仕様書番号	FO320-0001K1
発 行 日	2013/1/31

御 中

仕　様　書

品名　TFT-LCD Cell

型名　FO320－0002K

備　考

RECORDS OF REVISION

MODEL No. : LK0DZ1C0444

SPEC No. : LD-K24902

DATE	NO.	REVISED No.	PAGE	SUMMARY	NOTE
2012.9.13	LD-K24902	-	-	-	1st Issue

1. Application

This specification applies to the color 31.5" TFT-LCD Open-Cell (LK0DZ1C0444).

* This specification is proprietary product of SHARP CORPORATION ("SHARP") and includes materials protected under copyright of SHARP. Do not reproduce or cause any third party to reproduce them in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of SHARP.

* In case of using the device for applications such as control and safety equipment for transportation (aircraft, trains, automobiles, etc.), rescue and security equipment and various safety related equipment which require higher reliability and safety, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.

* Do not use the device for equipment that requires an extreme level of reliability, such as aerospace applications, telecommunication equipment (trunk lines), nuclear power control equipment and medical or other equipment for life support.

* SHARP assumes no responsibility for any damage resulting from the use of the device that does not comply with the instructions and the precautions specified in this specification.

* Contact and consult with a SHARP sales representative for any questions about this device.

2. Overview

This Open-Cell is a color active matrix LCD panel incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, and Source-PWB.

The following contents can be achieved in using LK0DZ1C0446 (C-PWB) and LK0DZ1C0380 (CS-FPC) that SHARP specifies.

Graphics and texts can be displayed on a 1366×RGB×768 dots panel with 16,777,216 colors by using LVDS (Low Voltage Differential Signaling) for the interface and +5V DC supply voltage, which are put into Control PWB.

This applies the Over Shoot driving (O/S driving) technology, signals are being applied to the Liquid Crystal according to a pre-fixed process as image signals of the present frame when a difference is found between image signals of the previous and current frame by comparing each other. The O/S driving technology makes the Liquid Crystal response within 1 frame completely, motion blur reduce, so that clearer display performance can be realized.

3. Mechanical specifications

Parameter	Specifications	Unit
Display size	80.039 (Diagonal)	cm
	31.5 (Diagonal)	inch
Active area	697.69 (H) × 392.26 (V)	mm
Pixel Format	1366 (H) × 768 (V) (1pixel = R + G + B dot)	pixel
Pixel pitch	0.51075(H) × 0.51075 (V)	mm
Pixel configuration	R,G, B vertical stripe	
Display mode	Normally black	
Outline Dimensions [Note1]	715.7(W) × 432.45(H) × 1.8(D)	mm
Mass	1.15±0.1	kg
Surface treatment [Note2] (Polarizer)	Low-Haze Anti Glare, Hard coating Surface Hardness; 2H: CF side (Front) <6B: TFT side (Rear)	

[Note1] Outline dimensions are shown in P17.
[Note2] Without the protection film.

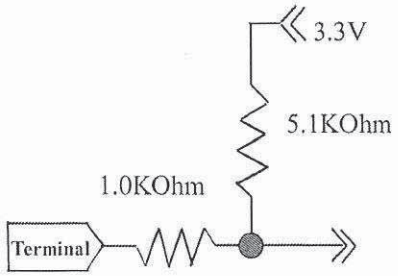
[Note 1] SELLVDS

Transmitter		SELLVDS	
Pin No	Data	=L(GND)	=H(3.3V) or Open
51	TA0	R0(LSB)	R2
52	TA1	R1	R3
54	TA2	R2	R4
55	TA3	R3	R5
56	TA4	R4	R6
3	TA5	R5	R7(MSB)
4	TA6	G0(LSB)	G2
6	TB0	G1	G3
7	TB1	G2	G4
11	TB2	G3	G5
12	TB3	G4	G6
14	TB4	G5	G7(MSB)
15	TB5	B0(LSB)	B2
19	TB6	B1	B3
20	TC0	B2	B4
22	TC1	B3	B5
23	TC2	B4	B6
24	TC3	B5	B7(MSB)
27	TC4	NA	NA
28	TC5	NA	NA
30	TC6	DE(*)	DE(*)
50	TD0	R6	R0(LSB)
2	TD1	R7(MSB)	R1
8	TD2	G6	G0(LSB)
10	TD3	G7(MSB)	G1
16	TD4	B6	B0(LSB)
18	TD5	B7(MSB)	B1
25	TD6	NA	NA

NA: Not Available

(*) Since the display position is prescribed by the rise of DE (Display Enable) signal, please do not fix DE signal during operation at "High."

[Note 2] The equivalent circuit figure of the terminal



4.2. Interface block diagram

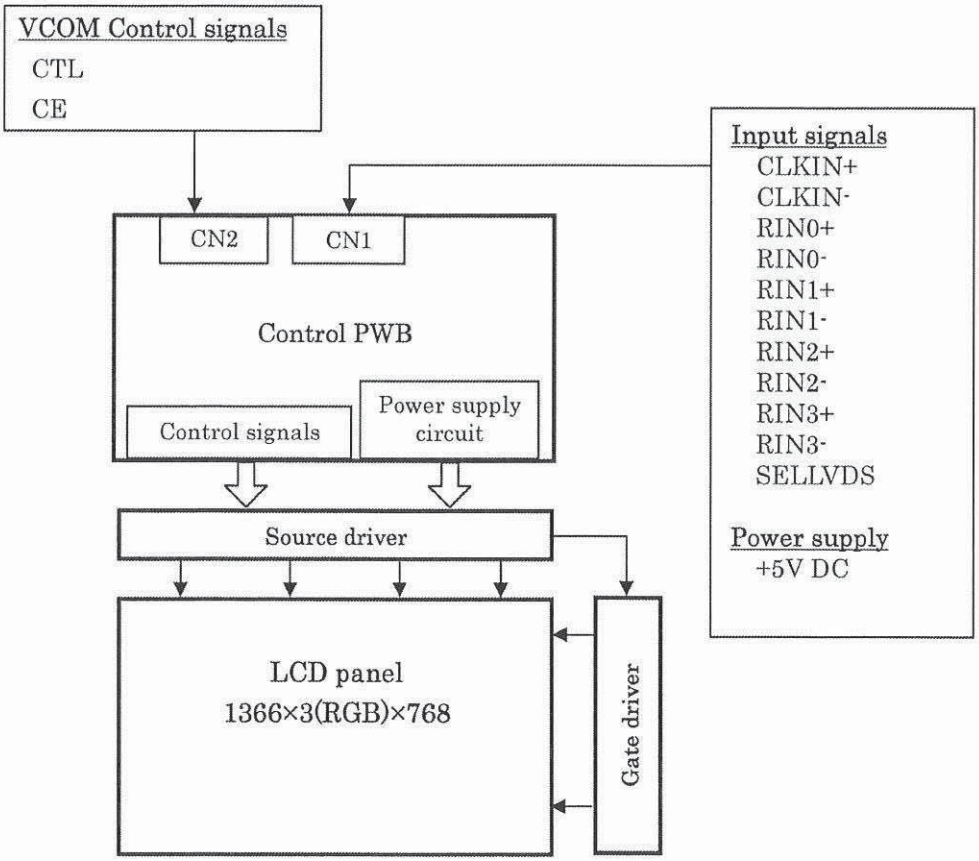
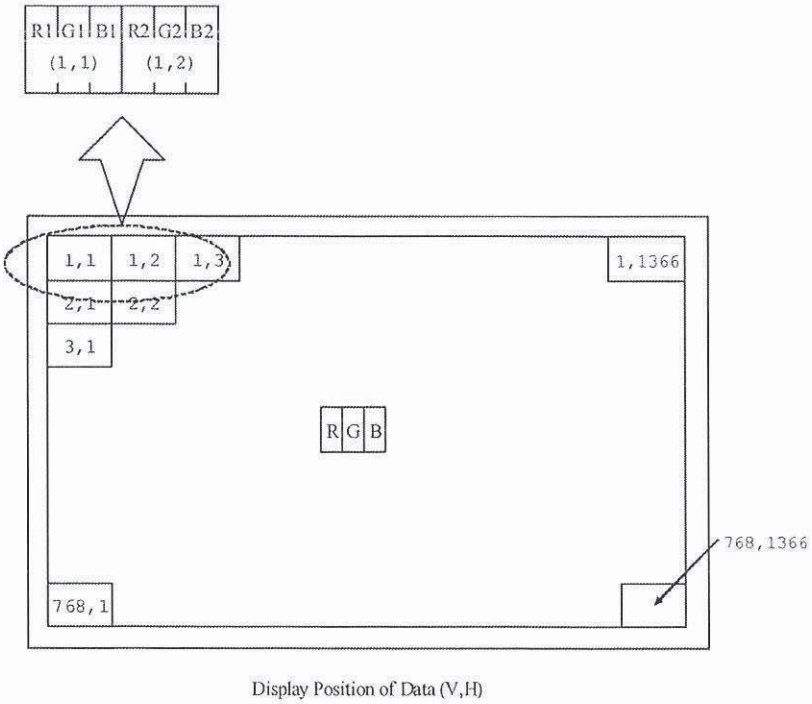


Fig.1 Interface block diagram

4.3. Display position of data



Display Position of Data (V,H)

6. Electrical characteristics

6.1. Electrical characteristics of input signals

Parameter		Symbol	Min.	Typ.	Max.	Uniit	Remark
+5V supply voltage	Supply voltage	Vcc	+4.5	+5.0	+5.5	V	[Note 1]
	Current dissipation	Icc	-	800	1500	mA	[Note 2]
		I_{RUSH}	-	-	4500	mA	[Note 5]
		T_{RUSH}	-	-	1	ms	[Note 5]
Permissible input ripple voltage		V_{RP}	-	-	100	mV_{P-P}	Vcc = +5.0V
Differential input threshold voltage	High	V_{TH}	-	-	100	mV	V_{CM} = +1.2V [Note 4]
	Low	V_{TL}	-100	-	-	mV	
Input Low voltage		V_{IL}	-	-	0.7	V	[Note 3]
Input High voltage		V_{IH}	2.6	3.3	3.6	V	
Input leak current (Low)		I_{IL}	-	-	400	μA	V_I = 0V [Note 3]
Input leak current (High)		I_{IH}	-	-	100	μA	V_I =3.3V [Note 3]
Terminal resistor		R_T	-	100	-	Ω	Differential input

[Note] V_{CM}: Common mode voltage of LVDS driver.

[Note 1]

Input voltage sequences

0 < t1 ≤ 10ms

0 < t2-1 ≤ 20ms

t2-2 ≥ 10ms

0 < t3 ≤ 1s

t4 ≥ 1s

t5 ≥ 200ms

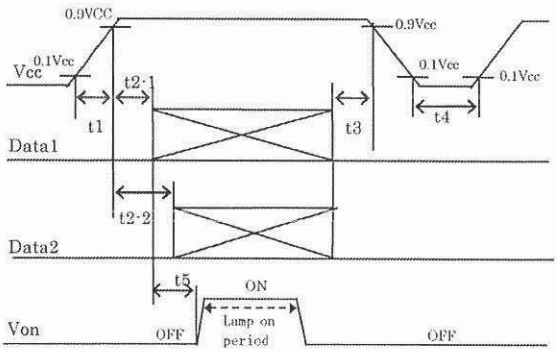
Dip conditions for supply voltage

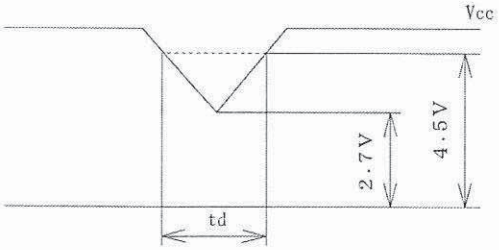
a) 2.7V ≤ Vcc < 4.5V

td ≤ 10ms

b) Vcc < 2.7V

Dip conditions for supply voltage is based on input voltage sequence.





* Data1: CLKIN±, RIN0±, RIN1±, RIN2±, RIN3±

* Data2: SELLVDS

* About the relation between data input and back light lighting, please base on the above-mentioned input sequence.

When back light is switched on before panel operation or after a panel operation stop, it may not display normally. But this phenomenon is not based on change of an incoming signal, and does not give damage to a liquid crystal display.

6.2. Timing characteristics of input signals

Timing diagrams of input signal are shown in Fig.2

Parameter		Symbol	Min.	Typ.	Max.	Unit
Clock	Frequency	1/Tc	80	82	85	MHz
Data enable signal	Horizontal period	TH	1686	1696	1940	clock
			19.8	20.68	-	μs
	Horizontal period (High)	THd	1366	1366	1366	clock
	Vertical period	TV	778	806	972	line
	Vertical period (High)	TVd	768	768	768	line

[Note] *When a vertical period is very long, a flicker may occur.

*Please turn off the module after it shows the black screen.

*Please make sure that a length of vertical period should be an integral multiple of horizontal period, otherwise the screen may not display properly.

*Please be careful not to fall below the minimum horizontal period, otherwise the display may be dark.

We will check the display operation for your final setting of drive timing, so please inform us of your final setting.

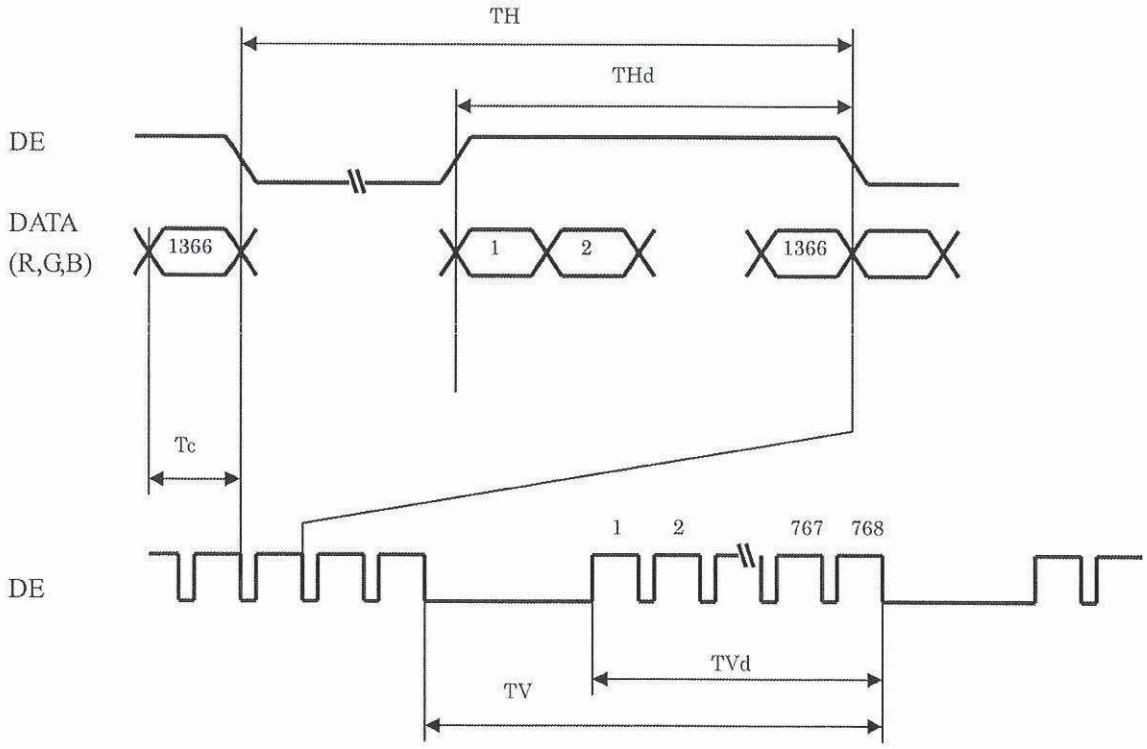


Fig.2 Timing diagram of input signals

8. Optical characteristics

Ta = 25°C, Vcc = +5V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Horizontal	$\theta 21$ $\theta 22$	CR ≥ 10	70	88	-	Deg.	[Note1,4]
	Vertical	$\theta 11$ $\theta 12$		70	88	-	Deg.	
Contrast ratio		CRn	θ=0 deg.	3500	4500	-	-	[Note2,4]
Response time		τ_{DRV}		-	7	-	ms	[Note3,4,5]
Chromaticity of white		x		Typ.-0.03	0.280	Typ.+0.03	-	[Note 4]
		y		Typ.-0.03	0.292	Typ.+0.03	-	
Chromaticity of red		x		Typ.-0.03	0.607	Typ.+0.03	-	
		y		Typ.-0.03	0.336	Typ.+0.03	-	
Chromaticity of green		x		Typ.-0.03	0.306	Typ.+0.03	-	
		y		Typ.-0.03	0.611	Typ.+0.03	-	
Chromaticity of blue		x		Typ.-0.03	0.154	Typ.+0.03	-	
		y		Typ.-0.03	0.080	Typ.+0.03	-	
Luminance of white		Y_L		300	400		cd/m^2	[Note 4]
Luminance uniformity		δ_W		-	-	1.25	-	[Note 6]

*Optical characteristics are based on SHARP LK315T3FZJ1 module.

*The measurement shall be executed 60 minutes after turning on.

[Note] The optical characteristics are measured using the following equipment.

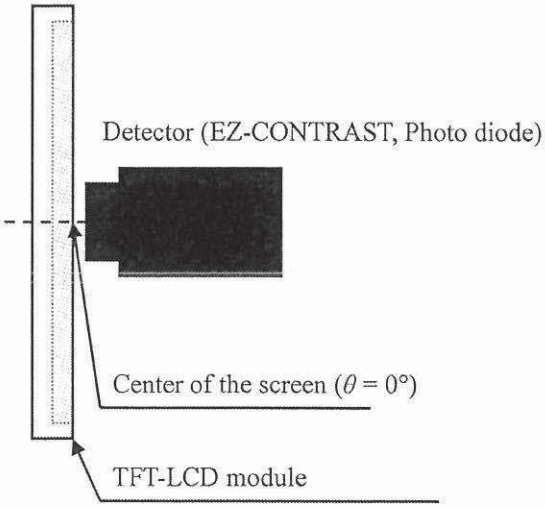


Fig.3-1 Measurement of viewing angle range and response time.
(Viewing angle range: EZ-CONTRAST
Response time: Photo diode)

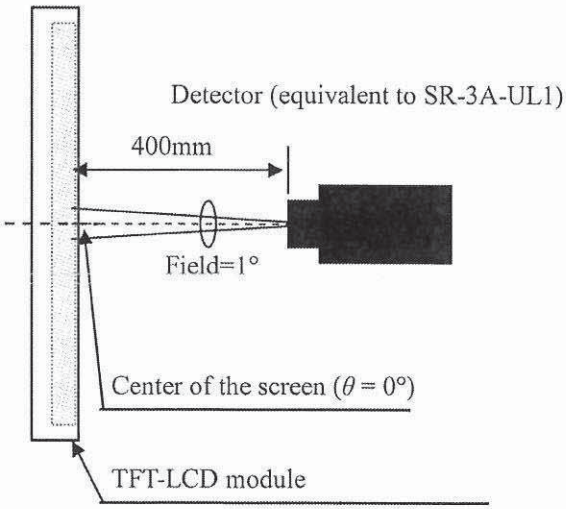


Fig.3-2 Measurement of Contrast, Luminance, and Chromaticity.

13. Precautions

a) Because the Open-Cell is weak to static electricity, please do not touch the terminal with bare hands.

b) Since the front polarizer is easily damaged, pay attention not to scratch it.

c) Since long contact with drops of water may cause discoloration or spots, please wipe off them as soon as put on the screen.

d) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

e) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

f) Precautions of peeling off the protection film:

- Be sure to peel off slowly (recommended more than 7sec) and constant speed.
- Peeling direction shown in Fig. 5.
- Be sure to ground person with adequate methods such as the anti-static wrist band.
- Be sure to ground S-PWBs while peeling off the protection film.
- Ionized air should be blown to the surface while peeling off.
- The protection film must not touch drivers and S-PWBs.
- If adhesive may remain on the polarizer after the protection film peeled off, please remove with isopropyl-alcohol.

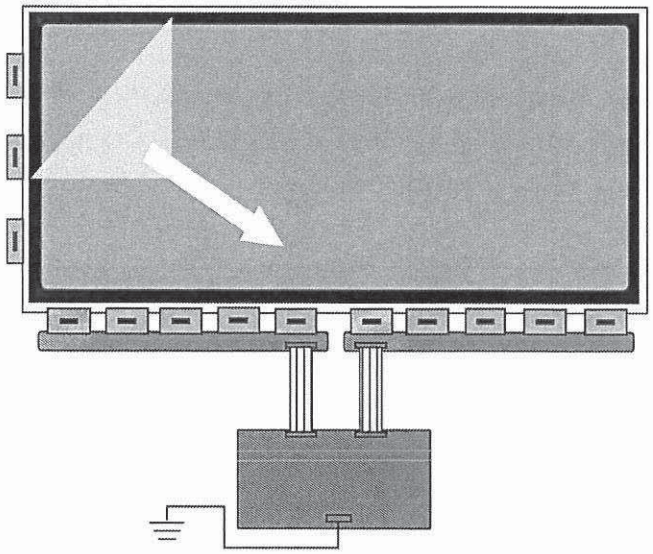


Fig.5 Direction of peeling off

g) Since the Open-Cell consists of TFT and electronic circuits with CMOS-ICs, which are very weak to electrostatic discharge, persons who are handling a Open-Cell should be grounded through adequate methods such as an anti-static wrist band. Connector pins should not be touched directly with bare hands.

・Reference: Process control standard of sharp

	item	Management standard value and performance standard
1	Anti-static mat(shelf)	1 to 50 [Mega ohm]
2	Anti-static mat(floor, desk)	1 to 100 [Mega ohm]
3	Ionizer	Attenuate from ±1000V to ±100V within two seconds.
4	Anti-static wrist band	0.8 to 10 [Mega ohm]
5	Anti-static wrist band entry and ground resistance	Below 1000 [ohm]
6	Temperature	22 to 26 [°C]
7	Humidity	60 to 70 [%]

h) Since the Open-Cell has some PWBs, please take care to keep them off any stress or pressure when handling