



# LCD PANEL

## Types of Display

Positive Type



\*It is necessary to use Type under ambient light conditions

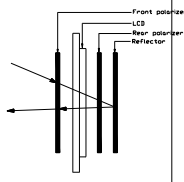
Negative Type



\*Negative type is most applicable for back-lighting system and is capable of multi-color displaying.

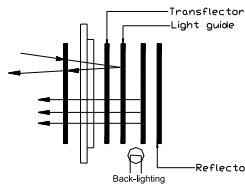
## Lighting Methods

(1) Reflective Mode



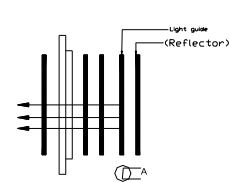
\*It is necessary to use type under ambient light condition.

(2) Transflective Mode



\*Ambient light is taken from the outside during day or in the dark and a back light is used in the dark.

(3) Transmissive Mode



Back-lighting only. In case of B, no reflector is used.

\*A back light is always used

## Connector and LCD Mounting Method

To connect LCD to the drive circuit, following connectors are available.

### Rubber Connector

LCD Mounting Method(example)

Structure:

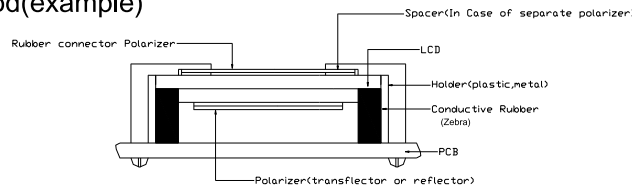
Alternate lamination of conductive rubber and insulating rubber:

Connecting Method:

Mechanical compression.

Pitch(mm)

Min 0.4



Easy to assemble  
Adopted for many year.  
Applicable even to narrow pads.  
Printed circuit boards need gold plating or graphite coating.

### Pin connector

LCD Mounting Method(example)

Structure:

pads.

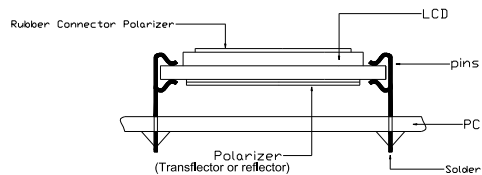
Metal pins fit onto the panel terminal

Connecting Method:

Soldering.

Pitch(mm):

1.8,2.0,2.54



Suitable for small production runs.

### Flexible Connector

LCD Mounting Method(example)

Structure:

Film with electroconductive thin film or printed

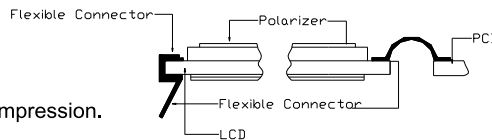
Connecting Method:

Heat and pressure fitting,

Soldering or mechanical compression.

Pitch(mm):

Anisotropic Type: Min 1.25



\*Resin on connecting point.

A thin structure can be achieved.  
Possible to bend.  
Free trimming possible.



# LCD PANEL

## Characteristics

Items	Fluid type		Static		1/2 Multiplex		1/3 Multiplex		1/4 Multiplex		1/8 Multiplex	1/16 Multiplex	
			C	HR	C	HR	C	HR	C	HR	C	C	
	Reliability grade		Unit										
Absolute maximum ratings	Applied Voltage,AC		V	15	15	15	15	15	15	15	15	15	
	Applied Voltage,DC		V	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
	Operating Temperature Range		C	0~40	-30~80	0~40	-30~80	0~40	-30~80	0~40	-30~80	0~40	-30~80
	Storage Temperature Range		V	-25~70	-40~85	-25~70	-40~85	-20~70	-40~85	-20~70	-40~85	-20~70	-40~85
Typical operating characteristics	Operating Voltage		V	3.0	5.0	3.0	5.0	3.0	5.0	3.0	5.0	5.0	
	Response time	tr	25 °C	30	80	60	50	100	70	100	70	100	200
			0 °C	100	150	350	150	600	150	600	150	500	600
			-30 °C		1500		2000		2500		2500		
	tf	25 °C	100	50	100	30	100	30	100	30	150	150	
		0 °C	300	150	300	100	250	100	250	100	400	500	
		-30 °C		2000		1200		1000		1000			
Expted life under normal use			hour	50,000	100,000	50,000	100,000	50,000	100,000	50,000	100,000	—————	

Note: C: Consumer,HR: High Reliability

## Reliability Grade

Fluid type Reliability grade	Static	1/2 Multiplex	1/3 Multiplex	1/4 Multiplex	1/8 Multiplex	1/16 Multiplex
Commercial grade	•	•	•	•	•	•
High reliability	•	•	•	•	•	•

Note : Available

## Environmentaental Characteristics (without polarizers)

Items	Conditions
Storage at high temperature	(A) Storage 250 Hrs 95°C surrounding temp. (Power off) (B) Storage 500 Hrs 95°C surrounding temo. (power off)
storage at low temperature	(A) Storage 250Hrs at -25°C surrounding temp. (Power off) (B) Storage 500Hrs at -40°C surrounding temp. (Power off)
Damp Heat	(A) Storage 250Hrs at 80°C and 90% RH surrounding condition (B)Storage 500 Hrs at 80°C and 90°C Surrounding condition
Thermal Shock	(A) (-40 C 30 minutes → 25° C 5 minutes → 85 C 30 minutes → 5 C° 5 minutes) 20 cycles (B)(-40 C 30 minutes → 25° C 5 minutes → 85 C° 30 minutes → 25 C° 5 minutes) 200 cycles
Operation at high temperature	(A) Operating 250 Hrs at 60 C surrounding temp. (3Vop,32Hz) (B) Operating 500 Hrs at 80 C surrounding temp. (5Vop, 32Hz)
Operation at Damp Heat	(A) Operating 259 Hrs at 40 C and 90 RH Surrounding Condition (3Vop, 32Hz) (B) Operating 500 Hrs 60 C and 90 RH Surrounding Condition (%Vop, 64Hz)

DC TEST → \* Operating 72 Hrs at 45 °C Surrounding Condition.(12VDC)  
U.V TEST → \* Operating 300 Hrs at 63 °C Surrounding Condition temp.

Note:(A):Consumer (B):High Reliability