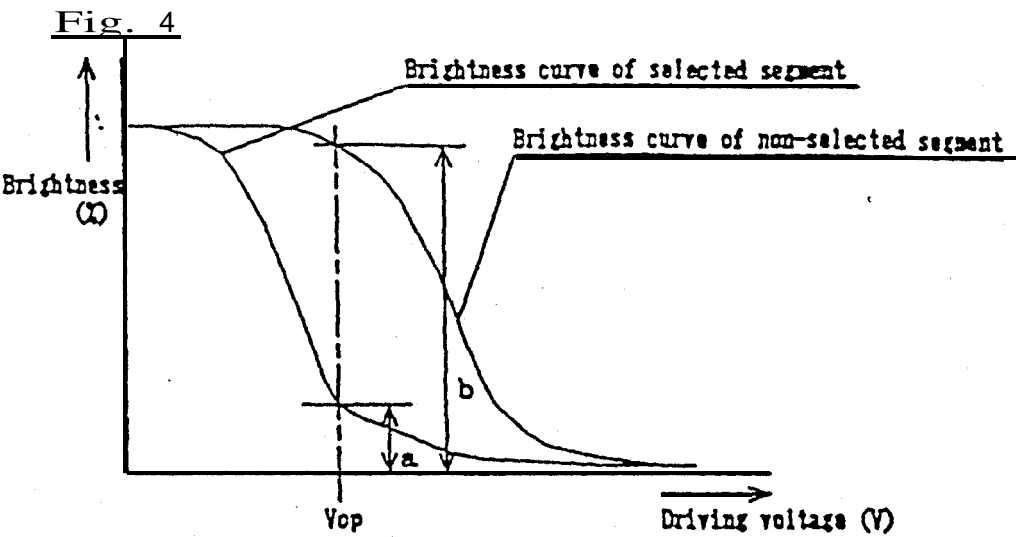


[Note 4] Definition of contrast ratio



Definition :

Contrast ratio = (Brightness in **OFF** stats) /
(Brightness in ON state) = b/a

Parameter	Conditions
a) Ambient temperature	25 °C
b) Driving voltage	22.5 V
c) viewing angle	0°

10. HANDLING PRECAUTIONS

- (1) The LCD panel of EPSON LCD modules consists of two thin glass pltets with polarizers (with UV cut filters) which easily get damaged. Extreme care should be used when handling the display panel.
- (2) When cleaning the display surface, use soft cloth (e-g., gauze) with a solvent (recommended below) and wipe lightly.

- isopropyl alcohol
- ethyl alcohol
- trichlorotriflouroethane

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvents:

- water
- ketone
- aromatics

- (3) The LCD modules use CMOS LSI drivers, so we recommend that you:
 - a) connect any unused input terminal to VDD or VSS;
 - b) do not input any signais before power is turned on;
and
 - c) ground your body, work/assembly areas, and assembly equipment **to** protect against static electricity.
- (4) Modules employ LCD.elements, and must be treated as such. Avoid intense shock **and** falls from a height.
- (5) To prevent modules from degradation, do not operate or store then exposed direct to sunshine or high temperature/humidity.

11. OPERATIONAL PRECAUTIONS

- (1) If the LCD panel is driven on DC, the electrochemical reaction within it causes a rapid reduction in display performance. The duty $50\pm 1\%$ of the FR signal must always be observed.
- (2) Follow the power on/off sequence shown in Fig. 1 to prevent latch-up or DC operation of the LCD module.
- (3) No LCD module must exceed the absolute maximum ratings. If a module is operated with any value exceeding absolute maximum ratings, its performance will deteriorate and may no longer restore to normal. In designing a system using LCD modules, utmost care should be taken of ambient temperature, input voltage signal fluctuations, supply voltage fluctuations, etc.

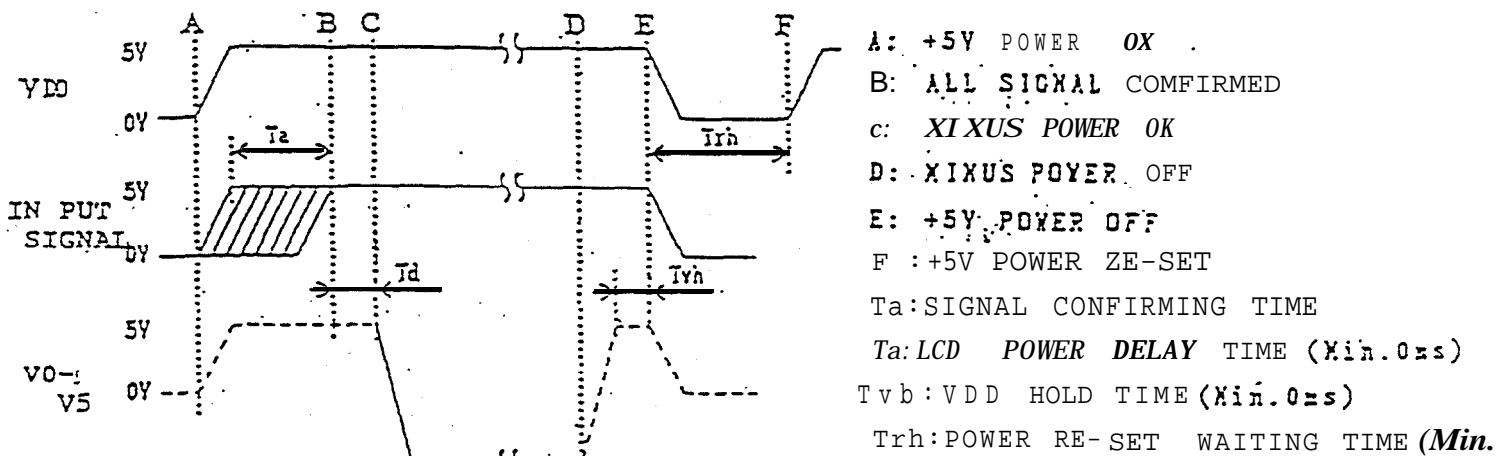


Fig. 1 Power On/Off Sequence

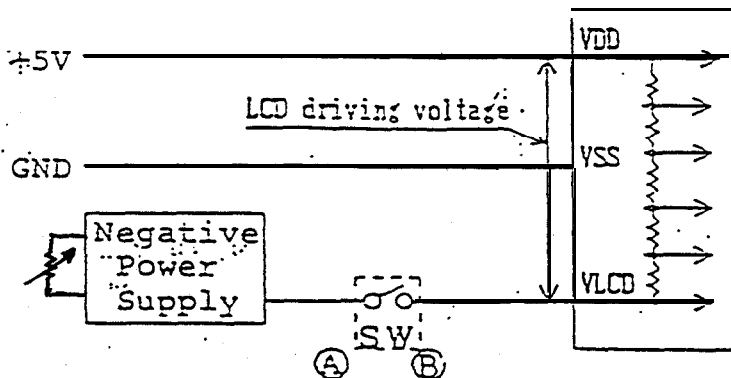


Fig. 2 Typical Power Supply Connection

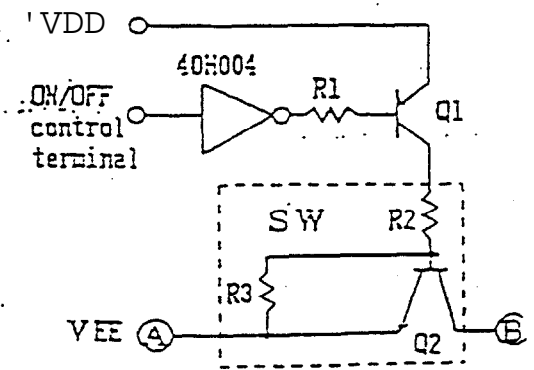


Fig. 3 Typical SW Circuit

- (Note 1) The VLCD on/off operation shown in Fig. 1 indicates the switching operation of Fig. 2,
- [Note 2] Turning off the SW (Fig. 2) will open the VLCD terminal. Therefore, the LCD driving voltage (VDD-VLCD) will become zero 100ms(Max.) later.
- (Note 3) A typical circuit for the SW portion of Fig. 2 is given, in Fig. 3 for reference.

12. Specification of Back Light Unit (Cold Cathode Fluorescent Lamp + Inverter)

12-1 Electrical Characteristics

Parameter	MIN	TYP	MAX	Unit	Condition
Tube Current	7	8	9	mA	---
Discharge Start(V)	---	- -	900	Vrms	- -
Tube Voltage	- -	275	- -	Vrms	- -
Frequency	25	30	35	KHZ	- -

12-2 Electric Optical Characteristics

Parameter	MIN	TYP	MAX	Unit	Condition
Brightness	250	-__	—	cd/m'	at Tube Current 8.0 mA
Brightness Uniformity	80	---	--	%	-__

Note : **Above** characteristics show the standard value on the lighting plate.
The definition of brightness uniformity is $(MIN \div MAX) \times 100$.

12-3 Life Cycle

Parameter	MIN	TYP	MAX	Unit	Condition
Life Time	10,000	---	---	H	at Tube current 8.0 mA

Note : The life is defined as the time until the brightness becomes half.

1	VDD
2	VSS
3	VICD
4	IP
5	NC
6	NC
7	YSCI
8	DIN
9	XSEL
10	NC
11	UD0
12	UD1
13	UD2
14	UD3
15	UD0
16	UD1
17	UD2
18	UD3
19	EI
20	EO

CEL CONNECTOR	
1	300V
2	NC
3	NC
4	OV

