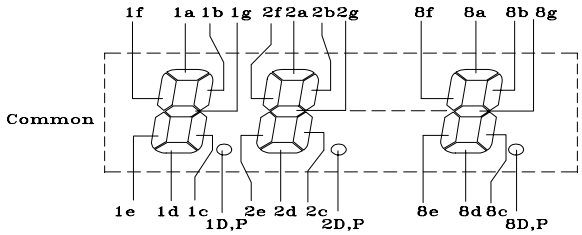
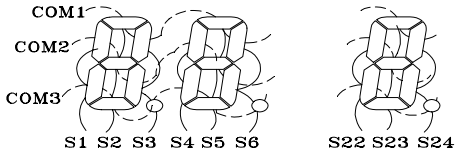
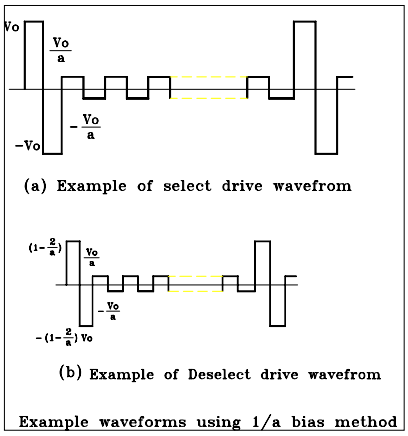
Drive System

The following illustrations show the two types of liquid crystal drive systems available.

System	Characteristics	
Static drive system	● Obtainable high margin of operating voltage allows higher quality display. ● Simple drive circuit conditions, low-voltage operations possible.	 Static drive terminals
Dynamic (time-division) drive system	When a large number of elements are driven : ● Fewer drive circuits. ● Fewer connections between circuit and display cells.	 <Example> Time-division drive(3-division)terminals

■ Dynamic (Time-Division) Drive System



Example waveforms using 1/a bias method

1. Voltage averaging method

This method provides optimum bias 1/a for the number of time divisions by weighting the drive voltage for N-1 deselects of the scanning side less than the drive voltage of one select of the scanning side.

→The voltage averaging method 1/a bias is calculated according to the following formula :

$a=\sqrt{N+1}$ ·····N: number of time divisions

The resulting value for "a" is generally truncated to an integer.

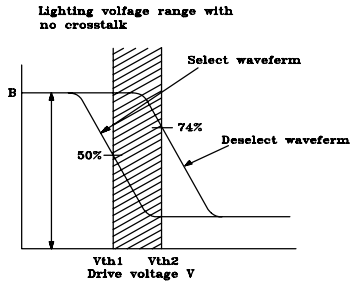
2. Operating voltage range

The lighting condition of the liquid crystal depends on the effective value of the drive voltage.

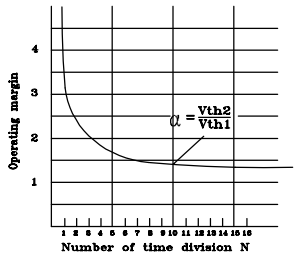
The maximum operating margin α is expressed as follows :

$$\alpha=\sqrt{\frac{\sqrt{N+1}}{\sqrt{N-1}}}=\left(\frac{Vth_2}{Vth_1}\right)$$ ·····Vth_1 : Voltage representing 50% of luminance characteristics of select waveform.

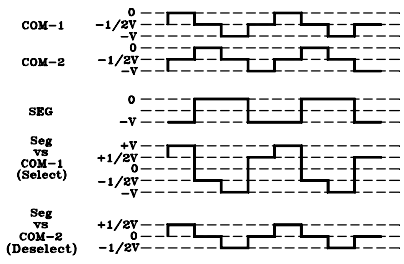
Vth_2 : Voltage representing 74% of luminance characteristics of deselect waveform.



Luminance characteristics by time-division drive



Operating margin in 1/a bias method (a=√N + 1)



Waveforms for 1/2 duty, 1/2 bias liquid crystal drive