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Document Chinese Title: 17 " (G170 Series)TFT-LCD 進料檢驗規範 (A grade)

Document English Title: Incoming Inspection Standard For 17 " (G170 Series) TFT-LCD Modules (A)

AU OPTRONICS CORPORATION

Specification for Approval

INCOMING INSPECTION STANDARD FOR 17" TFT-LCD MODULES (A grade)

Model Name: **G170 Series**
(Excluded G170ETN02 Series)

Approved By	Prepared By
<i>YenChun Fu</i>	<i>Jeffrey Chan</i>

General Display Business Unit/AU Optronics

Customer	Checked and Approved by



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Inspection criteria's change record						
Version/ Effective Date (Approval)	Page	Inspection Item	Previous Inspection Spec		New Inspection Spec	
2011/2/28	All	All	Initial Specification			
2013/9/1	All	All			Format changed	
2015/10/1	All	All			Format changed	
2020/Jan/30	7	Linear particle	Linear	Width: W (mm) Length: L (mm) W ≤ 0.07 L ≤ 3.0 0.07 < W 3.0 < L Disregarded n = 0	Linear	Width: W (mm) Length: L (mm) 「W ≤ 0.07 and L ≤ 2.0」 or 「W ≤ 0.10 and L ≤ 0.3」 0.07 < W ≤ 0.10 and 0.3 < L ≤ 2.0 0.10 < W or 2.0 < L Disregarded n ≤ 3 n = 0
	7	Linear scratch	Linear	Width: W (mm) Length: L (mm) W ≤ 0.07 L ≤ 3.0 0.07 < W 3.0 < L Disregarded n = 0	Linear	Width: W (mm) Length: L (mm) 1) W ≤ 0.05(w A/G) 1) L ≤ 2(w A/G) 1) Disregarded 2) W ≤ 0.20 2) L ≤ 30 2) n ≤ 3 1) W > 0.05(w A/G) - N = 0 2) W > 0.20



1. Scope:

1.1 The incoming inspection standards shall be applied to TFT-LCD Modules (hereinafter called “Modules”) that supplied by AU Optonics Corporation (hereinafter called “seller”).

1.2 Specifications contains

- Electrical inspection specification
- Appearance specification

2. Incoming inspection:

The buyer (customer) shall inspect the modules within ninety calendar days since the delivery date (the “inspection period”) at its own cost. The results of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to the seller.

The buyer may, under commercially reasonable reject procedures, reject an entire lot in the delivery involved. Within the inspection period, if the samples of modules within a lot show a number of unacceptable defects in accordance with this incoming inspection standards, the buyer must notify the seller in writing of any such rejection promptly, and not later than within three business days in the end of the inspection period.

Should the buyer fail to notify the seller within the inspection period, the buyer’s right to reject the modules shall be lapsed and the modules shall be deemed to have been accepted by the buyer.

The buyer (customer) shall sign the IIS back to AUO once the buyer verify the model completely and move to mass production stage. The seller(AUO) has right to follow internal specification or base on ES (engineeering sample) performance to the buyer If the buyer (customer) don’t sign back to AUO.

3. Inspection sampling method:

Unless otherwise agree in writing, the method of incoming inspection shall be based on ANSI/ASQL Z1.4-2003.

3.1 Lot size: Quantity per shipment lot per model.

3.2 Sampling type: Normal inspection, single sampling.

3.3 Sampling level: Level II.

3.4 Acceptable quality level (AQL):

Major defect: AQL=1.0%.

Minor defect: AQL=2.5%.

4. Inspection instruments:

4.1 Pattern generator: LD-2000 or equivalent model.

4.2 Video board: AU video board or equivalent. The output of the signal should comply with the specification provided by AU.

4.3 Luminance colorimeter: Topcon BM-7 or equivalent model

5. Inspection environment conditions:

5.1 Room temperature : **20 ~ 25 C.**

5.2 Humidity: **65±5% RH.**

5.3 Illumination: Fluorescent light (day-Light Type) display surface illumination to be 300 ~ 700 Lux. (standard **500Lux.**)

5.4 To be a distance about **35 ± 5 cm** in front of LCD unit and view angle should be **± 10°.**

5.5 Take off the protector of polarizer while judging the display area

5.6 If there is any question while judging, check the panel again while operating

6. Classification of defects:

Defects are classified as major defects and minor defects according to the degree of defectiveness defined herein.

Major defects:

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.

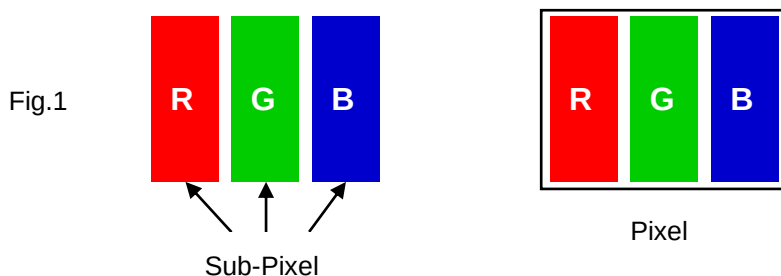
Minor defects:

A minor defect is either a defect that is not likely to reduce materially the usability of the product for its intended purpose, or a departure from an intended purpose with little bearing on the effective use or operation of the product.

6.1 Electrical inspection specification:

No.	Inspection Item		Max. acceptable number / Distance	Unit	Note
1	Bright dots	1 dot	2	dot	1, 2, 6
2		2 Adjacent dots	1	pair	4, 5, 6
3		3 Adjacent dots	0	pair	4, 5, 6
4		Over 3 Adjacent dots	0	pair	4, 5, 6
5		Distance between bright dots	≥15	mm	3
6		Total (1+2+3+4)	2	dot	
7	Dark dots	1 dot	3	dot	1, 6
8		2 Adjacent dots	1	pair	4, 5, 6
9		3 Adjacent dots	0	pair	4, 5, 6
10		Over 3 Adjacent dots	0	pair	4, 5, 6
11		Distance between dark dots	≥15	mm	3
12		Total (7+8+9+10)	3	dot	
13	Bright dot and	2 Adjacent dots	1	pair	4, 5, 6
14	Dark dot	Distance between dots	≥15	mm	3
15	Total amount of Dot Defects (1~13)		5	dot	
16	Line defect		Not allowed	-	
17	Mura		Use 5% ND filter or judged by equivalent limit sample		6, 7, 8

Note 1) Definition of pixel and sub-pixel: refer to figure 1.



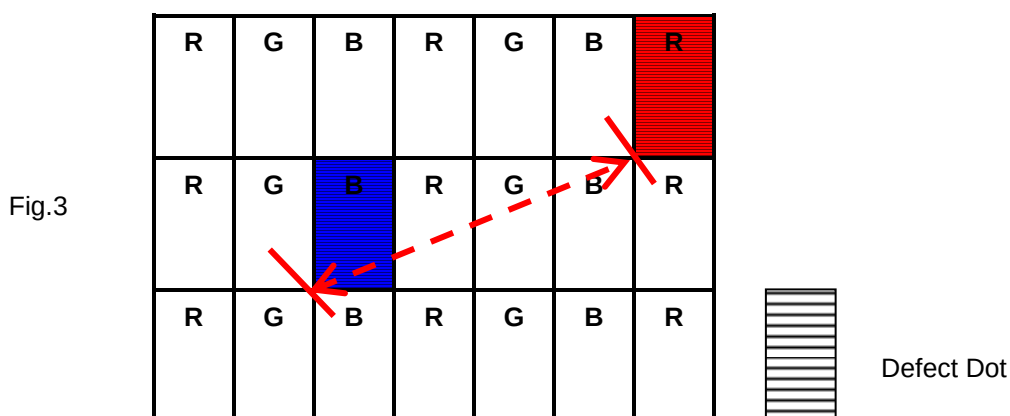
Note 2) Bright dot and Small bright dot judgment criteria:

Judgment Criteria		Bright Dot Defect area	
		> 1/2 sub-pixel	≤ 1/2 sub-pixel
ND filter 10%	Visible	Bright Dot	Small Bright Dot
	Invisible	Small Bright Dot	Small Bright Dot

The drawing of 1/2 area sub-pixel definition: The 1/2 area sub-pixel can be defined as below one or more of specific shapes (Fig.2). The amount of small bright dots should be less or equal to 10.

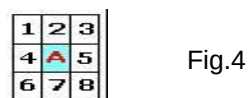


Note 3) Definition of distance between defect dots as following



Note 4) Adjacent-dot defect should be observed under the same display pattern in any one of Black/Green/Blue/Red pattern.

Adjacent-dot defect : refer to Figure 4, dot 1,2,...,8 around A are all A's adjacent dots



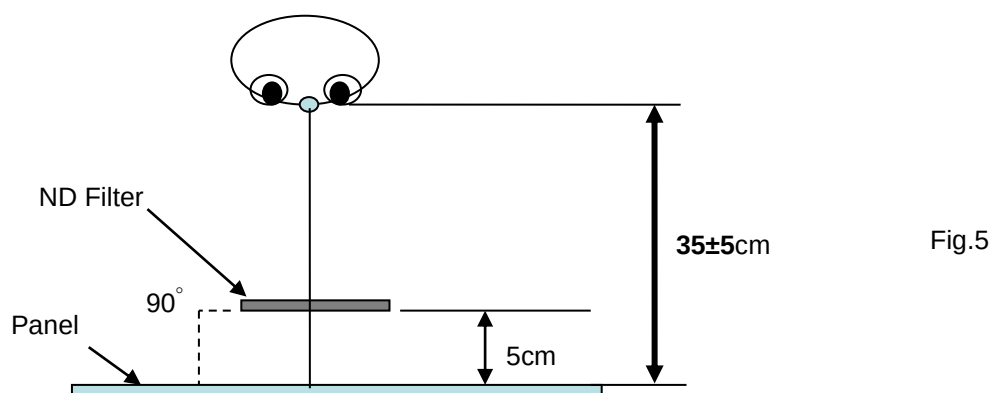
Note 5) In three (or more) adjacent dot defect, for any 3rd dot that adjacent to 2 continuous defective dots (can be of any combination of bright dots and dark dots), the 3rd dot, no matter how large it may be, should be viewed as a dot.

Note 6) Inspection pattern: Standard inspection patterns of dot defect are listed below. AU uses these patterns as standard criteria for judging dot defect. Please inform AU if any other pattern is to be used to examine it.

Defect type	Inspecting Pattern
Mura/ display un-uniformity	L0/255 、 L92/255 、 L255/255
Bright Dot / Small Bright Dot	L0/255
Dark Dot	L255/255 、 Monotone Red 、 Green 、 Blue
BL particle/Scratch	L255/255
Polarizer particle/Scratch/Bubble	L0/255 、 L255/255

Note 7) Unless other specified written document or limit samples, Mura (display un-uniformity) should be inspected under the ND filter and be acceptable when it is invisible through ND filter.

ND filter use method: The inspection method of ND Filter - holding ND filter in front of the panel around 5 cm and examine the panel from 35±5 cm in the front view for 3 seconds. (Fig.5)



Note 8) While operating over 50°C ambient temperature, there should be no function failure occur and Mura (display un-uniformity) should be invisible under 1% ND filter applied.

Note 9) Image Retention: 5 seconds test pattern and image retention must be disappeared in 5 seconds after pattern changed.

6.2 Scratches, dent, extraneous substances and Appearance inspection specification

Judge area	Judge item		Inspection specification		Judge criterion	
					Major	Minor
Active area	Particles on back light and polarizer	Circular	Average diameter: D (mm)	Numbers		○
			$D \leq 0.15$	Disregarded		
			$0.15 < D \leq 0.50$	$n \leq 4$		
			$0.50 < D$	$n = 0$		

		Linear	Width: W (mm) Length: L (mm)		Numbers		○
			「W ≤ 0.07 and L ≤ 2.0」 or 「W ≤ 0.10 and L ≤ 0.3」		Disregarded		
			0.07 < W ≤ 0.10 and 0.3 < L ≤ 2.0		n ≤ 3		
			0.10 < W or 2.0 < L		n = 0		
	Scratch/Defect on the polarizer	Circular	Average diameter: D (mm)		Numbers		○
			D ≤ 0.15		Disregarded		
			0.15 < D ≤ 0.50		n ≤ 4		
			0.50 < D		n = 0		
		Linear	Width: W (mm) Length: L (mm)		Numbers		○
			1) W ≤ 0.05(w A/G) 2) W ≤ 0.20	1) L ≤ 2(w A/G) 2) L ≤ 30	1) Disregarded 2) n ≤ 3		
			1)W > 0.05(w A/G) 2)W > 0.20	-	N = 0		
	Bubble on the polarizer	Circular	Average diameter: D (mm)		Numbers		○
			D ≤ 0.15		Disregarded		
			0.15 < D ≤ 0.50		n ≤ 4		
			0.50 < D		n = 0		
From Active area outside 0.3mm	The end of polarizer	The defect can't be seen ,from active area outside 0.3mm				○	
Bezel	Gap between front bezel and polarizer on all sides	≤ 0.8mm				○	
	Scratches, Wrap and Sunken	No harm, dangerous				○	
	Assembly Fail	Not allowed			○		
Label (S/N, B/L, WEEK)	No label	Not allowed			○		
	Invert label				○		
	Content Error				○		
	Dirt	Word can be read. Barcode can be scanned.				○	
	Not clear					○	
	Word out of shape					○	
	Broken					○	
	Crease					○	
	Label overlapping					○	
	Position				Be attached on right position		
Screw	Not enough (Q'ty)	Not allowed			○		
	Loose	Not allowed			○		
Connector	Appearance	No broken, rising, deformation			○		

Note 10 : Extraneous substances which can be wiped out, such as fingerprint and particles are not considered as a defect.

Note 11 : Defects on the Black Matrix (outside Active Area 0.3mm) are not considered as a defect.

Note 12 : Defect size definition: (Unit:mm). When $L \geq 2W$, defect count as liner defect.

D: Average Diameter; L: Length W: Width

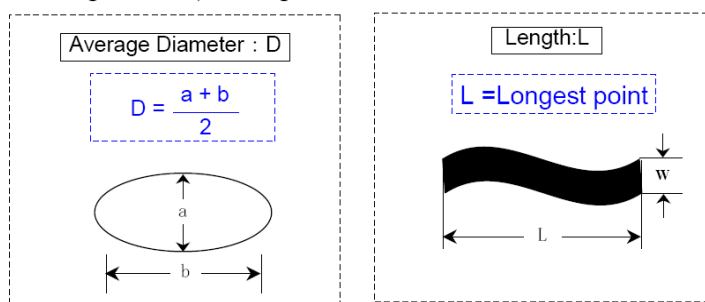


Fig.6

Note 13 : The gap between front bezel and Polarizer :

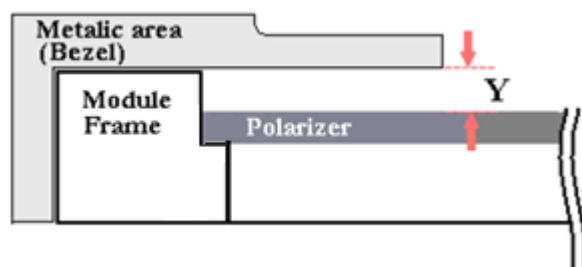


Fig.7

7. Inspection judgement:

- 7.1 The judgement of the shipped lot (acceptance or rejection) should follow the sampling plan of ANSI/ASQL Z1.4-2003, single sampling, normal inspection, level II.
- 7.2 If the number of defects is equal to or less than the applicable acceptance level, the lot shall be accepted.
- 7.3 If the number of defects is more than the applicable acceptance level, the lot shall be rejected and the buyer should inform the seller of the result of incoming inspection in writing.

8. Precaution:

Please pay attention to the following items when you use the LCD Module with back-light unit.

- 8.1 Do not twist or bend the module and prevent the unsuitable external force for display module during assembly.
- 8.2 Adopt measures for good heat radiation. Be sure to use the module with in the specified temperature.
- 8.3 Avoid dust or oil mist during assembly.
- 8.4 Follow the correct power sequence while operating. Do not apply the invalid signal, otherwise, it will cause improper shut down and damage the module.
- 8.5 Less EMI: it will be more safety and less noise.
- 8.6 Please operate module in suitable temperature. The response time & brightness will drift by different temperature.
- 8.7 Avoid displaying a fixed pattern (exclude the white pattern) for a long period, which may lead to image sticking.
- 8.8 Be sure to turn off the power when connecting or disconnecting the circuit.
- 8.9 Polarizer scratches easily, please handle it carefully.



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- 8.10 Display surface never likes dirt or stains.
- 8.11 A dewdrop may lead to destruction. Please wipe off any moisture before using module.
- 8.12 Sudden temperature changes cause condensation, and it will cause polarizer damaged.
- 8.13 High temperature and humidity may degrade performance. Please do not expose the module to the direct sunlight and so on.
- 8.14 Acetic acid or chlorine compounds are not friends with TFT display module.
- 8.15 Static electricity will damage the modules; please do not touch the module without any grounded device.
- 8.16 No parts of the panel should be dismantled without the presence of AU engineer or the product will not be warranted.
- 8.17 Be careful do not touch the rear side directly because of the backlight high voltage.
- 8.18 No strong vibration or shock. It will cause module broken.
- 8.19 Storage the modules in suitable environment with regular packing.
- 8.20 Be careful of injury from a broken display module. Please avoid the pressure adding to the surface (front or rear side) of modules, because it will cause the display non-uniformity or other function issue.
- 8.21 Please remove the POL protection carefully or the panel may be disassembled or damaged.

AU Optronics Corp.

No. 1, Li-Hsin Rd. II,

Science-Based Industrial Park,

Hsin-Chu City, Taiwan, R.O.C.Tel :886-3-500-8800

Fax:886-3-666-9320