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Issued Date : February 17, 2005

File No.

LDI-315TRA01

TO : _____

Incoming Inspection Standards

Product **TFT-LCD Module**

Model **LQ315T3LZ28**

* This standards is composed of Eight pages including the cover, the attached document, and so on.

☐ CUSTOMER'S APPROVAL

DATE

BY

PRESENTED

BY

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Records of Revision

Revision Date	Rev. Mark	Contents of Revision	Check and Approval
17-Feb-05		- First Edition Standards No. : LDI-315TRA01	K.Sogame

0-315TRA01-2

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Incoming Inspection for TFT-LCD Module

1. Scope

- These Incoming Inspection Standards shall apply to TFT-LCD Modules supplied by AVC LCD Group. Sharp Corporation to

2. Inspection Lot

- Quantity per shipment lot is ONE Inspection lot.

3. Incoming Inspection Condition

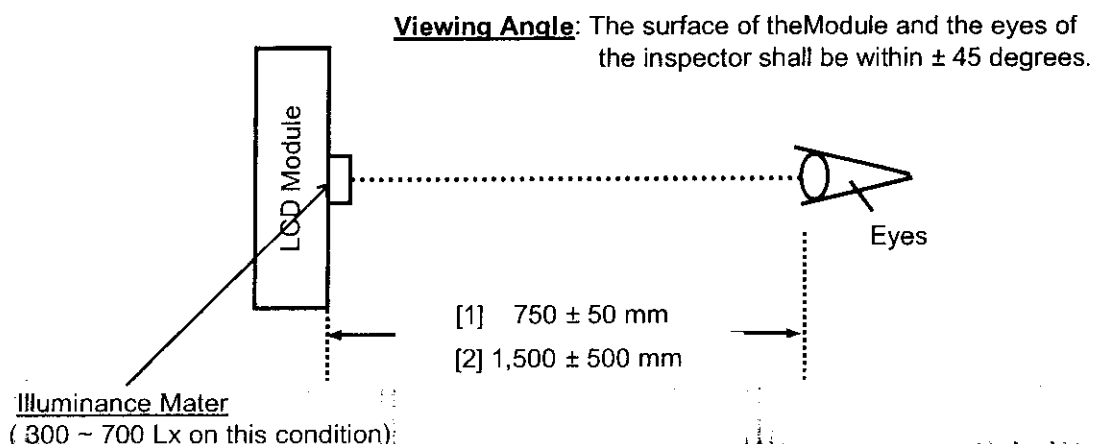
3.1 Condition of Lot Judgement

- Unless otherwise agreed in writing, the method of incoming inspection shall be in accordance with a sampling inspection based on ISO 2859-1
 - Sampling Table : Table in ISO 2859-1
 - Sampling Type : Normal Inspection, Single Sampling
 - Inspection Level : II
 - Acceptable quality level (AQL) : Major defects: AQL: 0.4
: Minor defects: AQL: 1.0 Based on overall evaluation
- Defects are classified as major defect and a minor defect according to the degree of defect defined herein.
 - a) Major defect: A major defect is a defect that is likely to result in failure, or to reduce materially the usability of the product for its intended purpose.
 - b) Minor defect: A minor defect either is a defect that is not likely to reduce materially the usability of the product for its intended purpose, or is a departure from an established having little bearing on the effective use or operation of the product.

3.2 Inspection Condition of Operation Quality Determination

- The inspection condition shall be conducted in the standard operative condition.
- The external illumination on the Module. 300 ~ 700Lx (Standard 500Lx)
- The viewing distance between the Module and the eyes of the inspector.
 - *Refer to Fig.1 and Fig.2 [Inspection : Angle ± 45 degrees]
 - [1] Apply to Bright Dot and Galaxy Dot (Small dots seem to bright by foregun material)
 - [2] Apply to defect concerned with Mura (Display Uniformity)
- Backlight Luminance: 450 ± 30 cd/m²
- Ambient temperature: 24 ± 2 degree C
- Ambient humidity: $65 \pm 5\%$ RH

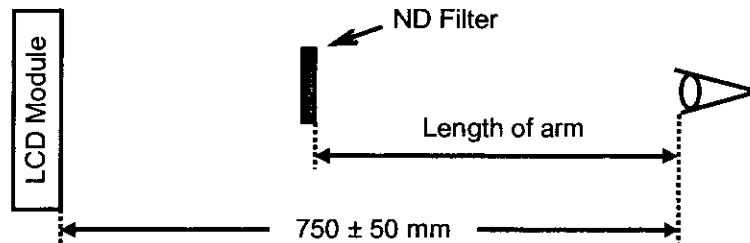
Fig.1) Judge position of the operation inspector



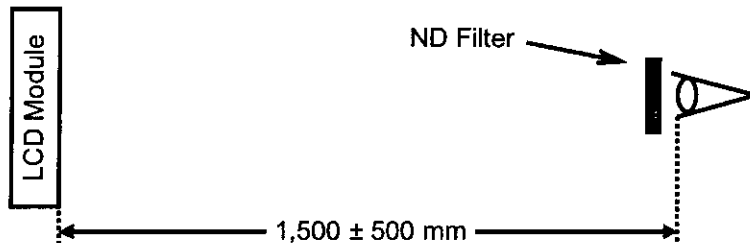
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Fig.2) How to use the ND Filter

- [1] Apply to Bright Dot and Galaxy Dot (Small dots seem to bright by foregun material)
ND filter is moved to the panel side closer and judged.



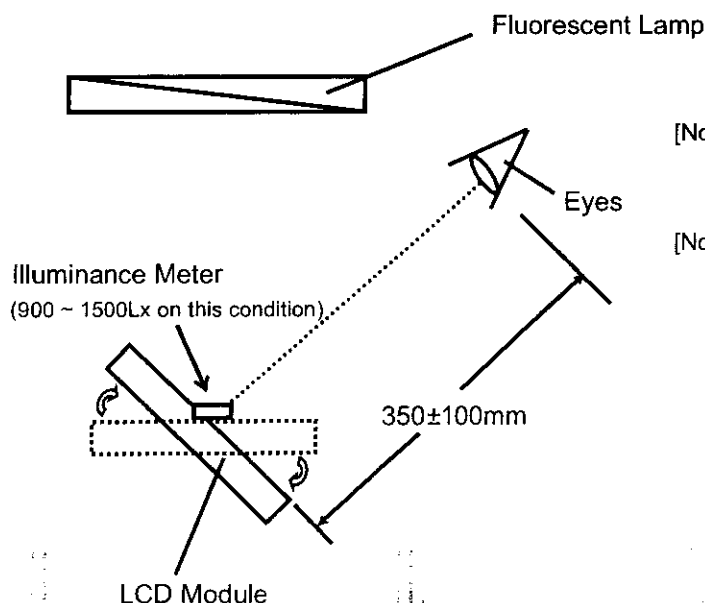
- [2] Apply to defect concerned with Mura (Display Uniformity)
ND filter is moved to the eyes closer and judged.



3.3 External Inspection

- *1: In the normal inspection condition, the distance between the Module and eyes of the inspector shall be 75cm or MORE. (Condition of lighting B/L and operating Module on White picture)
- *2: In the normal inspection condition, the distance between the Module and eyes of the inspector shall be 75cm or MORE. (Condition of lighting B/L and operating Module on Black picture)
- *3: Shall be conducted with fluorescent lamp lighting on working bench; the outside illuminance of the panel surface 900 ~ 1500Lx (Standard: 1200Lx). [Refer to Fig.3]
The visual observation shall be conducted with the judgement distance whose distance between the panel and the eyes of the inspector shall be 350 ± 100mm. (Condition of Non-operating)

Fig.3) Judgement position of External Inspector



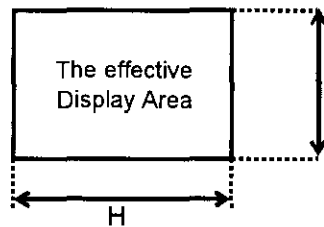
[Note] External inspection apply range is by 1.0 mm width of the effective display area.

[Note] Scratch/Dent on the rear polarizer is not counted, if it is not found by B/L lighting from the front side.

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4. Standards for Display Quality Investigation

4.1. Zone



- H and L mean all the effective display area.

4.2. Definition

a) Bright Dot

*Full-time lighting Bright Dot in the Black Display.

- Visible through 5% ND filter
- Not visible through 5% ND filter

: Count (Bright Dot)

: No Count

b) Galaxy Dots

*Small dots seem to be bright by foreign material

- $D > 0.8$ (mm)
- $0.3 \leq D \leq 0.8$ (mm)

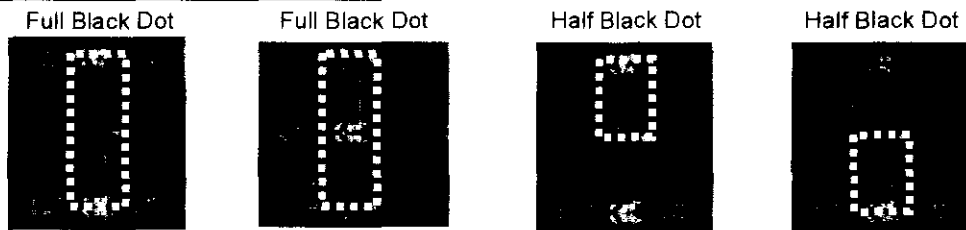
: Galaxy Dots (Counted as Bright Dot)

: $N \leq 4$

c) Black Dot

*Dot which seems to come out in Black or purple (magenta) in the white and Red/Green/Blue self-color display. There are Full-Dot Black dot and Half-Dot one due to the Multi-Pixel Structure.

Fig.4) Full Black dot and Half Black dot



d) Scratches on the ITO / Color Filter

*White dot in the Black display.

- Torn over the half of the dot
- Torn under the half of the dot

: Count (Bright Dot)

: No Count

Fig.5) Torn color filter symptom



e) Scratches on the Black Mask

*White dot around dot (black mask part) in the black display.

- Torn over $50\mu\text{m}\phi$
- Torn under $50\mu\text{m}\phi$

: Count (Bright Dot)

: No Count

[Target Area]

Target area is from active area to 1.5mm (High density is NG)

Fig.6) Torn black mask symptom



f) Line Defect (Horizontal / Vertical)

*All kinds of line defects such as Vertical, Horizontal or Cross are not allowed.

g) Display Non-Uniformity

*Non-Uniformity of display brightness.

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4.3 Bright Dot

Check Pattern	Total Number
Black Pattern (Refer to Item# 4.2)	0

4.4 Black Dot

Check Pattern	Total Number		
	Full Black Dot	Half Black Dot	Full Black Dot + Half Black Dot
White pattern and at each pattern of R, G and B (Refer to Item# 4.2)	Total : 5	Total : 10	Total : 10

* Joined 2 Black dots by Horizontal / Diagonal are considered as one defect dot (one count).

* Joined more than 1.5 Black dots by Vertical shall be judged NG.

[Note] Flashing dot is Black Dot

4.6 Distance of Dot defects

- Full Black Dot - Full Black Dot : More than 5mm
- Half Black Dot - Half Black Dot : Max 3 dots within 5mmφ
- Full Black Dot - Half Black Dot : More than 5mm

5. Standards for External Quality Investigation

[Permissible Number : N, Average Diameter(Fig.7) : D(mm), Length(Fig.8) : L(mm)]

Item		Criteria	External Inspection (Refer to Item# 3.3)
Foreign Material (in the polarizer, Cell)	Circular	$0.3 \leq D \leq 0.8, N \leq 3$	Condition of Operation (refer to *1)
	Linear	$L \leq 3.0, N \leq 3$	Condition of Operation (refer to *1 & *2)
Linear scratch on the Polarizer/Glass		$L \leq 10.0, N \leq 4$	Condition of Non Operation (refer to *3)
Dent on the Polarizer/Glass		$0.3 \leq D \leq 0.8, N \leq 4$	

Fig.7) Average Diameter : D

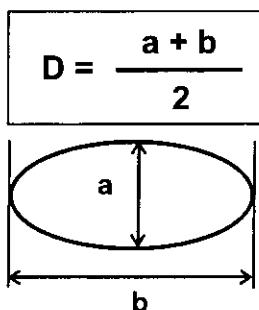
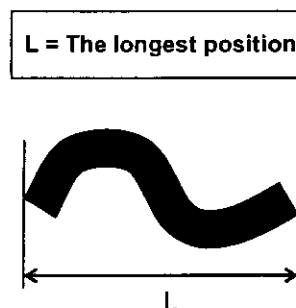
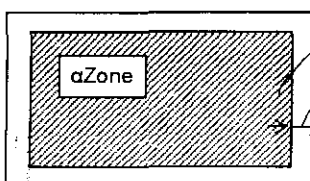


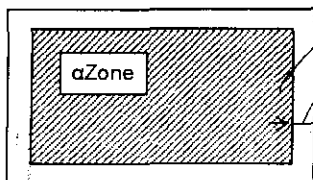
Fig.8) Length : L



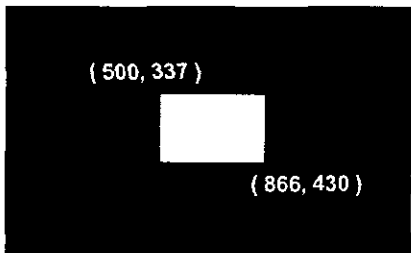
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6. Classification on Defects Minor & Majors

Classification	Inspection Item	Criterion for defects/determinations	Defect Type	
Characteristic of electricity and mechanical	A power supply voltage is counted by the standard value described in the Specification			
	Operating Frequency	(1) Dose not meet the specified range in the Specification	Major	
	Current Consumption	(2) Dose not meet the specified range in the Specification	Major	
	Contrast Rate	(3) Dose not meet the specified range in the Specification	Major	
	Display-On Inspection	(4) The display pattern decided in advance input, a correct display pattern is not obtained.	Major	
		(5) Vertical Line defect	Major	
		(6) Horizontal Line defect	Major	
		(7) Cross line defect	Major	
Criterion for External Quality	Scratches and Dent on the polarizer	(8) Shall be accorDance with the Item# "5. Standards for External Quality Investigation"		Minor
	Bubble in the polarizer	(9) Shall be accorDance with the Item# "5. Standards for External Quality Investigation"		Minor
	Foreign material	(10) Shall be accorDance with the Item# "5. Standards for External Quality Investigation"		Minor
	Bezel Appearance	(11) Irregular plating / Irregular Coating / Rust on the edge are ignored		Minor
	Damaged Part	(12) (A) Part lead wire is broken. (B) The part lead wire is not yet broken, but is damaged. (C) Failure is found concerning function or performance, or product value is impaired in appearance.	Major Major	Minor
Criterion fo Display Quality	Bright Dot	(13) Exceed permissible numerical value		Minor
	Torn Color Filter	(14) Exceed permissible numerical value		Minor
	Torn Black Mask	(15) Exceed permissible numerical value		Minor
	Black Dot	(16) Exceed permissible numerical value (Flashing dot is Black Dot)		Minor
	Display Non-Uniformity	(17) There should not be Non-Uniformity through 2% ND filter.		Minor
	Electric Charge Retention	(18) α Zone shall not remain for more than 3 seconds soon after cutting power supply. (External illuminance condition : Illumination 300 ~ 700Lx(Standard :500Lx)  [Inspection Condition] - Signal power is off - B/L power is on		Minor



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Classification	Inspection Item	Criterion for defects/determinations	Defect Type	
Criterion to Display Quality	PI Repellent	(19) One dot-shaped black stain is considered as "good product" (But, if it seems to be bright dot when changing viewing angle, it will be counted as small bright dot)		Minor
	Long term Afterimage	(20) When a pattern having been displayed for 30 minutes is switched to another pattern, an afterimage of the former pattern shall disappear within 10 seconds.		Minor
	Short term Afterimage	(21) Display the same pattern for 5 seconds and then disappear within 10 seconds.		Minor
	Shadowing	(22) There should be no brightness difference between A section and B section through 5% ND filter. 		Minor
Others	Outline demensions	(23) Dose not meet the specified range in the Specification		Minor
	Weight	(24) Dose not meet the specified range in the Specification		Minor
	Label Display (Sealing/ Display label)	(25) (A) There should be no foretfulness, misprinting, not readable one. (Readable one should be a good one) (B) As for the display label, peel-off should be within the degree of 1/10 of total area. (except for legible one among discoloration of display label.)	Major	Minor

[Note] Regarding the items to use limit sample, limit sample should have priority over others.

7. Others

- Issues which is not defined in this criteria shall be discussed with both parties for better solution.