

Definition of pixel failure

In spite of modern production facilities and clean-room environment, it is not yet possible to completely avoid pixel failure, due to the manufacturing process. A 14-inch XGA panel contains e.g. 2,359,296 subpixels. A single non-working subpixel already constitutes a visible pixel failure.

According to ISO 13406-2 TFT panels are being divided into classes. Class I requires zero percent defects. Production in line with this standard is not possible and therefore necessitates a 100% selection in order to ship TFT panels of this class.

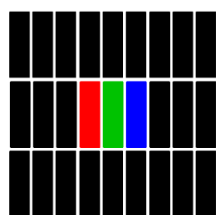
A selection would boost prices drastically and all panels of class II would **inevitably** have at least one pixel failure.

Any number of pixel failures up to the quantity defined by the specification do not justify complaint, hence cannot be returned. For inspection please refer to the latest data sheet of the respective display.

Since we endeavour to create transparency we have summarised a few specifications. The market differentiates . . .

- a) permanently luminous pixel (sparkle mode or bright dot)

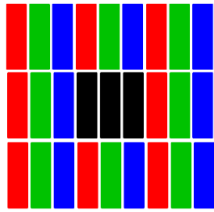
White pixel (RGB ON)



Either one subpixel (R, G, B) or all three combined

b) permanently non-luminous pixel (black mode or dark dot)

Black pixel (RGB OFF)



Either one subpixel (R, G, B) or all three combined

A complete pixel consists of three subpixels (RGB). Data sheets often define one single subpixel (e.g. red) as “dot” or “pixel”.

There is a clearly defined number of allowed pixel failures which may vary, depending on the resolution and manufacturer. In addition, you will find specifications of so-called “clusters” (adjacent pixel failures) and the minimum distance between two of these.

Manufacturer A

6.	SCRATCHES AND DENT ON GLASS POLARIZER	(1) PLS REFER TO THE ABOVE NO.3 AND 4 TO DETERMINE SCRATCHES AND DENT ON POLARIZER OR GLASS																								
7.	DOT DEFECT ON DISPLAY	<table border="1" data-bbox="574 1243 1069 1388"> <thead> <tr> <th colspan="5">Judgment Criteria</th> </tr> <tr> <th>Grade</th> <th>Area</th> <th>Bright Dot</th> <th>Dark Dot</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td rowspan="2">A</td> <td>A</td> <td>0</td> <td>2</td> <td rowspan="2">5</td> </tr> <tr> <td>B</td> <td>1</td> <td>5</td> </tr> <tr> <td>B</td> <td>—</td> <td>—</td> <td>—</td> <td>7</td> </tr> </tbody> </table> <p data-bbox="558 1400 1085 1572"> (1)It is defined as Point Defect if defect area>0.5dot (2)It is ignored if defect area≤0.5dot (3)Weak point defect will be defined as Bright Dot if it can be observed through ND filter 6% (4)The distance between 2 dot defect≥5mm (5)Not Allowed Joint point defect </p>	Judgment Criteria					Grade	Area	Bright Dot	Dark Dot	Total	A	A	0	2	5	B	1	5	B	—	—	—	7	<p data-bbox="1133 1265 1340 1332">Note : A/B Area Definition</p>
Judgment Criteria																										
Grade	Area	Bright Dot	Dark Dot	Total																						
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- two defect subpixels are to have a distance of at least 5mm
- definition of zone A and B (A = 3/5 of the visible area)
- in zone A no bright pixel is allowed, only two dark ones
- in zone B a few more pixel failures are allowed

Manufacturer B

Dot Defect			Maximum number acceptable
	Sparkle mode	1 dot	4
		2 dots (Note.(3)-(f))	1
		Total	5
	Black mode	1 dot	5
		2 dots (Note.(3)-(f))	2
		Total	5
	Total		10

- two adjacent subpixels (2 dots) are considered a set
- white subpixel: 4 single and max. one set (max. 5 altogether)
- black subpixel: 5 single and max. 2 sets (max. 5 altogether, e.g. 3 subpixels and 2 sets)
- max. 10 failures if both modes are combined

Please note: With some displays there is a given radius (e.g. 20mm), in which only a limited number of failures may appear (density).

Manufacturer C

Inspection Item		Specification
Line defect		Can't be seen.
Bright dots		≤ 2 dots
Dark dots		≤ 3 dots
Total dots defect		≤ 4dots
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 :	≥ 5 mm
Distance between Dark dot and Bright Dot :		≥ 15 mm
Mura		6% ND filiter

- only 2 bright or 3 dark subpixels are allowed. Only four if they occur combined
- if two adjacent subpixels are defective, they are considered a pair and, as such, may only appear twice
- min. distance between two bright subpixels is 15mm and between two dark ones only 5mm