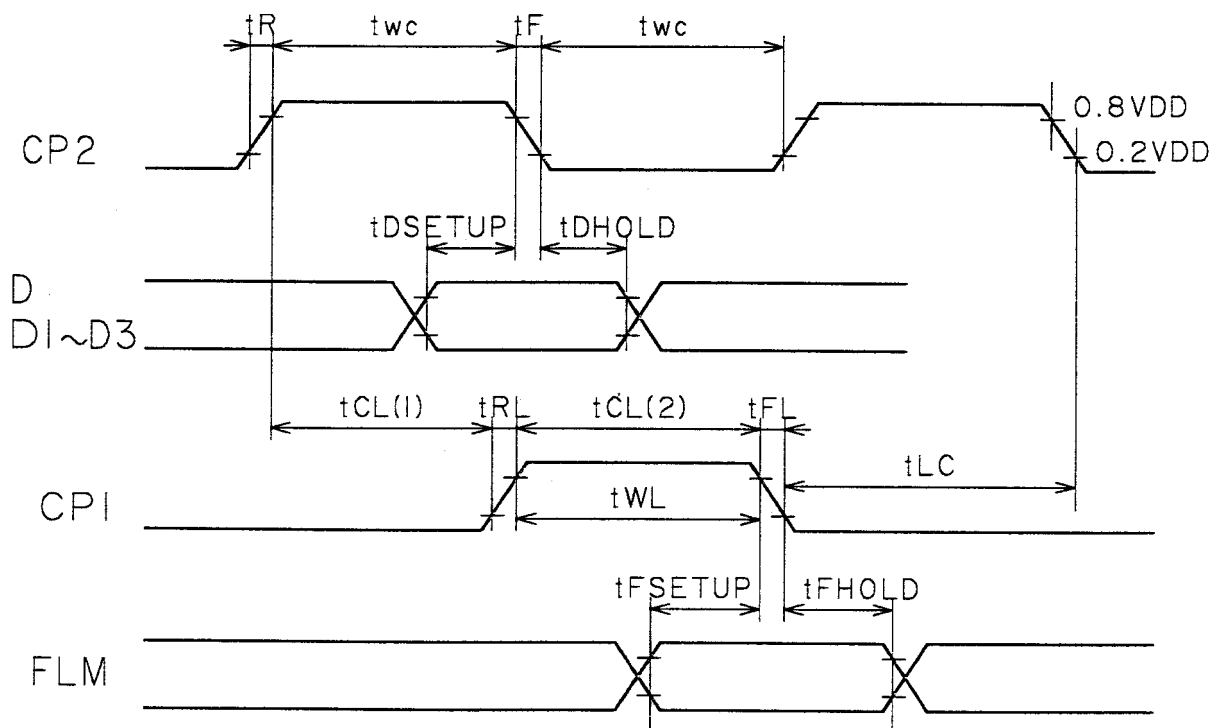
OFF : LCD voltage (VEE) should be removed before or at the same time as Logic voltage (VDD)

8. INTERFACE TIMING



8-1 TIMING CHART

	Symbol	Condition	Min	Typ	Max	Unit
CP2 Frequency	f_{CP}	Duty=50%	-	-	3,3	MHz
CP2 Pulse Width	t_{WC}	-	100	-	-	ns
CP1 Pulse Width	t_{WL}	-	125	-	-	ns
CP2 Rise Time	t_R	-	-	-	50	ns
CP2 Fall Time	t_F	-	-	-	50	ns
CP1 Rise Time	t_{RL}	-	-	-	50	ns
CP1 Fall Time	t_{FL}	-	-	-	50	ns
Data Setup Time	t_{DSETUP}	-	80	-	-	ns
Data Hold Time	t_{DHOLD}	-	80	-	-	ns
CP2 -> CP1 Time	$t_{CL(1)}$	-	0	-	-	ns
CP2 -> CP1 Time	$t_{CL(2)}$	-	100	-	-	ns
LIP Pulse Width	t_{LC}	-	100	-	-	ns
FLM Setup Time	t_{FSETUP}	-	100	-	-	ns
FLM Hold Time	t_{FHOLD}	-	100	-	-	ns



9. CFL UNIT

9-1 CCFL Lamp

Item	Symbol	Value	Unit
Discharging Tube current	(IL)	5	mA
Discharging Tube voltage	(VL)	190 (typ.)	Vrms
Starting Tube Voltage	(VS)	900 (min.)	Vrms
Brightness (Tube)	(B)	30.000	Nit
Tube diameter	Ø	3	mm
Tube length	l	86	mm
Half Brightness Time	min	15.000*	h
Half Brightness Time	typ	25.000*	h

The definition of half brightness time is either average brightness decreased to 50% of initial average brightness value.

* The lifetime of the CCFL tube is reduced at low temperature operation

9-2 Example of Inverter

Inverter : CXA K10A (5V) or 8m6243 (5V or 12V)
 Input current : 0,2A
 Output current : 5,0 mArms
 Drive frequency : 30 kHz (typ)

9-3 Interface connector

Used connector : IL-G-4S-S3C2 (*1)
 Manufacturer : JAE

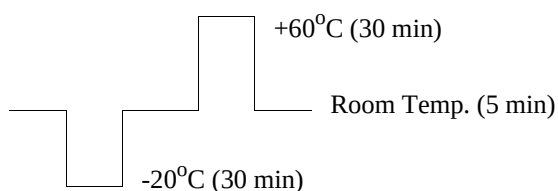
Pin No.	Signal Name	Function
1	HV	High Voltage
2	NC	Not connected
3	NC	Not connected
4	GND	Ground

*1 Suitable through hole connectors (90°/180°) are available on request.

10. RELIABILITY

Item	Condition
High temperature storage	60°C 120h
Low temperature storage	-20°C 120h
Damp heat storage	40°C / 90% RH 120h
Thermal cycles	5 cycles see below diagram
Vibration	Total amplitude : 1,5 mm Frequency : 10 .. 55 .. 10 Hz Tested at above condition for X,Y,Z directions 60 min. each

Temperature Cycle Diagram



10-1 Evaluation Criteria

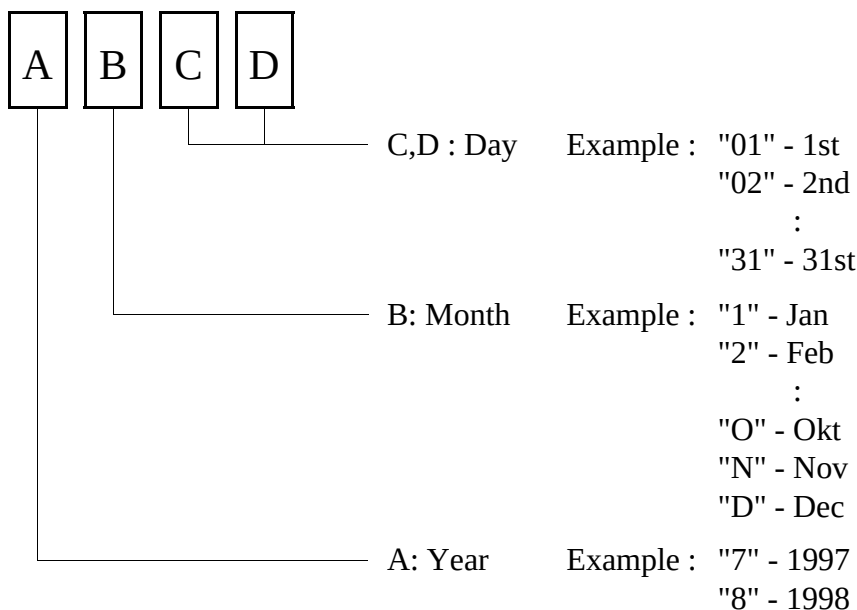
Every test item should meet the following criteria :

- All of the segments (dots) should be not blurred
- All segments (dots) should be usually displayed

Judgements should be made after exposure in room temperature condition for 4 hours.

11. LOT MARKING

The manufacturing lot number is marked on each module



12. HANDLING PRECAUTION

1. Do not disassemble the module
2. Since the LCD cell is made of glass, do not apply strong mechanical impact or static load onto it. Handle with care, and do not twist or bend the LCD module.
3. In case the LCD cell is broken, do not sip or drink leaked liquid crystal material. If the liquid crystal material touched your skin, wash it out with soap immediately.
4. Store and use within ratings in order to keep performance and prevent damage.
5. Do not drop water or any chemicals onto the display surface.
6. Handle the polarizers with care as it maybe easily scratched. Do not press or rub them with any hard object.
7. Do not apply high electrostatic voltage to the LCD module. It may damage CMOS / LSI circuit in the LCD module. Ground yourself when you touch the LCD module directly.
8. When you handle the LCD module for incoming inspection or assembly, use soft fingerstalls or gloves in order to keep the display quality.
9. Do not pull or fold the CCFL cable

13. TERMS OF WARRANTY

13-1 Incoming Inspection

Incoming inspection by the customer shall be performed within thirty (30) days from the shipping date.

13-2 Warranty Period

HOSIDEN warrants the LCD modules for a period of 6 months from the shipping date when stored or used under normal conditions.

14. DRAWING

See following page.

If a more detailed drawing is necessary please contact HOSIDEN or its representatives.

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