

GD-SD

DALIAN GOOD DISPLAY CO.,LTD.

ENTERPRISE STANDARD

LCD PRODUCT CRITERIA

ISSUED AND EXECUTED BY AUGUST 18TH,1999

ISSUED BY DALIAN GOOD DISPLAY CO.,LTD

PREFACE

LCD PRODUCT CRITERIA are based on the product criteria of America, Japan and domestic manufacturers dealing with LC display productions .combined with our own situation We made this criteria and made it a rule of quality of our company.

This criteria is proposed by production department, Research & development department and quality department.

This criteria is undertaken by quality department.

Main undertaker: Dongmei Sun, Haiyan Wang , Henry Chai

This criteria is approved by general manager:

Date:

This criteria is first issued by august 18th ,1999.

Quality department is entrusted to explain this criteria.

1. Scope

This **LCD PRODUCTION CRITERIA** specifies the performances ,quality and reliability standards of LCD ,it is used as the standard of quality judging.

2. Basic parameters

- 2.1 Outline size ,character and lines (see the manufacture drawing)
- 2.2 Display mode (see the manufacture drawing)
- 2.3 Drive mode (see the manufacture drawing)
- 2.4 Work voltage (see the manufacture drawing)

3. General character

3.1 maximum parameter

	Commerce	Industry	Unit
Work voltage (Vrms)	12	15	V
Work frequency	1,000	1,000	HZ
DC component	50	50	Mv
Work temperature	-15~+55	-40~+85	°C
Store temperature	-40~+55	-55~+90	°C

3.2 electronic performance parameter

		Commerce			Industry			Unit
		Min	normal	max	Min	normal	max	
Work voltage (Vrms)		2.0	3.0	10.0	3.5	5.0	12.0	V
Work frequency		32	60	100	32	60	100	HZ
Work current per 1/2"bit			1.25	5		1.25	5	MA
Work temperature		-10		55	-40		85	°C
Contrast			20:1			20:1		
Response	TRISE<25°C		30	50		10	20	Ms
	TDECA<25°C		50	75		45	55	
Time	Tr<0°C		200	350		60	100	
	Td<0°C		350	600		100	220	
	Tr<-20°C		—	—		750	1,100	
	Td<-20°C		—	—		1,000	1,500	
	Tr+Td<-40°C		—	—		5,000	7,500	
Viewing	Vertical		+85/-70			+85/-70		Deg.

Angle	Horizontal		±75			±75		
Capacity (per 1/2" bit)			750			750		Pf

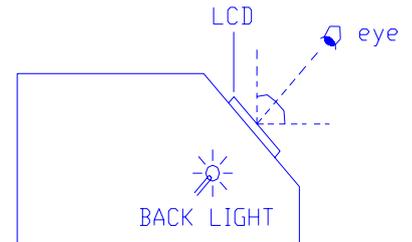
3.3 life

Under reasonable work and store conditions, the life of LCD won't be below 50000 hours.

4. TESTING CONDITION

Under two 20W fluorescent lamps or a 40W one, there is a Distance about 30 cm between the eyes and the LCD panel.

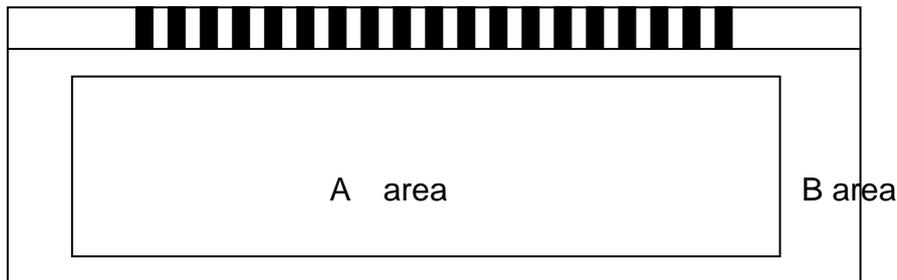
Must place a reflecting piece when inspecting a transmissive LCD.



The angle between direction of looking and the normal should be within 45 deg.

5. The definition of “visible” and “domain”

- A area: visible domain
- B area: invisible domain



Basic principle:

B area and defects which doesn't influence the assembling are acceptable.

When the user doesn't accept the criteria, we can consult then we will reach an acceptable criteria.

We must add new items if there are.

6. Quality level

6.1 Sampling plan

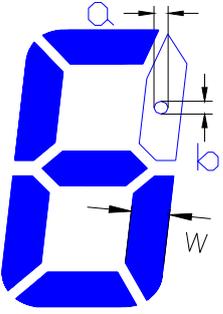
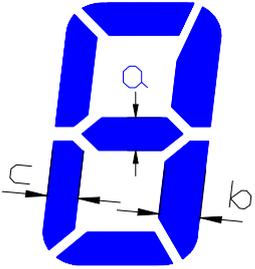
According to MIL-STD-105D II , single normal sampling

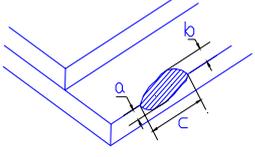
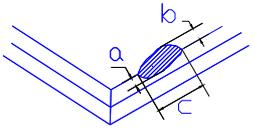
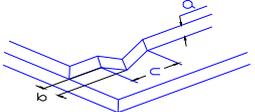
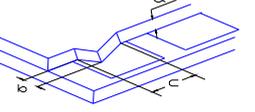
6.2 Acceptable quality level

AQL 1.00

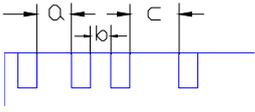
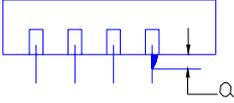
7. Testing standard

All the data's units below are millimeter(mm).

Nu m.	Details	Classification	Standard/acceptable pcs.	Defect class
1	Electric performance		$\Phi = (\text{length} + \text{width}) / 2$	
1.1	None or partial lighting due to pin holes or short		Not allowable	Fatal
1.2	Lighting by leakage		Not allowable	Fatal
1.3	Partial missing Due to pin holes , Disconnected or wrong orientation		$\Phi \leq 0.1$ ok. $\Phi = \text{MAX } 0.2$ 且 $a \leq w/3,$ $B \leq w/3$ Acceptable pcs.: 2 /cell	Fatal
1.4	The lines are not well-proportioned		A: standard width $B \leq 4a/3$ $C \geq 2a/3$	Slight
2	LCD dimension		Design dimension ± 0.25	Slight
3	Glass			
3.1	Glass cracks			Slight
	Cracks between two layer glass		Should be outside of the seal ring	
	Cracks on one layer (not extend to ITO)		Acceptable within 1.0	

	Cracks on one layer (extend to ITO)		Acceptable within 1.0, the crack should be 0.4 or more far from ITO	
	Cracks at seal part		Not acceptable	
3.2	Chip on glass			Slight
	Chip on the one layer glass		$A \leq 0.5$, $b \leq 0.3$, c ok. $A \leq 0.5$, $b \leq 2.0$, $c \leq 5.0$ $A \leq t$, $b \leq 1.0$, $c \leq 5.0$ T :thickness of glass	
	Chip between the two layer glass		$A \leq 0.5$, $b \leq 0.3$, c 无要求 $A \leq 0.5$, $b \leq 1.5$, $c \leq 5.0$ $A \leq t$, $b \leq 1.0$, $c \leq 5.0$	
	Chip on corner of one or two layer of glass		$A \leq 0.5$, b , c ok. $A \leq t$, $b \leq 2.0$, $c \leq 5.0$	
	Chip at the ITO area		Over 3/4 of ITO are kept	
3.3	Remains of glass		A: depth b: width c: length	Slight
	Remains on the one layer glass (out of ITO)		A, c ok. , $b \leq 0.3$	
	Remains on the one layer ITO		a , C ok., $b \leq 0.3$ Over 3/4 of ITO are kept	
	Other remains		Within the tolerance limit of external size	
4	Internal defect			
4.1	Black or white spots due to air bubbles ,foreign objects or wrong orientation in glass	Common standard: $\Phi \leq 0.1$ $0.1 < \phi \leq 0.2$ $0.2 < \phi \leq 0.25$ $0.25 < \phi$ Total defects	Ok. 3 2 0 3	Slight

	or polarizer. Density of black or white spots	High standard: $\Phi \leq 0.1$ $0.1 < \phi \leq 0.2$ $0.2 < \phi \leq 0.25$ Total defects $\Phi \leq 0.1$ $\Phi > 0.1$	Ok. 2 0 2 Ok. Far from 1.0	
4.2	Black or white lines due to air bubbles, foreign objects or wrong orientation in glass or polarizer.	$W \leq 0.01$ $0.01 < w \leq 0.03$ $0.03 < w \leq 0.05$ $0.05 < w$	Ok. $L \leq 3.0$ (2) $L \leq 2.0$ (2) According to 4.1	Slight
4.3	Discoloration or wrong orientation		According to sample	Slight
5	Polarizer			
5.1	Scrach on the polarizer (protecting film is excluded)	$\Phi \leq 0.1$ $0.1 < \phi \leq 0.25$ $0.25 < \phi$ $W \leq 0.01$ $0.01 < w \leq 0.03$ $0.03 < w \leq 0.05$ $0.05 < w$	Ok. 2 0 Ok. $L \leq 3.0$ (2) $L \leq 2.0$ (2) According to 4.1	Slight
5.2	Bubble between glass and polarizer	$\Phi \leq 0.15$ $0.15 < \phi \leq 0.3$ $0.3 < \phi \leq 0.5$ $0.5 < \phi$	Ok. 2 1 0	Slight
5.3	Polarizer is turned up or fell off		Not allowable	Slight
5.4	Stained polarizer		Not allowable	Slight
5.5	Stained protect film		Ok.	Slight
5.6	Film turned up		Resume after pressing	Slight
5.7	Film break		Ok. If Polarizer is good	Slight

6	Pin and pin glue			
6.1	Pin broken		Not allowable	Slight
6.2	Pin rusted		Not allowable	Slight
6.3	Length of pin		Within the tolerance	Slight
6.4	Insert error of pin		A: regular dimension $B \geq a/2$ $C \leq 3a/2$	Slight
6.5	Foreign objects on the pin glue		Not cause any short	Slight
6.6	Pin glue flow out		$A \leq 1.5$	Slight
6.7	Pin glue excessive		Not over the protecting film	Slight
6.8	Lack of pin glue	Front side Back side	ITO is exposed. Ok. If 1/2 of ITO is coated	Slight
6.9	Bubble in pin glue		Ok.	Slight
7	Seal ring resin			
7.1	Seal resin leakage		Out of the viewing area	Slight
7.2	Lack of seal resin		There must be 0.2 resin at the entrance	Slight

7.3	Crack of seal resin		Can't be drop by finger and there must still be 0.2 resin coated at entrance	Slight
7.4	Seal extension		According to sample	

8. Reliability

8.1 damp heat, steady state

The LCD will be put at a place which temperature is 70°C and it's humidity is 90%RH, it takes 96 hours to test the LCD, when it resumed it's performance should be normal.

8.2 low temperature

The LCD will be put at a place which temperature is $-25\pm 3^{\circ}\text{C}$, it takes 24 hours to test the LCD, when it resumed it's performance should be normal..

8.3 Change of temperature

The LCD will be put into water which temperature is $100\pm 2^{\circ}\text{C}$, it takes 10 minutes to test the LCD; then put it into ice water which temperature is $0\pm 3^{\circ}\text{C}$, lasting 10 minutes .repeat this for 10 times ,and when it resumed it's performance should be normal..

8.4 Pin intension

Put a force about 1 kg on the same axe of pins ,lasting 10 seconds , the pin should not be broken ,loosen or removed relatively.

Reference:

1. American standard Q100288
2. Production criteria of Nippon electrics corporation 《液晶セルの品质基准书》
3. International electro-technical committee standard IEC 61747