



AU OPTRONICS CORPORATION

Specification for Approval

INCOMING INSPECTION STANDARD FOR 12.1" (A) TFT-LCD MODULES

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further information.

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1. Scope:

- 1.1 The incoming inspection standards shall be applied to TFT-LCD Modules (hereinafter called "Modules") that supplied by AU Optronics Corporation (hereinafter called "seller").
- 1.2 Specifications contains
 - Electrical inspection specification
 - Appearance specification
 - Outside dimension specification

2. Incoming inspection:

The buyer (customer) shall inspect the modules within twenty 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.

3. Inspection sampling method:

Unless otherwise agree in writing, the method of incoming inspection shall be based on **MIL-STD-105E**.

- 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 **500 lux.**)
- 5.4 To be a distance about **35 ± 5 cm** in front of LCD unit, viewing line should be perpendicular to the surface of the module judge the visual appearance with human's eyes.
- 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

Inspection Item		Specification
Line defect		Can't be seen.
Bright dots		≤ 2 dots (note1,2,3)
Dark dots		≤ 3 dots (note1,2,3)
Total dots defect		≤ 3 dots (note1,2,3)
Continuous defect	Two continuous bright dots :	≤ 1 pair
	Over three continuous bright dots (vertical, horizontal, oblique) :	Not allowed
	Two continuous dark dots (vertical, horizontal, oblique) :	≤ 1 pair
	Over three continuous dark dots (vertical, horizontal, oblique) :	Not allowed
	Distance between 2 Bright dots :	≥ 15 mm
	Distance between 2 Dark dots :	≥ 15 mm
Distance between Dark dot and Bright Dot :		≥ 15 mm
Display non-uniformity or Mura (Note 4,5)		Use of ND filter or judged by equivalent limit sample

Note (1) For bright dot defect, bright area should be larger than 1/2 area of a sub-pixel to be count as 1 dot defect. A dot defect that is smaller than the defined dot defect will be treated as 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.



All bright dot defects should not be noticeable by observer under specified inspection environment (Please refer to item 5).

Note (2) Adjacent-dot defect (refer to picture, dot 1,2,...,8 around A are all A's adjacent dots) should be inspected under the same display pattern in any one of White/Black/Green/Blue/Red/Monotone Gray pattern.

Note (3) Adjacent-dot defect should be observed under any one of white/Black/Green/Blue/Red pattern. 1 pair of bright dots equals 2 dots.

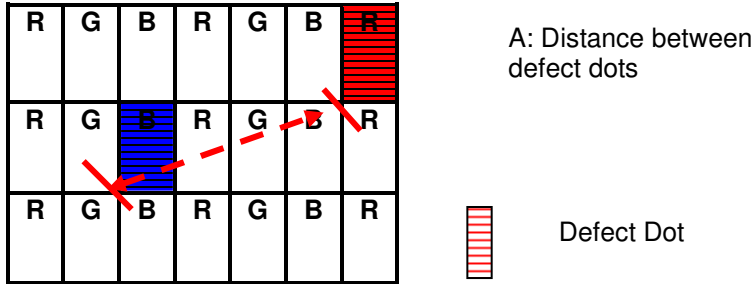
*Inspection patterns: Standard inspection patterns of dot defect are listed below. AU uses these patterns as standard criteria for judging dot defect. Please inform AU if any other pattern is to be used to examine dot defect.

Test Pattern	Defect
Black	For white dot(s)
White	For black dot(s)
Monotone Red/Green/Blue	For black and white dot(s)

Note (4) The general mura symptoms will use 6% ND Filter.

Note (5) The inspection method of ND Filter - holding ND filter in front of the panel around 1 cm and examine the panel from 35±5 cm in the front view for 3 seconds.

Note (6) Definition of distance between defect dots as following



6.2 Appearance inspection specification

Judge area	Judge item		Inspection specification			Judge criterion	
						Major	Minor
Active area	Particles, scratch and bubbles in display area	Circular	Average diameter: D(mm)		Numbers		
			D<0.15		Disregarded		
			0.15 ≤ D ≤ 0.50		n ≤ 1		
		0.50 < D		n = 0			
		Linear	Width: W(mm) Length: L(mm)		Numbers		
			W < 0.05		Disregarded		
0.01 ≤ W ≤ 0.07	L ≤ 2		n ≤ 1				
0.07 < W		L ≥ 2		n = 0			
Bezel	Scratch		1. No sharp burr/edge to cause safety issue; 2. The bezel defect to be accepted if it is not affecting display performance, quality and mechanical property.			○	
	Dirt					○	
	Wrap					○	
	Sunken					○	
Label (S/N, B/L, WEEK)	No label		No			○	
	Overlap Label (triple)					○	
	Invert label					○	
	Broken					○	
	Dirt		Word can be read.			○	
	Not clear					○	
	Word out of shape					○	
	Mistake		No			○	
	Position		Be attached on right position			○	
Screw	Not enough		No			○	
	float		Grounding OK			○	
	Limp		Grounding OK			○	
Solder	Appearance		Can't see the abnormal color, shape, hurt, dirt (fused goods, etc)If it is necessary, please prepare sample.			○	
White Sheet	Broken		No			○	
Connector	Connection status		No correct connection			○	
FPC/FFC	Broken		NO			○	



Note 1: Extraneous substances which can be wiped out, such as fingerprint and particles are not considered as a defect.

Note 2: Defects on the Black Matrix are not considered as a defect.

Note 3: To verify the responsibility of following defects was caused by supplier, the IQC checks as requested on above items before mass production such as the Pol. Scratch, Gap Mura, TFT Glass broken...etc.

7. Inspection judgement:

- 7.1 The judgement of the shipped lot (acceptance or rejection) should follow the sampling plan of MIL-STD-105E, 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 in adequately ventilated environment. Be sure to use the module in the specified temperature range.
- 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 Try to avoid the electrical magnetic interference, and 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 the fixed pattern (exclude the white pattern) in a long period, otherwise, it will cause image sticking.
- 8.8 Be sure to turn off the power when connecting or disconnecting the circuit.
- 8.9 Display surface Polarizer scratches easily, please avoid dirt and stains carefully.
- 8.10 A dewdrop may lead to destruction. Please wipe off any moisture before using module.
- 8.11 Sudden temperature changes cause condensation, and it will cause polarizer damaged.
- 8.12 High temperature and humidity may degrade performance. Please do not expose the module to the direct sunlight and so on.
- 8.13 Avoid any acid or chlorine compounds, which are harmful to the LCD module.
- 8.14 Static electricity will damage the modules; please do not touch the module without any grounded device connected.
- 8.15 Do not disassemble and reassemble the module by self.
- 8.16 Do not touch the rear side directly to avoid the electrical shock by the backlight high voltage.
- 8.17 Avoid strong vibration or shock. or it will cause the module broken.



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- 8.18 Store the modules in suitable environment with regular packing.
- 8.19 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 non-uniformity or other function issue to display.

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