

6-6-5 COM Inversion

There are two types of inputs, COM signal serial input (EXTMODE="Lo") and external COM signal input (EXTMODE="Hi").

EXTMODE="Lo"

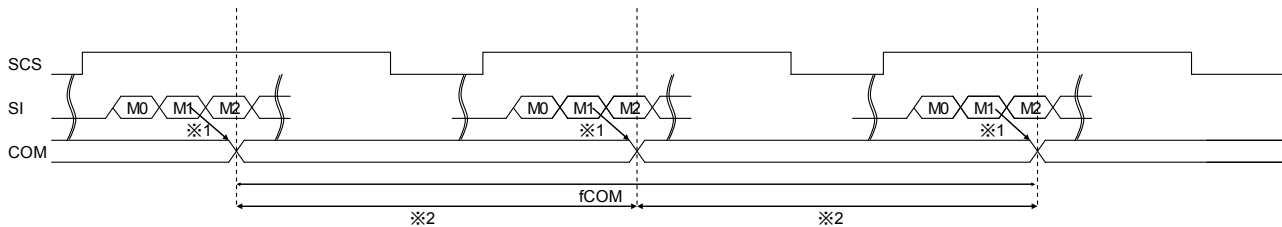


Figure 6-10 COM Inversion (EXTMODE=Lo)

M1 : LC polarity inversion flag:

If M1 is "Hi" then VCOM="Hi" is output.

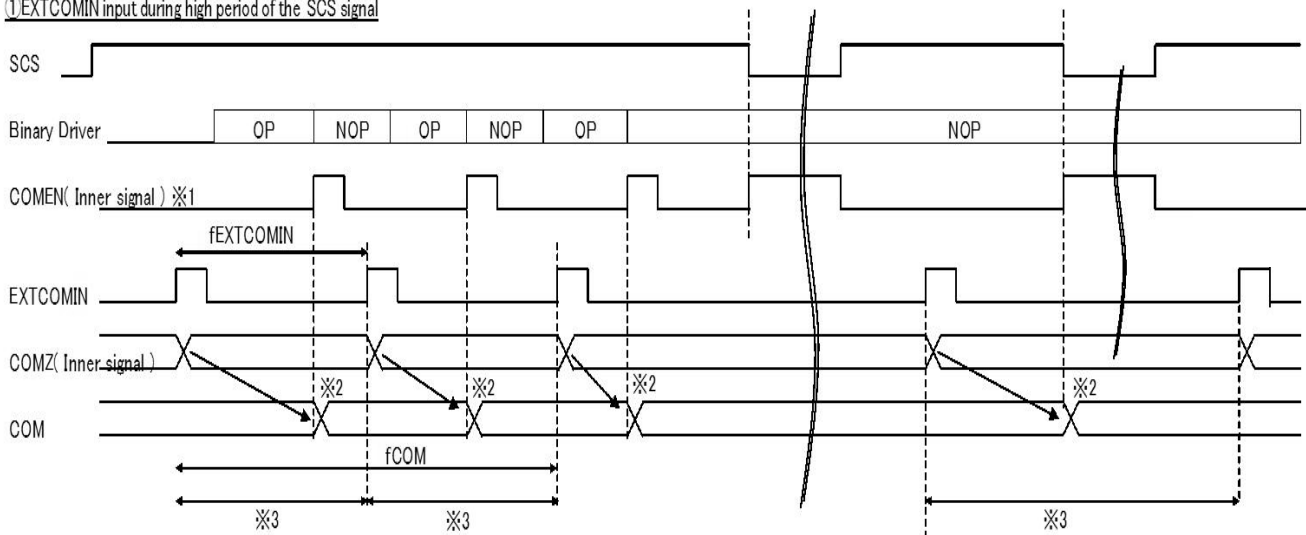
If M1 is "Lo" then VCOM="Lo" is output.

※1: LC inversion has been changed by M1 flag statement.

※2: The periods of plus polarity and minus polarity should be same length as much as possible.

EXTMODE="Hi" (COM inversion timing has two conditions)

① EXTCOMIN input during high period of the SCS signal



※1: COMEN is High when "SCS = Low" and certain period after Binary Driver operation.

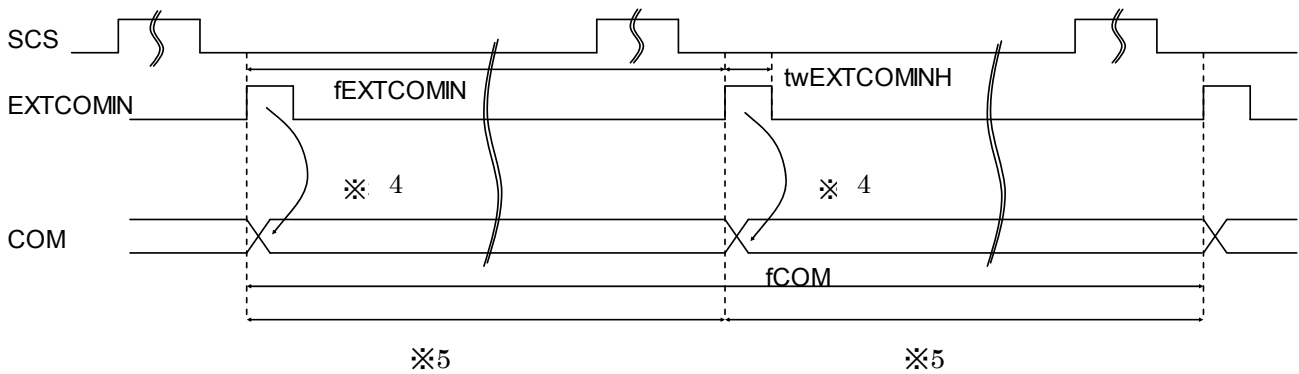
※2: Make "COM" reversal depending on COMZ at the COMEN's rise time.

※3: The period of EXTCOMIN should be constant.

And the period of COM inversion should be constant depending on EXTCOMIN. (with Binary Driver operate or making the period of "SCS = Low")

Figure 6-11 COM Inversion 1 (EXTMODE=Hi)

②: the EXTCOMIN input during low period of the SCS signal .



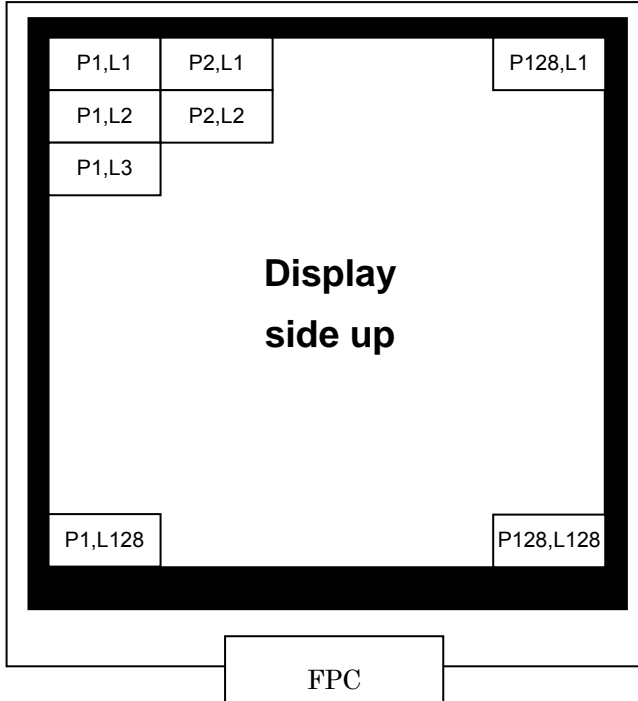
※4 LC inversion polarity has been set by the rising edge of EXTCOMIN.

※5 The period of EXTCOMIN should be constant.

Figure 6-12 COM Inversion 2 (EXTMODE=Hi)

6-7) Input Signal and Display, Gate address(Line) Setting

<Data position in display[H,V]>



P*: Pixels position

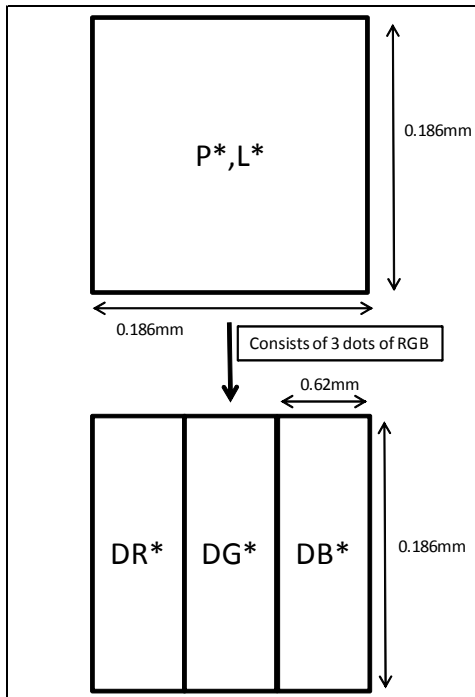
L*: Gate address line

<Gate line address setting>

GL	AG0	AG1	AG2	AG3	AG4	AG5	AG6	AG7
1	1	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0
5	1	0	1	0	0	0	0	0
7	0	1	1	0	0	0	0	0
8	1	1	1	0	0	0	0	0
:	:	:	:	:	:	:	:	:
121	1	0	0	1	1	1	1	0
122	0	1	0	1	1	1	1	0
123	1	1	0	1	1	1	1	0
124	0	0	1	1	1	1	1	0
125	1	0	1	1	1	1	1	0
126	0	1	1	1	1	1	1	0
127	1	1	1	1	1	1	1	0
128	0	0	0	0	0	0	0	1

GL: Gate address line

<Block diagram of the pixel>



<Color Data Table>

Color	DR*	DG*	DB*
Black	0	0	0
Red	1	0	0
Green	0	1	0
Yellow	1	1	0
Blue	0	0	1
Magenta	1	0	1
Cyan	0	1	1
White	1	1	1

Figure 6-13 Data position

7. Optical specification

Table 7-1 Optical specification

VDD=VDDA=5V, Ta=25°C

Item	Symbol	Min.	Typ.	Max.	unit	Remark	
Viewing angle range CR \geq 2	Horizontal	θ_{21}, θ_{22}	40	60	-	°(degree)	[Note 7-1]
	Vertical	θ_{11}	40	60	-	°(degree)	
		θ_{12}	40	60	-	°(degree)	
Contrast ratio	CR	15	24	-		[Note 7-2,3]	
Reflecivity ratio	R	6.5	8.5	-	%	[Note 7-3]	
Transmissivity ratio	T	-	0.15	-	%		
Response time	Rise	τ_r	-	10	20	ms	[Note 7-3,4]
	Fall	τ_d	-	20	40	ms	
Panel Chromaticity	White	x	-	0.30	-		[Note 7-3]
		y	-	0.34	-		
	Red	x	-	0.41	-		
		y	-	0.31	-		
	Green	x	-	0.30	-		
		y	-	0.40	-		
	Blue	x	-	0.21	-		
		y	-	0.28	-		
NTSC ratio		-	6.0	-	%		

[Note 7-1] Defintion of Viewing Angle

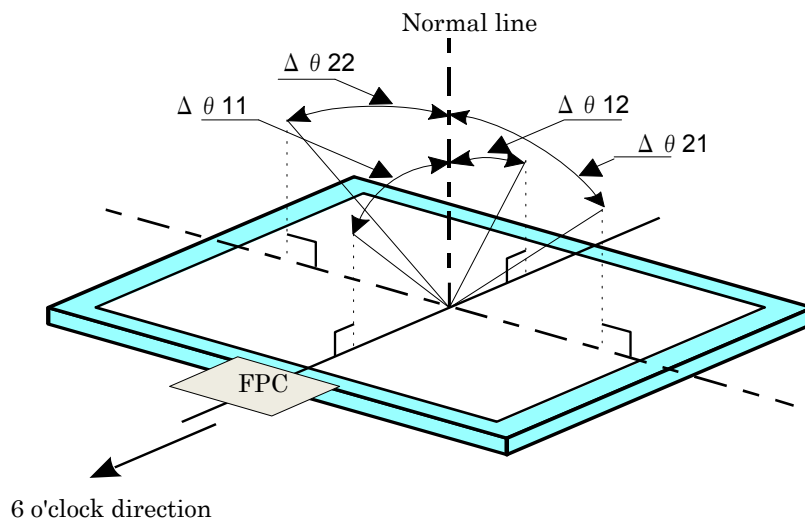


Figure 7-1 Defintion of Viewing Angle

[Note 7-2] Definition of Contrast Ratio

The contrast ratio is defined as the following.

$$\text{Contrast ratio(CR)} = \frac{\text{Reflection intensity in white display}}{\text{Reflection intensity in black display}}$$

[Note 7-3] Optical characteristics measurement equipment.

Figure 7-2 is for contrast ratio, reflectivity ratio, and panel chromaticity measurement, and Figure 7-3 is for response time measurement. Both are to be conducted in a dark or room equipped to a dark room

Measurement equipment

(CM700d)

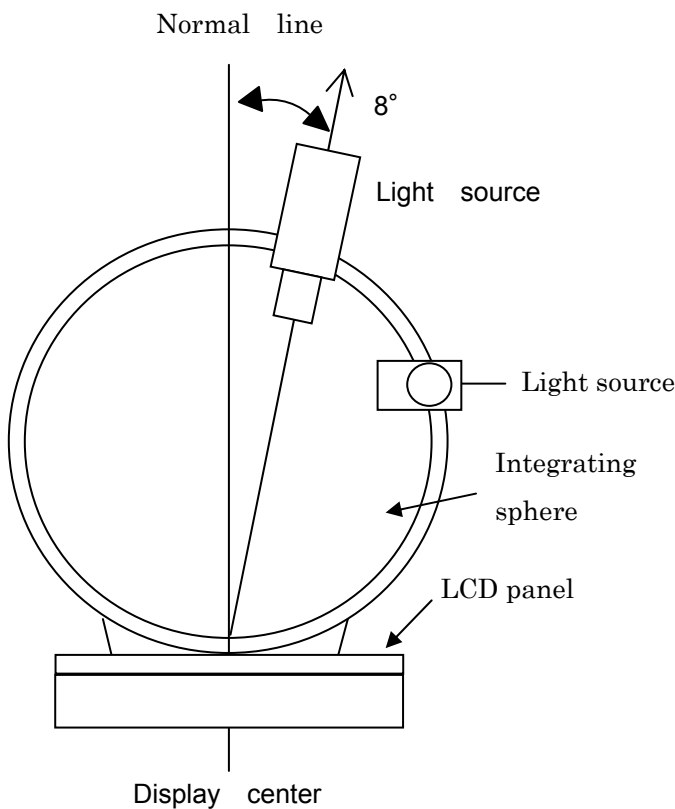


Figure 7-2 Contrast ratio, Reflection ratio, Panel chromaticity

Measurement equipment

(LCD-5200)

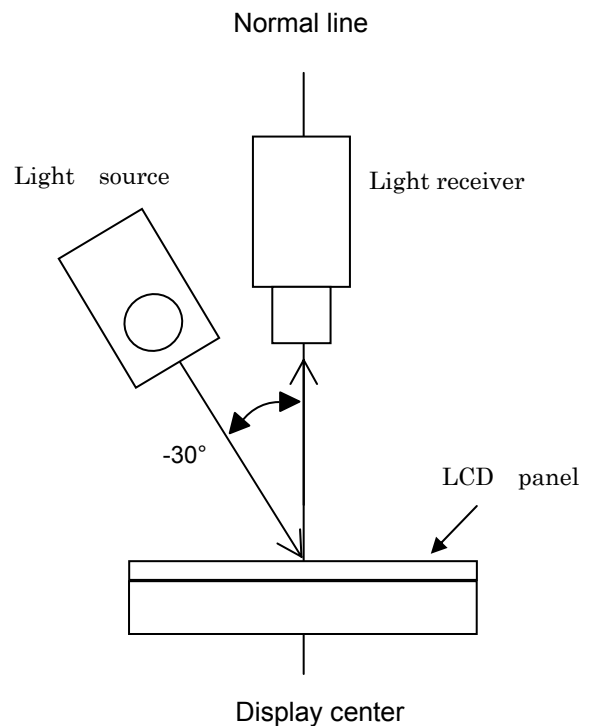


Figure 7-3 Response time

[Note 7-4] Respons time (Change in reflection ratio)

It's difined by the time change of optical receiver output when signal is input to display white or black

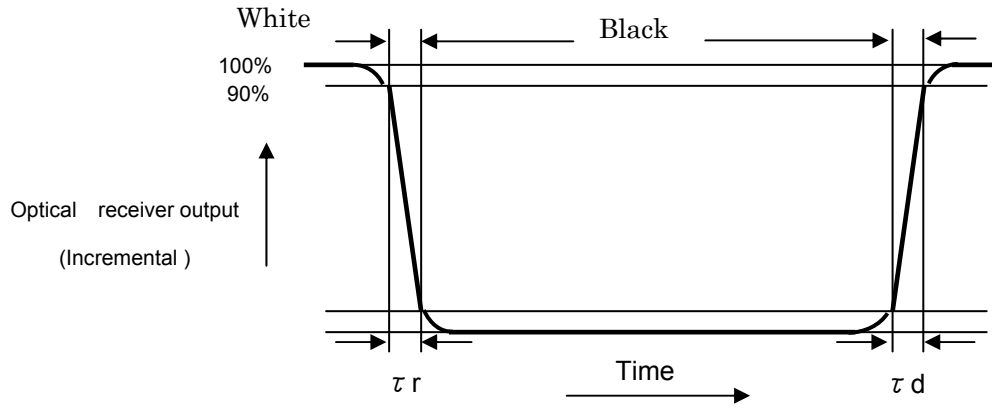


Figure 7-4 Respons time

8. Module outline

8-1) Outline dimension of the 1.33" (128 x 128) panel
The outline dimensions are shown in Figure 8-1 (Page.32)

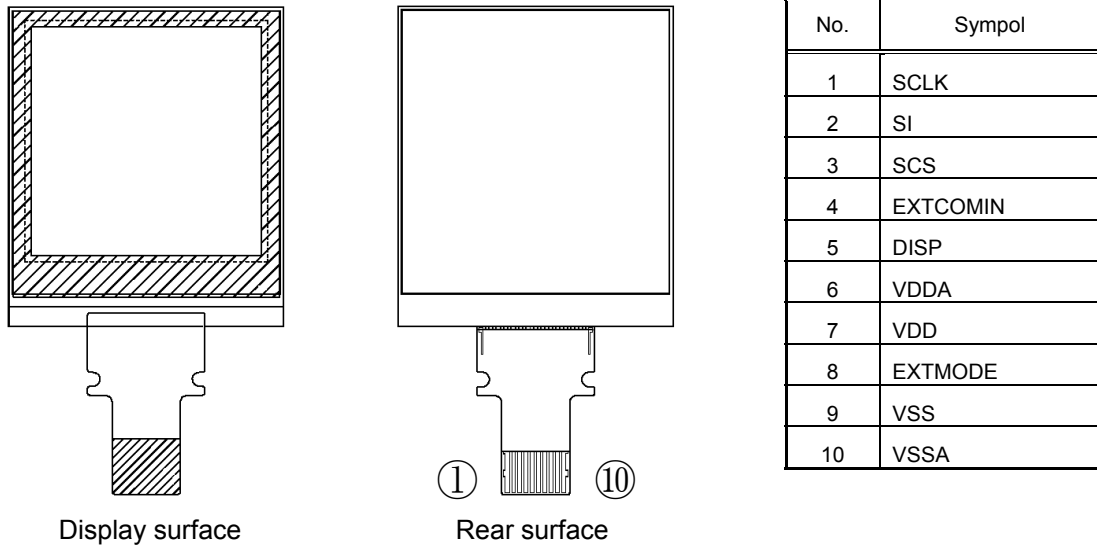


Figure 8-2 Module outline

8-2) FPC Bend Specification

Table 8-1 Recommended Connector No.1 (Bottom side)

Product manufacturer	Series	Part number	Contact
Panasonic	Y5B	AYF531035	Bottom side (Bottom and Upper)
SMK	FP12	CFP-4610-0150F	Bottom side

When bending FPC, bend where specified in Condition (1) and the bend R should be more than R specified in Condition (2). FPC is not to contact glass edge, and there should be no stress to connective area between panel and FPC.

Condition (1) FPC bend recommended area: 0.8mm – 6.0mm from glass edge.

Condition (2) Minimum bend R: Inner diameter R0.45

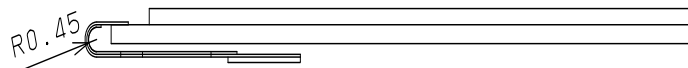


Figure 8-3 FPC Bend Specification

【Note 8-1】 Do not bend backward (toward polarizer film side)

【Note 8-2】 Bend frequency: 3 times or less (Repeat bend condition: 180° ~ 0°)

Table 8-2 Recommended Connector No.2 (Upper side)

Product manufacturer	Series	Part number	Contact
Panasonic	Y5B	AYF531035	Upper side (Bottom and Upper)
SMK	FP12	CFP-4510-0150F	Upper side

9. Display Qualities

Please refer to the outgoing Inspection Standard.

10. External capacitors

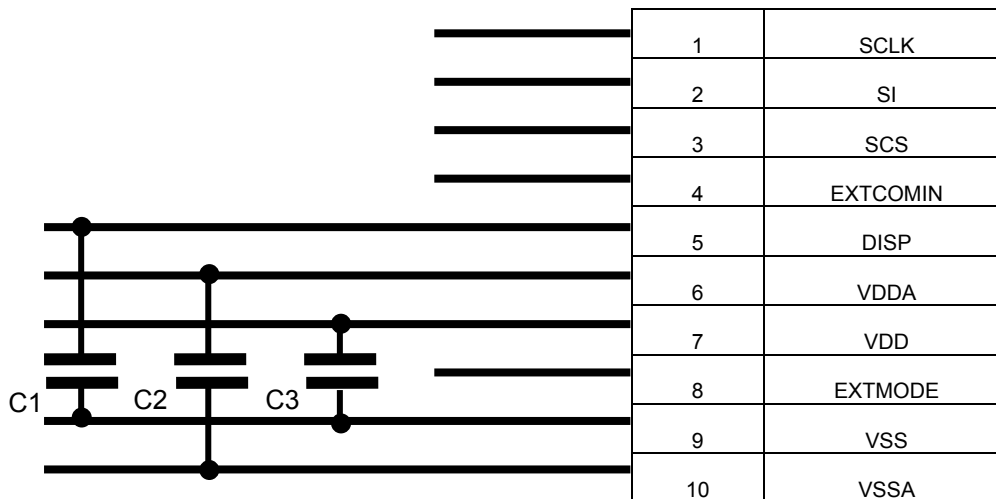


Figure 10-1 External capacitor recommendation capacity value

<Recommended capacity value>

C1: DISP – VSS : rank B 0.1uF Ceramic capacitor

C2: VDDA- VSSA : rank B 1.0uF Ceramic capacitor

C3: VDD – VSS : rank B 1.0uF Ceramic capacitor

※Above circuit and parts are only recommendation.

For actual use, please evaluate their conformity with your system and design.

(Capacitor pressure resistance can be larger than resistance indicated above.)

11. Marking

11-1) Displayed by printing. (Ink-jet print)

The display position is shown in Figure. 11-1 Outline dimension diagram.

Display contents

Line 1 → YMDDP
Line 2 → 01234A

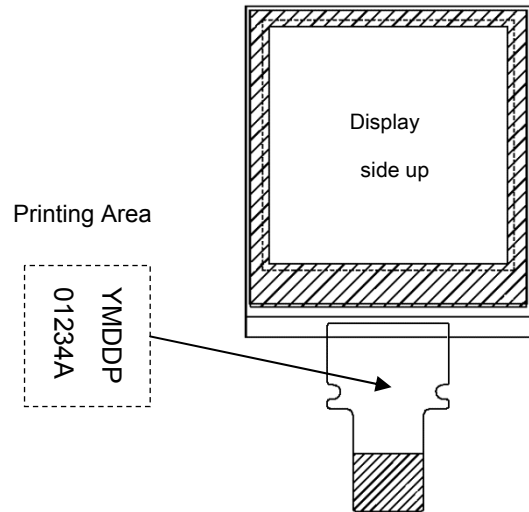


Figure. 11-1 Lot number printing position

Table 11-1 marking line definition

Line	Making	Description
1	YMDDP	Y : Single-digit year (Last digit of the year) (0,1,- - 8,9) M : Single-digit Month (1,2,--,9,X,Y,Z) DD : Digit of the day (01,--,31) P : Code of manufacture
2	01234A	01234 : Five-digit in Consecutive number (Traceability number) A : Product revision

12.Packaging form

12-1) Carton storage condition

- 1) Piling number of cartons. : 8
- 2) Package quantity in one carton : 1120 pcs
- 3) Carton size (Typ.) : 528 mm x 363 mm x 228 mm
- 4) Total mess : 6.8kg

(One carton filled with (1120) modules)

5) Carton store environment:

• Temperature:

0~40°C

• Humidity:

60%RH or lower (at 40°C)

There should be no condensation at low temperature and high humidity.

• Atmosphere:

No harmful gas, such as acid or alkali, which causes severe corrosion on electronic parts and wiring, are to be detected.

• Opening the package:

In order to prevent electrostatic damage to TFT modules, room humidity should be made over 50%RH and take effective measure such as use of earth when opening the package.

• Direct sunlight

Please keep the product in a dark room or cover the product to protect from direct sunlight.

• Atmospheric condition

Please refrain from keeping the product with possible corrosive gas or volatile flux.

• Prevention of dew

Do not place directly on the floor, and please store the product carton either on a wooden pallet or a stand to avoid dew condensation. In order to obtain moderate ventilation in the pallet's bottom surfaces, arrange correctly in the fixed direction.

Please place the product cartons away from the storage wall. Be careful of the inside of a warehouse to ventilate well and please consider installation of a ventilator. Manage to rapid temperature change under natural environment.

• Vibration

Please refrain from keeping the product in the place which always has vibration.

• Storage Period:

Within above mentioned conditions, maximum storage period should be 3 months

12-2) Packaging form figure

The packing condition is shown in Figure. 12-1

The packaging is designed such that the module does not break during transit.

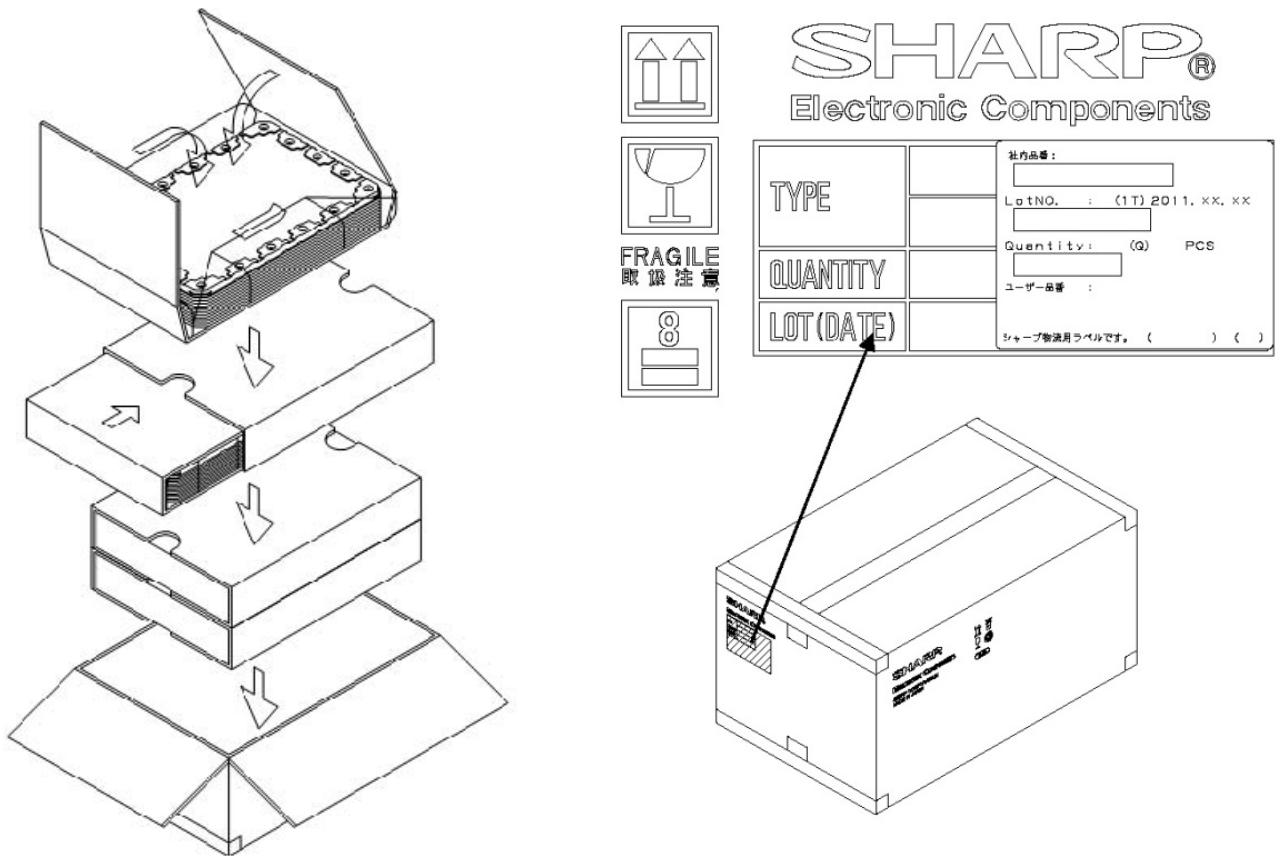


Figure. 12-1 Packaging Form

13. Reliability Test Conditions

13-1) Reliability Test Items

Table13-1 Reliability Test Items

No.	Test Item	Condition	Remark
1	High temperature storage test (Non operating test)	Ta=80°C 240h	
2	Low temperature storage test (Non operating test)	Ta=-30°C 240h (No condensation)	
3	High temperature and high humidity operating test	Tp=40°C/95%RH 240h	
4	High temperature operating test	Tp=70°C 240h	
5	Low temperature operating test	Tp=-20°C 240h	
6	Thermal Shock test (Non operating test)	Ta=-30°C (1h)~+80 °C (1h) / 5 cycle	
7	Electro static discharge test	±200V、200pF(0Ω) each terminal: 1 time (contact mode)	

(Note) Ta = Ambient temperature

 Tp = Panel surface temperature

Result Evaluation Criteria

Under the display quality test conditions with normal operation state, these shall be no change which may affect practical display function.

(*)normal operation state : Temperature:15~35°C, Humidity:45~75%, Atmospheric pressure:86~106kpa)

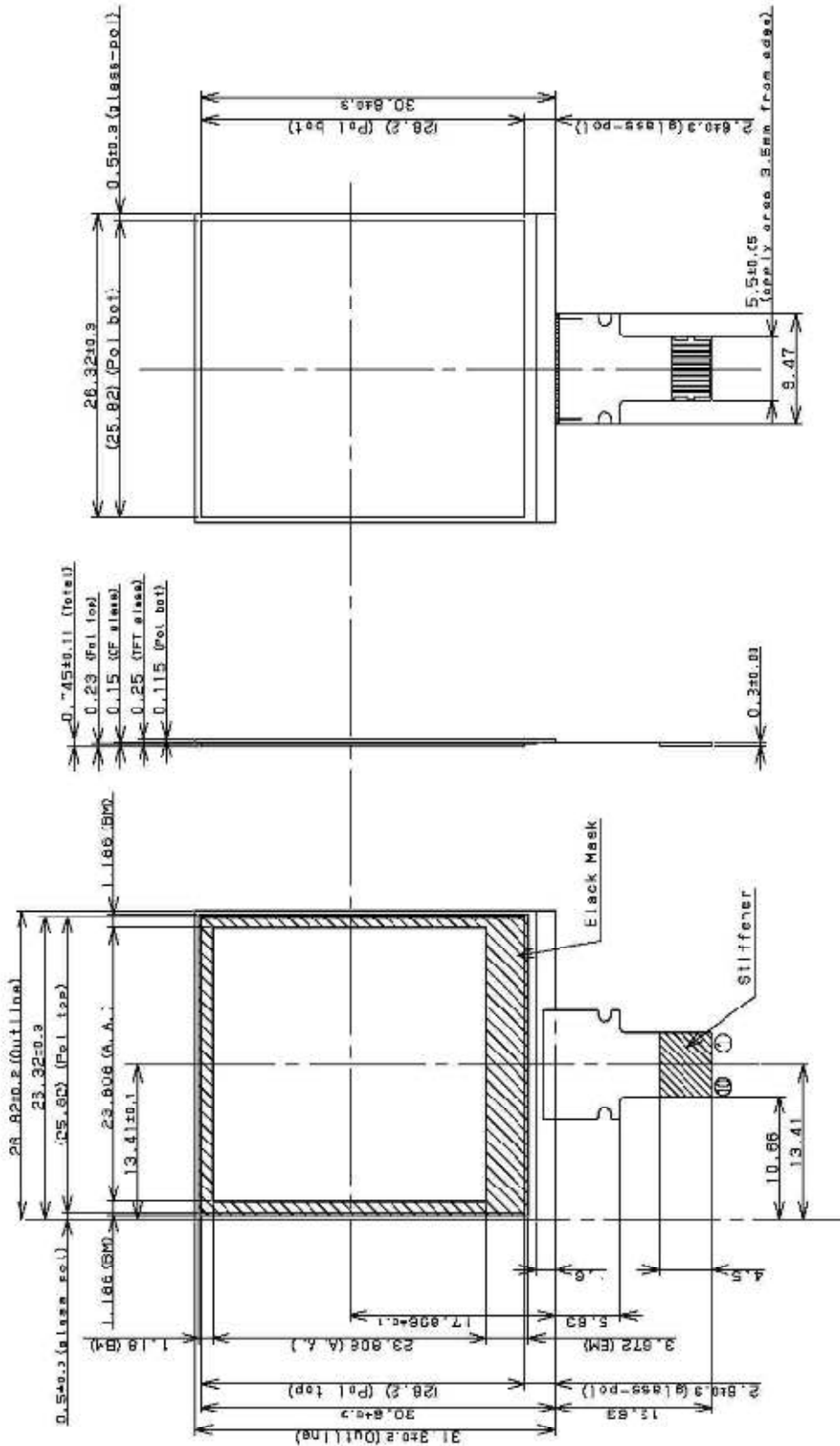


Figure 8-1 Module outline

Any foreign materials and contamination outside the Active area are to be treated as 'NO-Count' at our inspections. Guarantee of appearance=LCD Active area. General tolerance is ±0.2. FPC bend larger than 0.45 in radius. Please design carefully to hide the polarizer and other frame areas, which are outside of the guaranteed area. As the light from backlight may leak from the gap at outside of active area, which are outside of active area. Please pay attentions to such leakage when designing the set. The tolerances of the module which do not include vars of the case.