Customer :

No.

Date : 20.Feb.1996

Attention :

Your Reference No. :

Your Part No.

SPECIFICATIONS

ALPS' : LCD UNIT

MODEL LSU7S1011A

Spec. No. LSU7S1011A

Sample No. :

RECEIPT STATUS
RECEIVED

By. Date

Signature

Name

Title

DSG' D

APP' D

Sales

ALPS ELECTRIC EUROPA GmbH
Hansaallee 203, 40549 Düsseldorf, Germany

Contents

1. Table of Date-Revision

Date	Item	Revision Point
17,Jan,96	Item 12	Addition of Inspection standard
07,Feb,96	Mechanical Drawing	Addition of two holes on TCP
07,Feb,96	- Packing	Addition of Packing Assembly -
19,Feb,96	Vibration	Addition to item 9.7
20,Feb,96	Peeling	Addition to item 9.8

2. Scope

This specification is applied to the liquid crystal display module LSU7S1011A .
LCD is designed based upon 1/33 duty,1/6 bias,using built-in doubler circuit of SED1530TA*.

3. Display Contents

96x 32 dots .
Background color: gray, reflective mode

4. Mechanical Characteristics

Item	Specification	Unit
Outline dimension	70 (W) x 77(H) x 2.1(D)	mm
Viewing area	61.8 (W) x 23(H)	mm
Weight	(about 30)	g

Note: (D) shows maximum thickness.

5. Circuit diagram

See attached.

6. Electro-Optical Characteristics

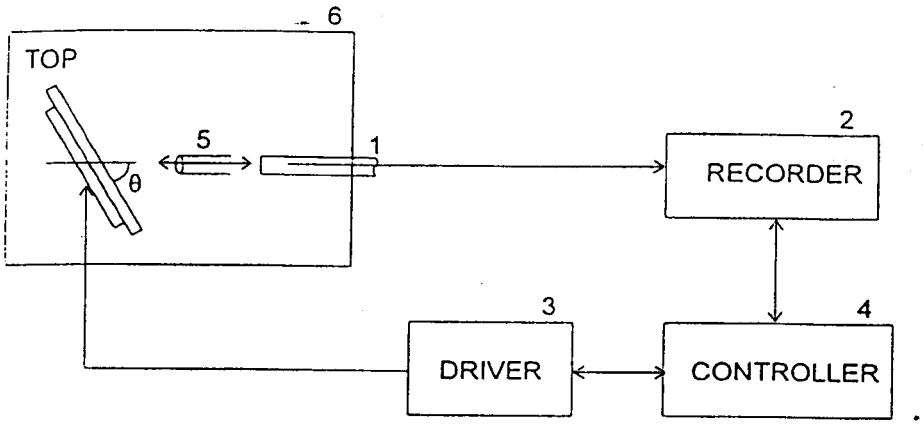
6-1. Electro-Optical Characteristics (1/33 duty ,1/6 bias)

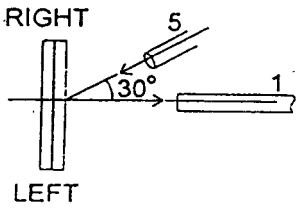
No.	Item	Symbol	Unit	Temp. (°C)	Std. value			Note
					Min.	Typ.	Max.	
1.	Operating voltage	Vop VDD-V5	V	50		6.5		
				25		6.9		
				0		7.3		
2.	Response rise time	tr	msec	50		100	200	Note 1
				25		150	300	
				0		800	1500	
	Response fall time	tf	msec	50		150	300	
				25		250	500	
				0		1200	2400	
3.	Frame frequency	fF	Hz	25		64	100	Note 1
4.	Recommendable viewing angle	θ_0	degree			75		Note 2
5.	Viewing angle (K ≥ 2) bottom-top direction	θ	degree		30			Note 2
	right-left direction	ϕ	degree				±30	Note 2
6.	Contrast	K		25	3	4		Note 3

-CD display must be readable at -25 degC.

6-2. Measuring instruments and Block diagram of system for electro-optical characteristics

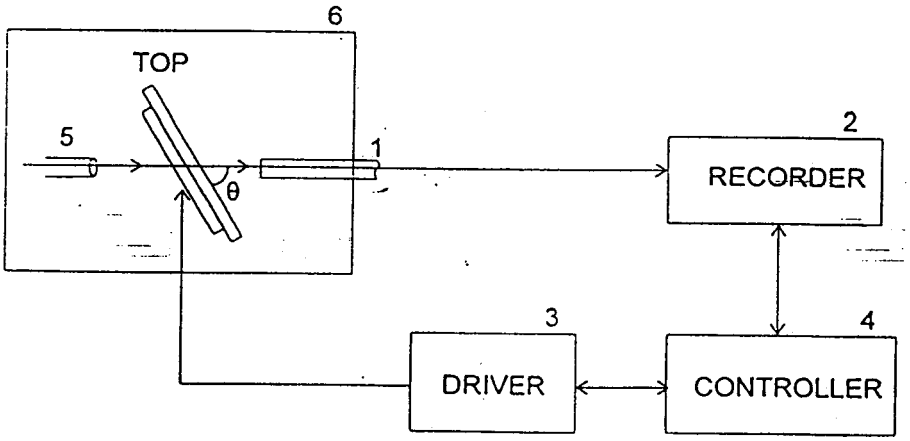
Reflective - positive type
Transflective - positive type

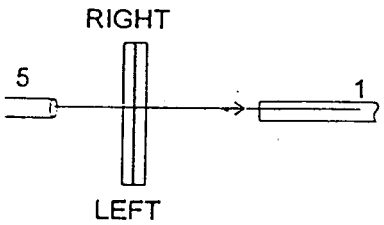




1 Luminance meter
2 Recorder
3 LCD driver
4 Controller
5 Diffuse light
6 Temperature control unit

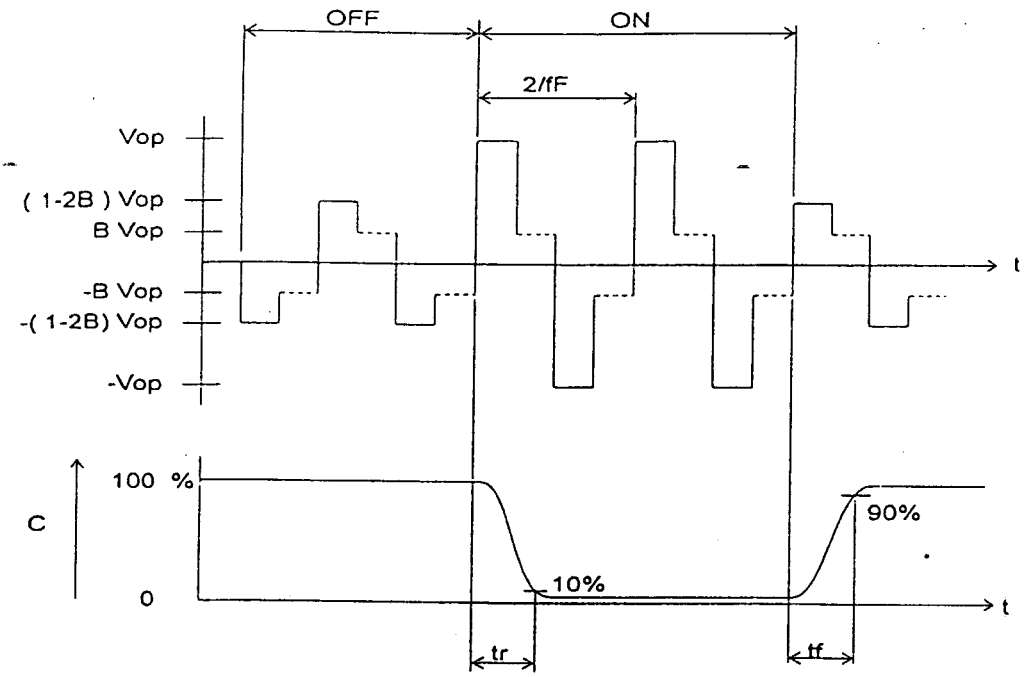
Transmissive type
Transflective - negative type





1 Luminance meter
2 Recorder
3 LCD driver
4 Controller
5 Diffuse light
6 Temperature control unit

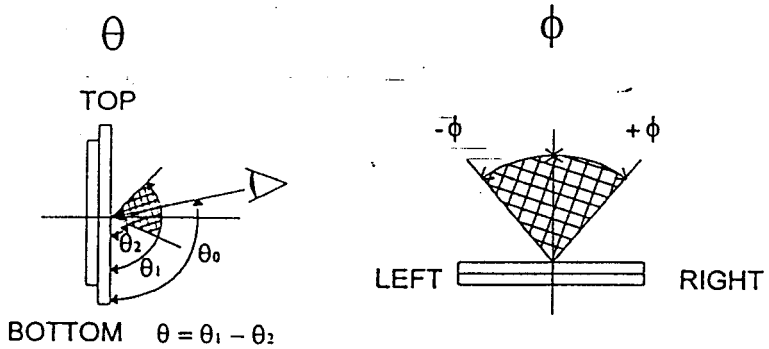
Note 1. Definition of response time and measuring condition.



Note: B = Bias
Positive type: C means brightness.
Negative type: C means darkness.

Conditions:			
	a) Temperature		0°C, 25°C, 50C
	b) Frame frequency	fF	64Hz
	c) Viewing angle	θ_0	75°
	d) Operating voltage	Vop	7.3V(0°C), 6.9V(25°C), 6.5V(50°C)

Note 2. Definition of viewing angle



Note 3. Definition of contrast ratio

$K = (Bn / Bs)^n$ -In case of negative mode LCD, n = -1
-In case of positive mode LCD, n = 1

where Bn and Bs are the brightness of non-selected segment and selected segment.

Conditions:			
	a) Temperature		25°C
	b) Frame frequency	fF	64Hz
	c) Viewing angle	θ_0	75°
	d) Operating voltage	Vop	6.9V

7. Electrical Characteristics

7.1 LCD and LCD driver part

7.1.1 Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Power supply voltage	VDD	-0.3 ~ +7.0	V
Input voltage	VI	-0.3 ~ VDD +0.3	V
Operating temperature	Top	0~ +50	°C
Storage temperature	Tstg	-20 ~ +70	°C

Note 1): If the LSI is operated exceeding maximum ratings, the LSI may be destroyed. It is strongly recommended for normal operation that the LSI is used under the condition of electrical characteristics which is written in this specification. Otherwise miss function will occur and it will affect to the reliability of LSI.

Note 2): All voltage values are specified by Vss = 0V

Note 3): If the LCD is operated under -20 deg.C,it may have unrecoverable defect.

7.1.2 Recommendable Operation Range

Item	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	VDD	4.5	5.0	5.5	V
Input voltage	VI	0	-	VDD	V
Operating temperature	Top	0	25	50	°C

7.1.3 DC Characteristics

Refer to the specification of SED1530TA*(SEIKO EPSON)

7.1.4 AC Characteristics

Refer to the specificatin of SED1530TA*(SEIKO EPSON)

8. Interface Pin Connection

Pin No.	Symbol	I/O	Function
1	NC	-	Non connection
2	FRS	O	Static drive output
3	FR	I/O	LCD AC signal input/output
4	DYO	I/O	Common drive signal output
5	CL	I/O	Display clock input/output
6	DOF	I/O	LCD blanking controll input/output
7	VS1	O	Internal power supply voltage monitor output
8	M/S	I	Master/slave mode select
9	RES	I	Reset(Low active)
10	P/S	I	Serial/parallel select pin
11	CS1	I	Chip select(Low active)
12	CS2	I	Chip select(High active)
13	C86	I	Microprocessor interterface select terminal
14	A0	I	Controll/display data flag input
15	W/R	I	Write enable input
16	RD(E)	I	RD for 8080(Active low);E for 6800 (Active high)
17	VDD	Supply	+5V
18	D0	I/O	Data bus
19	D1	I/O	Data bus
20	D2	I/O	Data bus
21	D3	I/O	Data bus
22	D4	I/O	Data bus
23	D5	I/O	Data bus
24	D6(SCL)	I/O	Data bus(Serial clock input for serial interface)
25	D7(SI)	I/O	Data bus(Serial data input for serial interface)
26	VSS	Supply	0V(Ground)
27	VOUT	O	DC/DC convertor output
28	CAP3-	O	DC/DC convertor capacitor 1 (negative)
29	CAP1+	O	DC/DC convertor capacitor 1 (possitive)
30	CAP1-	O	DC/DC convertor capacitor 1 (negative)
31	CAP2+	O	DC/DC convertor capacitor 2 (possitive)
32	CAP2-	O	DC/DC convertor capacitor 2 (negative)
33	V5	Supply	LCD driver supply voltage
34	VR	I	Voltage adjustment pin
35	VDD	Supply	+5V
36	V1	Supply	LCD driver supply voltage
37	V2	Supply	LCD driver supply voltage
38	V3	Supply	LCD driver supply voltage
39	V4	Supply	LCD driver supply voltage
40	V5	Supply	LCD driver supply voltage
41	NC	-	No connection

For more detail,refer to the SED1530 specification.

9. Reliability for LCD part except solderability

9.1 High Temperature Operation

Normal performance: After leaving them in on-state under normal humidity (less than 30% R. H) at 50°C for 120 hours.

9.2 Low Temperature Operation

Normal performance: After leaving them in on-state under normal humidity (less than 60% R. H.) at 0°C for 120 hours.

Pay attention to keep out dewdrops on the module during this test.

9.3 High Temperature Storage

Normal performance: After leaving them in off-state under normal humidity (less than 30% R. H.) at 70°C for 120 hours.

9.4 Low Temperature Storage

Normal performance: After leaving them in off-state under normal humidity (less than 60% R. H.) at -20°C for 120 hours.

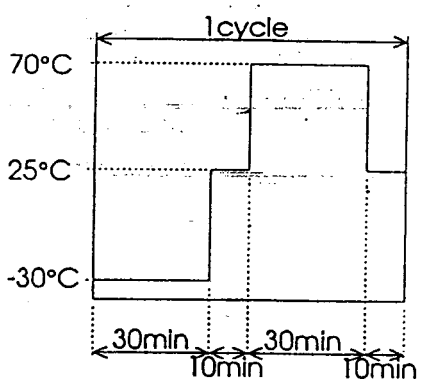
9.5 High Temperature and High Humidity Storage

Normal performance: After leaving them under the condition of 90 ~ 95% R. H. and 40°C for 120 hours.

Pay attention to keep out dewdrops on the module during this test.

9.6 Heat Cycle Test

Normal performance: After 10 cycles



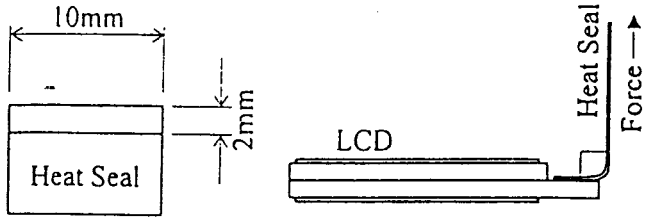
9.7 Vibration

The greatest acceleration	: 5G
Frequency	: 10 ~ 55 Hz/min.
Amplitude	: 1,5 mm
Time	: X,Y,Z direction 15 min.

Vibration Test Step
First Step :Frequency / Adjust frequency until 5G
Second Step :Amplitude / Adjust amplitude in order to keep 5G maximum

9.8 Peeling

Peeling Strength:over 5N
Test Method



Peeling Speed = 40mm/min.

9.9 Life Time

Expected life time is more than 50,000 hours under normal operating conditions.

10. Handling precaution for LCD part

10.1 LCD Surface

(1) Note that polarizers are so soft that they can be easily damaged. Do not press polarizer surface with hard object.

(2) When LCD surface becomes dirty, wipe softly with absorbent cotton soaked in benzine.

Do not use acetone or such kind of solvent, otherwise you will damage the polarizer surface.

10.2 Installment

(1) LSI on the TAB is easily damaged by static electricity. Body should be connected to the Ground through high resistance about 1 MΩ and discharge it in order to protect them from damage caused by static electricity.

(2) Refrain from strong pressure or bending force when you install it to the case.

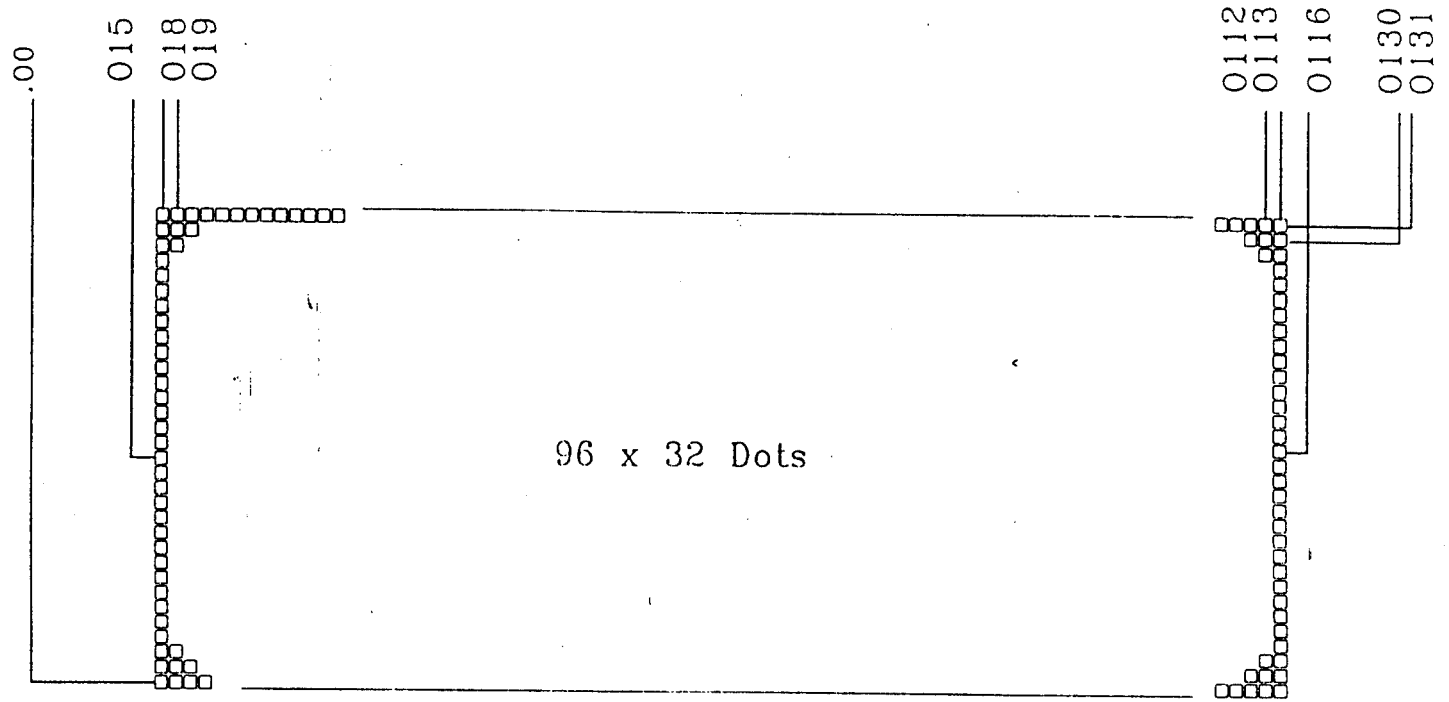
(3) Place a proper protective cover over the LCD surface in order to protect polarizer surface from scratch or strain.

(4) Pay attention not to apply pealing or strong stretching force to the connection part of Heat seal and LCD or Heat seal and TCP.

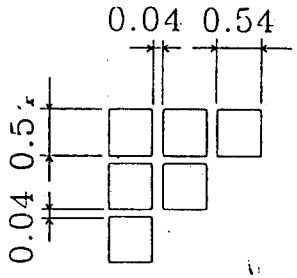
1. Drawing

(1) Mechanical drawing
(2) LCD mask detail and connection to SED1530
(3) Circuit diagram

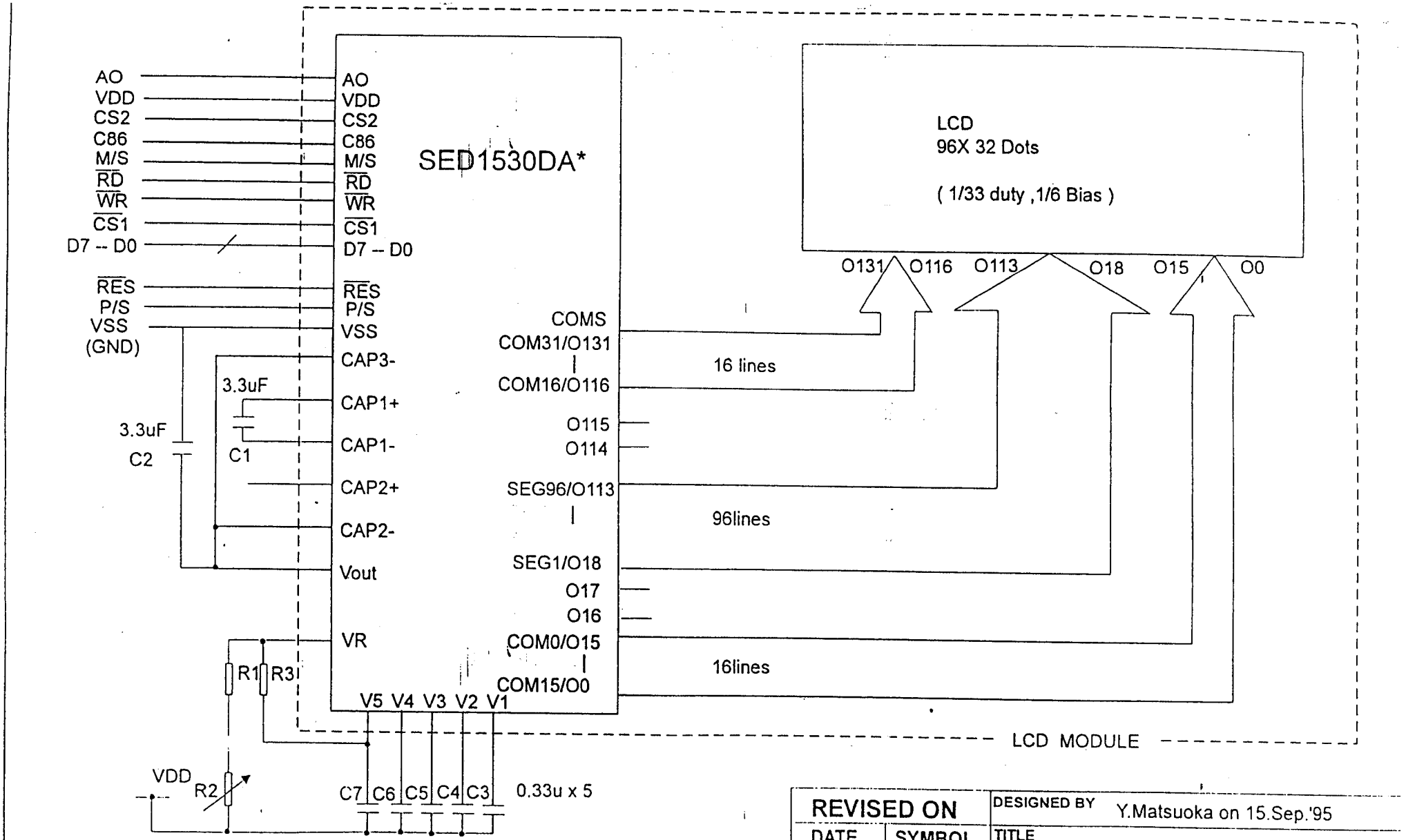
Connection to SED1530TA0



Mask Detail



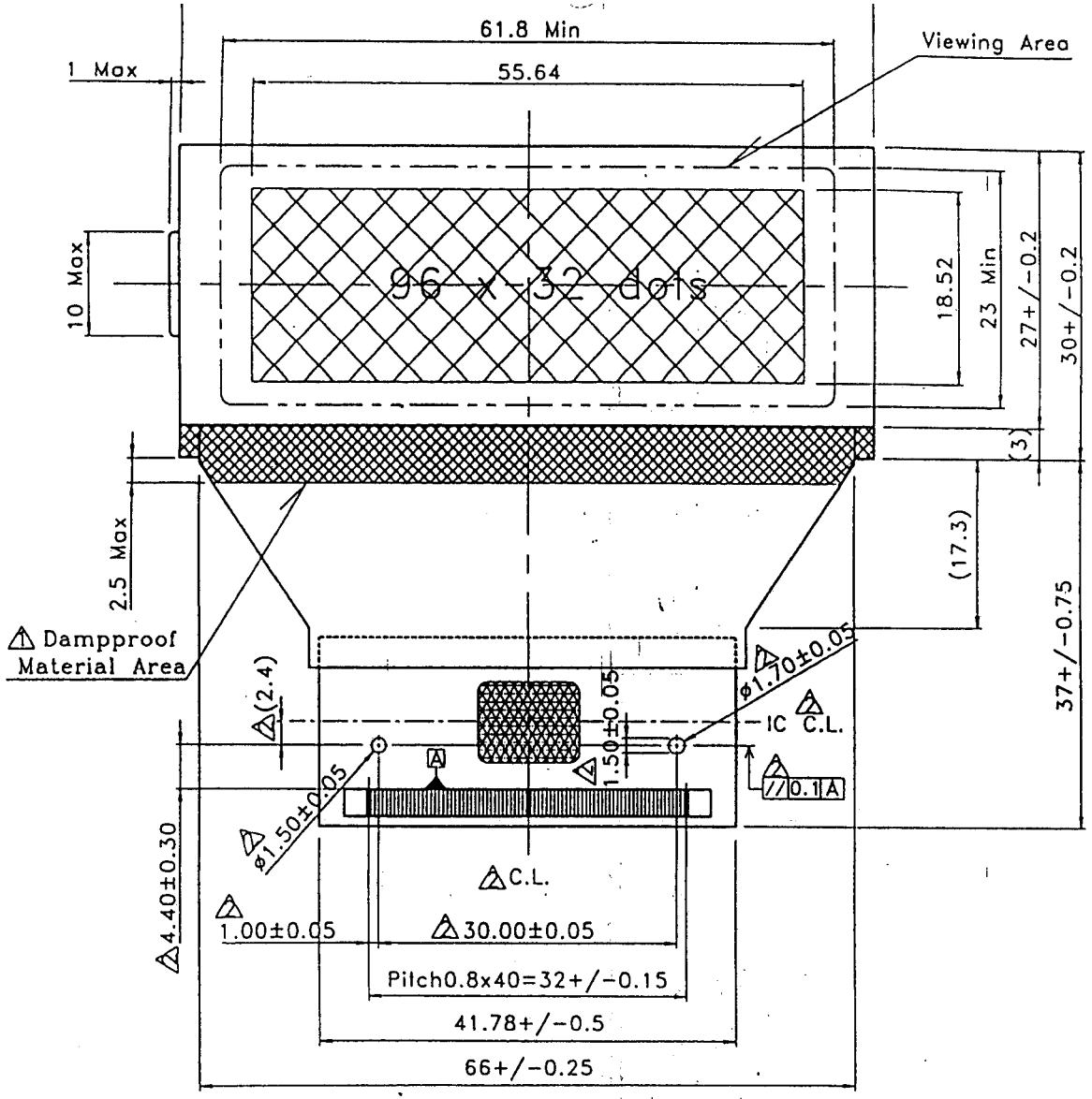
◎		UNIT mm	SCALE :		ALPS ELECTRIC EUROPA GmbH	
					DSGD M.Tomofuji	LSU7S1011A
					CHKD	TITLE LCD (2/2)
					APPD Y.Matsuoka	DOCUMENT NO.
SYMB	DATE	APPD	CHKD	DSGD		

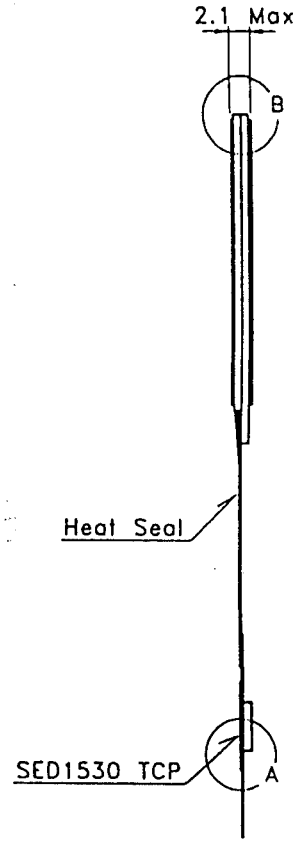


R1,R2 and R3 should be determined by customer.

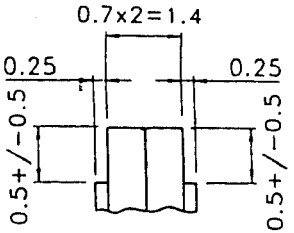
REVISED ON		DESIGNED BY	Y.Matsuoka on 15.Sep.'95
DATE	SYMBOL	TITLE	Circuit diagram for LSU7S1011A
		DOCUMENT NO.	
		CUSTOMER	

ALPS ELECTRIC EUROPE GmbH

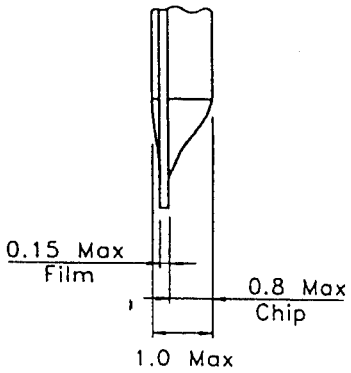


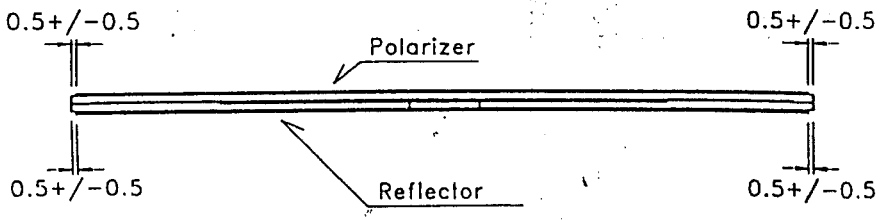


B Detail



A Detail





		UNIT mm	SCALE 2 : 1		ALPS ELECTRIC EUROPA GmbH	
					DSGD 12,Sep.,1995 M.Tomofuji	LSU7S1011A
					CHKD	TITLE LCD(1/2)
⚠ -10	07,02,96	Matsuoka		Tomofuji		
⚠ -1	13,11,95			Tomofuji	APPD 07,Feb.,1996 Y.Matsuoka	DOCUMENT NO.
SYMB	DATE	APPD	CHKD	DSGD		

12. Inspection standard

12-1 Purpose

This LCD inspection standard provides the shipping inspection items and the expected quality level which is based on our shipping inspection for LCD panels.

12-2 Applicable scope

This LCD inspection standard is applicable to the shipping inspection and the quality assurance after shipment.

12-3 Shipping inspection standard

Shipping inspection is in accordance with the products inspection manual.

12-3-1 Inspection method

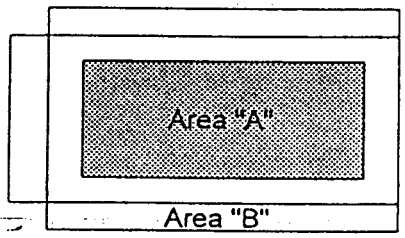
MIL-STD-105D, LEVEL Regular inspection

12-3-2 Quality assurance level

	Inspection items		AQL (%)
Major defect	Segment	Opens / Shorts / Erroneous operation	0,25
	Dimensions Angle	Outside dimensions / Pin dimensions Pin angle	0,40
Minor defect	Glass Inside glass Polarizer Segments Color Pin	Display missing, Pattern misalignment Pattern protrusion Black spots, Black streaks Bubbles Chromaticity and Uniformity Polarizer defects Glass defects Dirt, Spots	0,65
Total			1,00

12-3-3 Difinition for inspection area

Shipping inspection is applied to following area A and B individually.

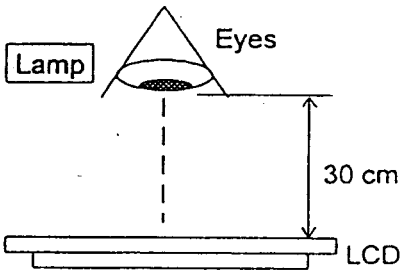


Area "A" shows the Viewing area that is written in the drawing.

Area "A" : Inside of viewing area
Area "B" : Outside of viewing area

12-3-4 Visual inspection

The visual inspection is perfomed under following conditions.



The distance between LCD panel and Lamp and also human eyes is around 30 cm.

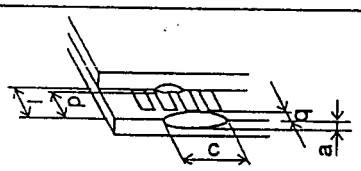
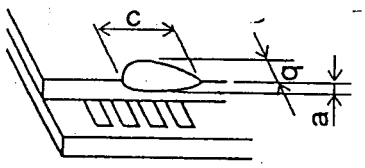
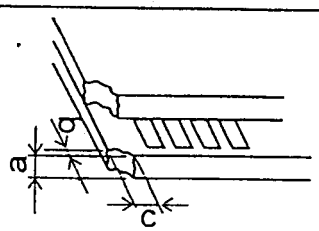
Lamp:40-W one fluorescent lamp

12-3-5 Limit sample

If it will come about to have the limit sample, in case, we will exchange it with each other by mutual consent. The limit sample is applicable to subsequent products.

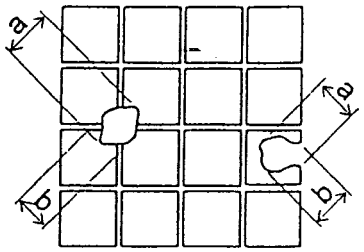
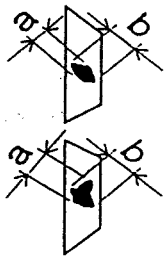
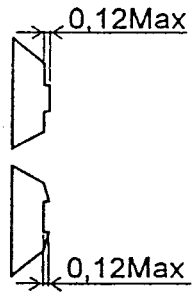
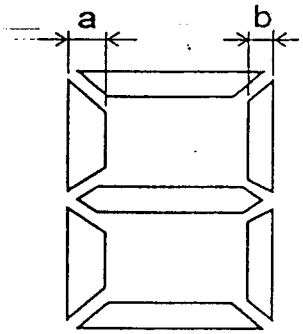
12-3-6 Apperance inspection standard-(I)

ϕ:Average diameter (mm), W:Width (mm), L:Length (mm)

No	Item	Details	Section	Criteria / maximum number of defects	
				Area "A"	Area "B"
1	Black or white spots	Black or white spots caused by dust, bubbles, or defective alignment in the cell.	ϕ≤ 0,10	ignore	ignore
			0,10 <ϕ≤ 0,20	3	
			0,20 <ϕ≤ 0,30	1	
			0,30 <ϕ	0	
			Total number of defects	4	
			In case that there are two or more, those must be more than 5mm each other.		
2	Black or white streaks	Black or white streaks caused by aligning scratches or dust in the cell or polarizer.	W ≤ 0,03	ignore	ignore
			W≤0,05 L≥2,0	2	
			W≤0,05 L<2,0	ignore	
			W≤0,08 L≥1,0	2	
			W≤0,08 L<1,0	ignore	
			W > 0,08	Same as No.1	
3	Bubbles (Polarizer)	Bubbles caused by dust, nap, etc. in the polarizer.	ϕ≤ 0,3	ignore	ignore
			0,3 <ϕ≤ 0,5	3	
			0,5 <ϕ≤ 1,0	1	
			1,0 <ϕ	0	
			Total number of defects	4	
4	Scratches on the polarizer	-	Same as No.2		
5	Chipped glass at lead terminals		a ≤ t(glass thickness) b ≤ (1/3) x l c ≤ 5 d = Refer to the drawing In case that a and b are equal or smaller than 0,5mm, it is ignored.		
			Total number of defects	5	-
6	Chipped glass excluding lead terminals		a ≤ t(glass thickness) b ≤ 2 c ≤ 5 In case that a and b are equal or smaller than 0,5mm, it is ignored.		
			Total number of defects	5	-
7	Chipped glass at corner		a ≤ t(glass thickness) b ≤ 3 c ≤ 3 In case that the chip reaches to seal part, more than 2/3 of the seal width must remain.		

12-3-7 Apperance inspection standard-(II) Area "A" only

ϕ:Average diameter (mm), W:Width (mm), L:Length (mm)

No	Item	Details	Section	Criteria / maximum number of defects
1	Pin holes and cracks in segment (dot)		ϕ:(a+b)/2 ≤ 0,2	In case ϕ ≤ 0,1 ignore
			Total number of defects	7
			They should not be concentrated.	
2	Pin holes and cracks in segment		ϕ:(a+b)/2 ≤ 0,2	In case ϕ ≤ 0,1 ignore
			Total number of defects	3
3	Transforma-tion of segment (partial)			
4	Transforma-tion of segment (thick, thin)		|a-w| ≤ 0,12 |b-w| ≤ 0,12 w : original width	