



IQC for Fixed Lens

推廣投影片

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The Purpose of IQC

- n Ensure the quality of the camera module is at an acceptable level and does not affect the final image quality.

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The Test Item of IQC

- n Lens Shading
- n Color Shading
- n Sharpness
- n Depth of Field
- n Lens Flare
- n Ring
- n Tilt
- n Distortion
- n Particle / Dark Pixel
- n Bright Pixel
- n Noise
- n Alignment
- n Rotation

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Lens Shading

n Testing Purpose

- n Check if the luminance ratio of corner and center area is within an acceptable level

n Testing Method

- n Uniform light source should be used
- n Check if the luminance ratio of corner and center area is bigger than 60%

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Lens Shading



The luminance of corner must bigger than 60% of Center area

Center Area

Lens Shading

Circle Contour and
Over-Exposure
happen, if not
control lens shading



Color Shading

n Testing Purpose

- n Due to lens quality or sensor and lens matching issues, occasionally, the image contains regional abnormal color.

n Testing Method

- n Uniform light source should be used
- n Check the Diff $((R/G)_{\text{center}} - ((R/G)_{\text{corner}})$ and
Diff $((R/G)_{\text{center}} - ((R/G)_{\text{corner}})$ is small than 10%.

Color Shading

Center area will be **Reddish**, if not control color shading



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Resolution

- n Testing Purpose

- n Make sure the sharpness of captured image is within an acceptable level

- n Testing Method

- n Put the resolution chart at the focused distance
 - n Calculate the MTF value
 - n Check whether the MTF value of center and corner area is bigger than 100 lp/mm and 80 lp/mm for 1.3M pixel.

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Resolution



Depth of field

- n Testing Purpose

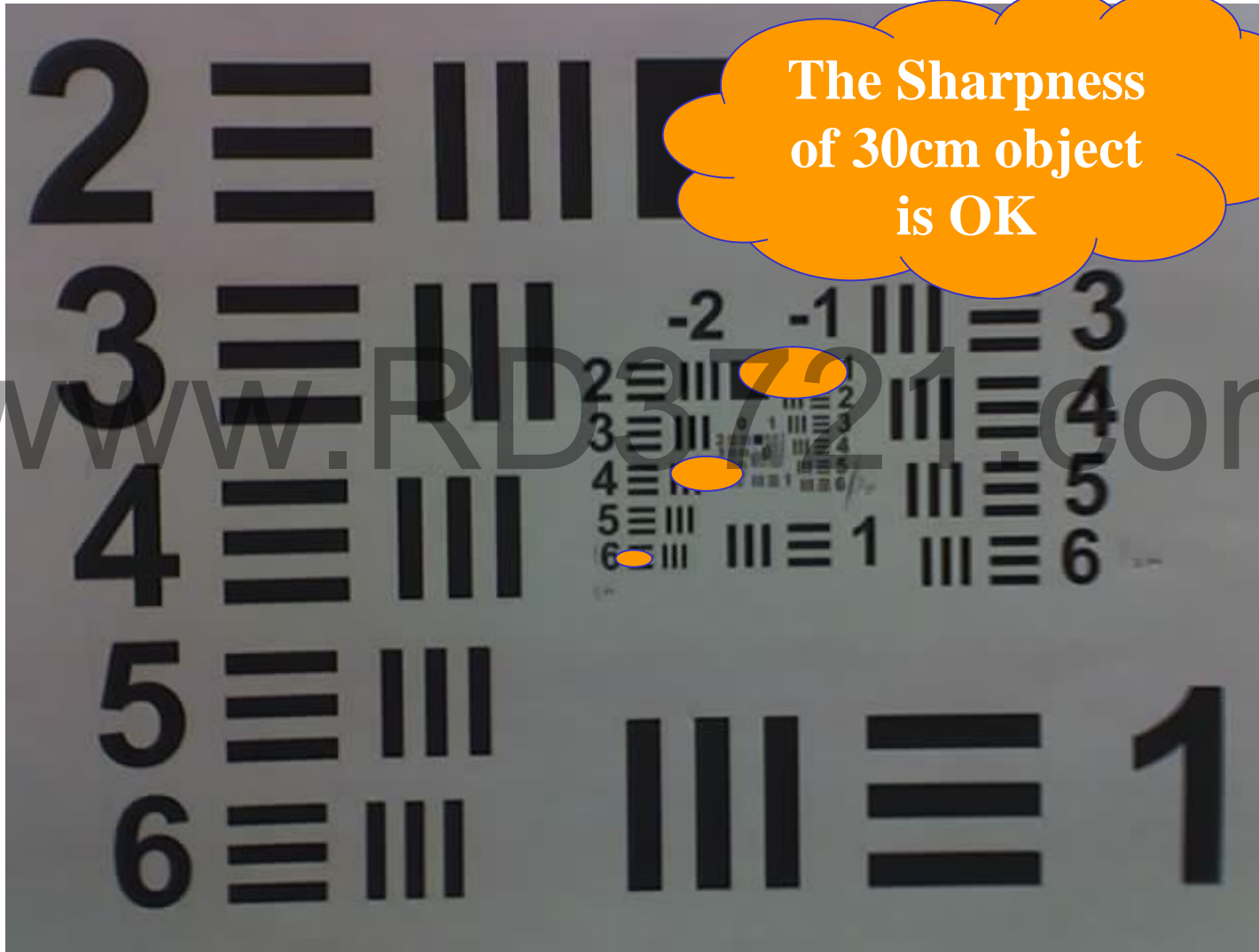
- n Make sure the Focus of lens can cover the near and far scenes.

- n Testing Method

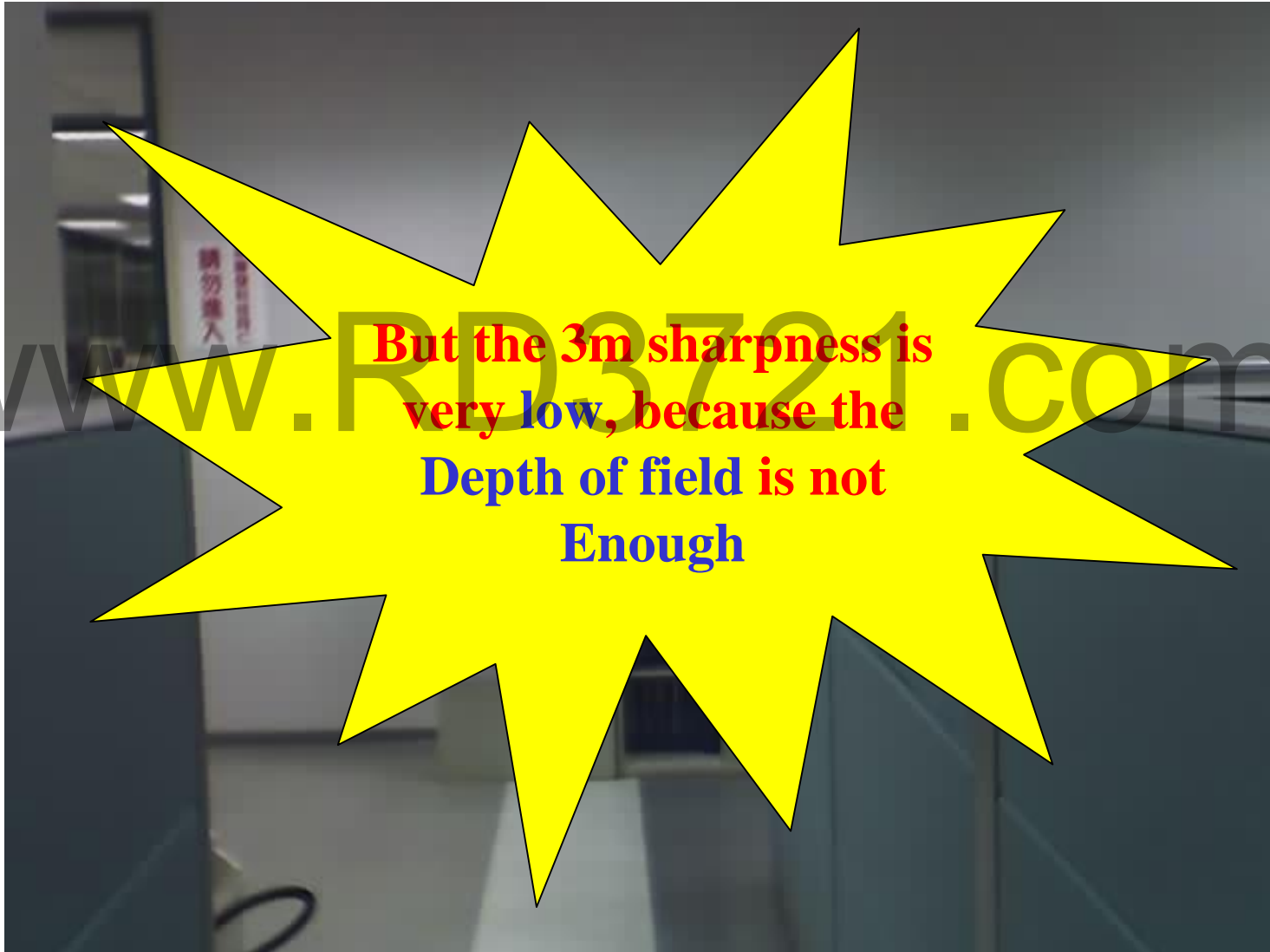
- n Put the resolution chart at the near and far positions
 - n Calculate the MTF value
 - n Check whether the MTF value of center and corner area is bigger than 100 lp/mm and 80 lp/mm for near and far distance.

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Depth of Field – 30m



Depth of Field – 3 m



Lens Flare

- n Testing Purpose

- n Flare can affect the dynamic range of the sensor

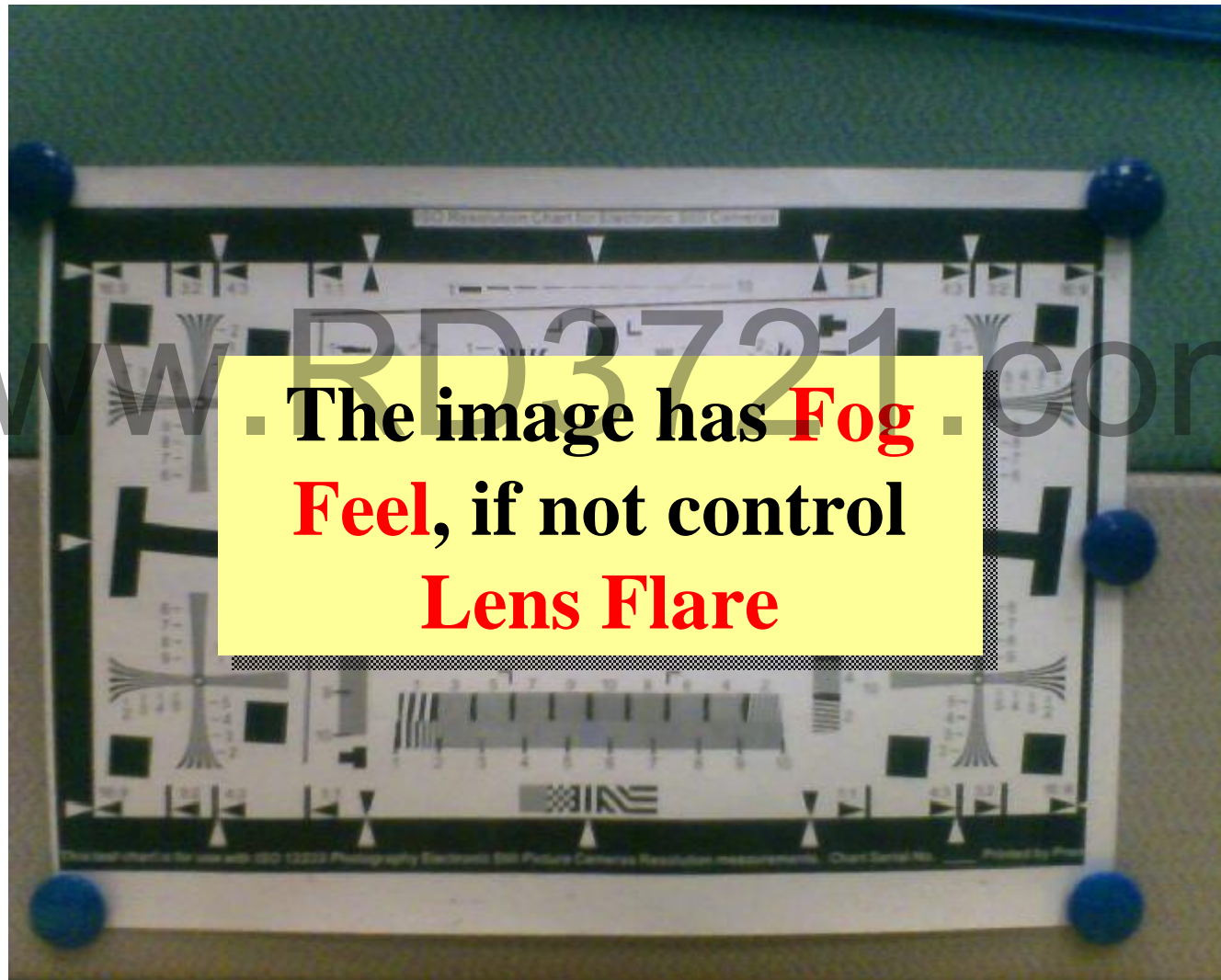
- n Testing Method

- n Capture ISO 12233 chart, and select the black and white area.

- n Check the luminance dynamic range is bigger than 80%

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Lens Flare



Ring

- n Testing Purpose

- n Avoid the Ring effect appearing

- n Testing Method

- n Uniform light source should be used
 - n Check if any center block luminance is small than corner area

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Ring

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There is Ring Contour, so Lens Ring Effect must check

Tilt

- n Testing Purpose

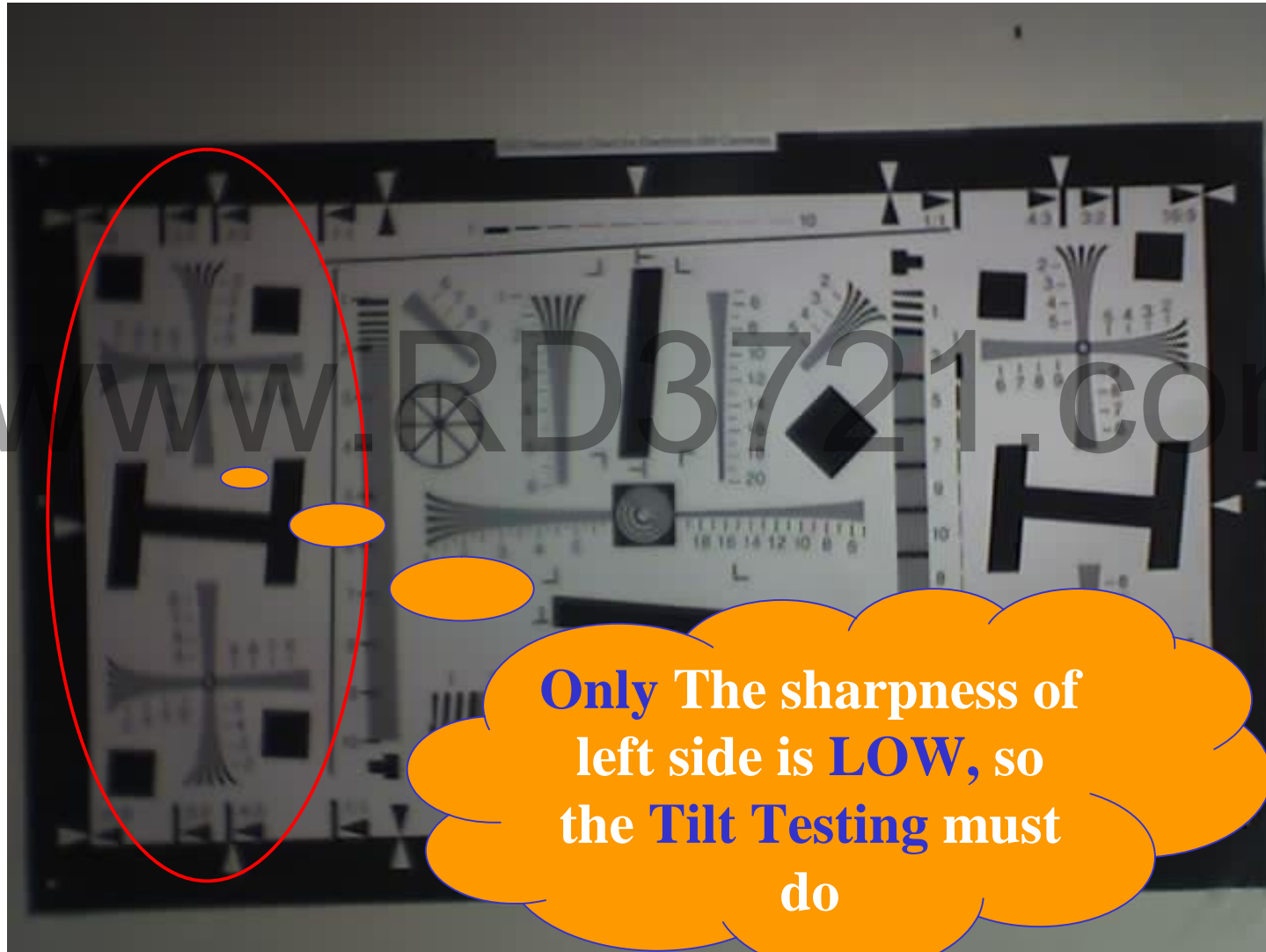
- n This is to test the alignment of the optical axis with the center of the sensing area.

- n Testing Method

- n The difference for the 4 corner MTF values should be within 0.2

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Tilt



Only The sharpness of left side is **LOW**, so the **Tilt Testing** must do

Distortion

- n Testing Purpose

- n This is to calculate the TV distortion of the lens.

- n Testing Method

- n The test pattern contains square that covers the peripheral of the chart

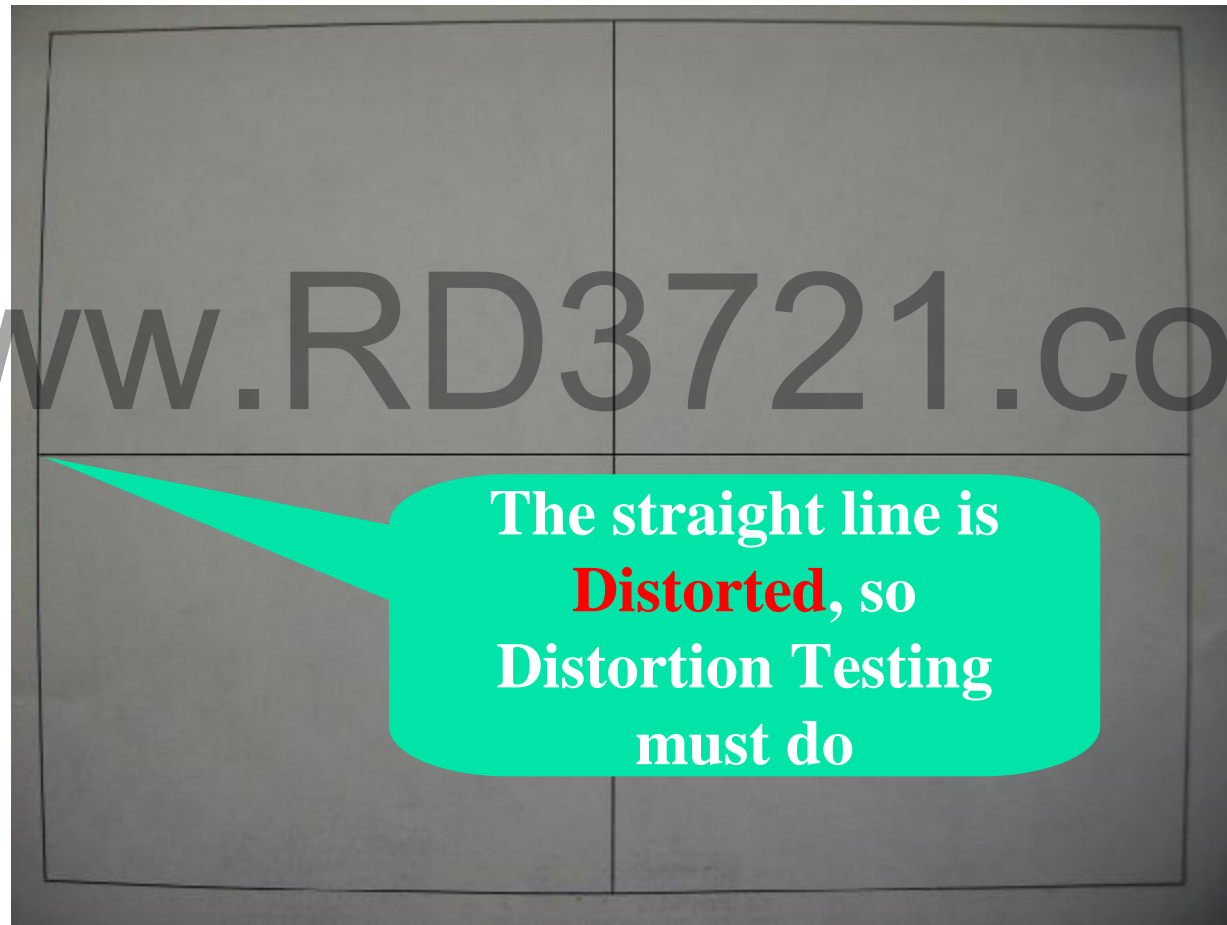
- n Locate the position of the straight line at the center and the corner.

- n Make sure the straight line doesn't distorted.

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Distortion

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Particle / Dark Pixel

n Testing Purpose

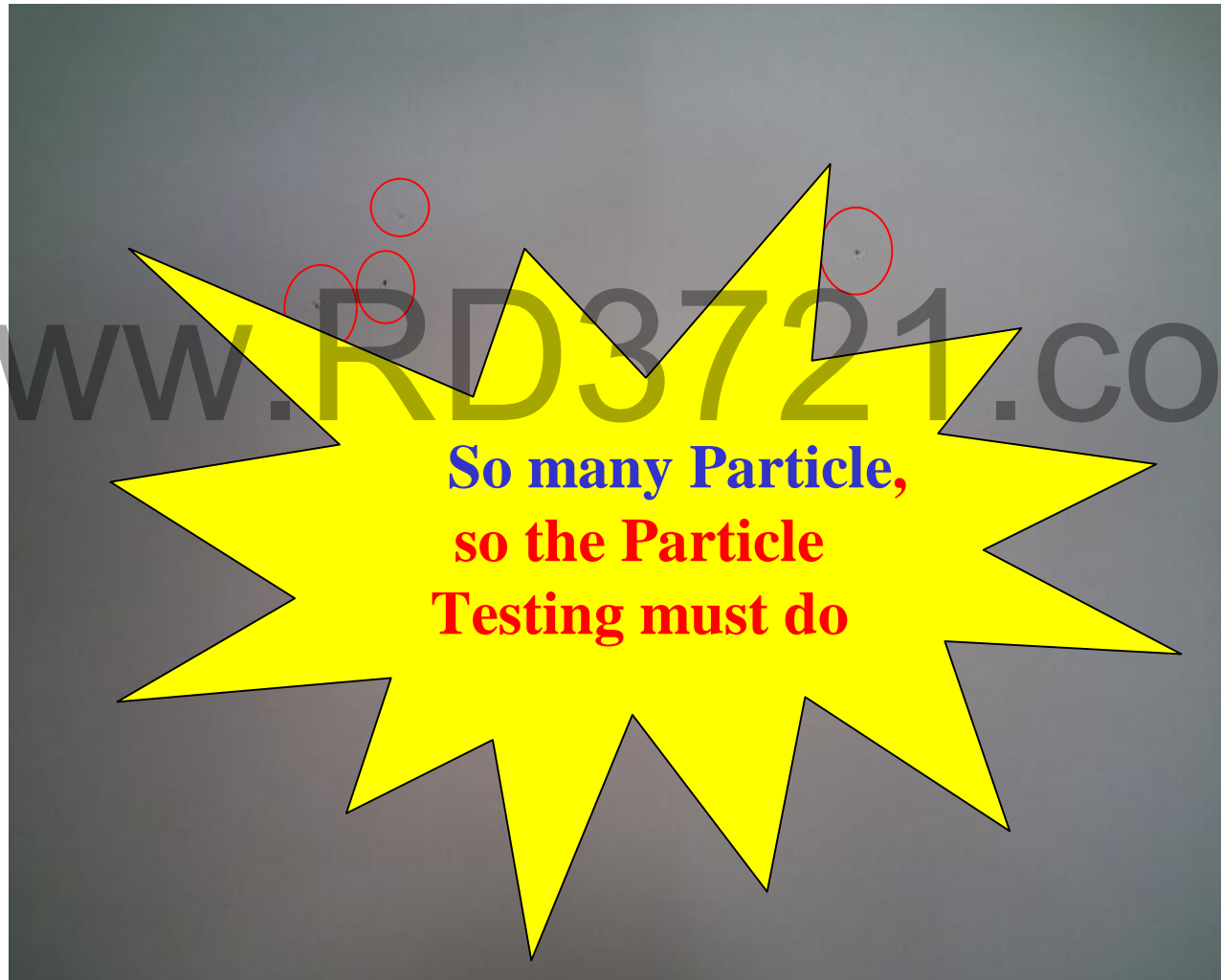
- n check if there is any noticeable particle introduced to the final image
- n make sure the severance of the dark pixel is within an acceptable level

n Testing Method

- n Uniform light source should be used
- n Detect any pixel which its luminance drops more than 20% compared to the mean luminance of surrounding pixels.

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Particle / Dark Pixel



Bright Pixel

- n Testing Purpose

- n Make sure the severance of the dark pixel is within an acceptable level

- n Testing Method

- n Cover the lens with a black rough surface cloth for verifying the bright pixel
 - n Detect any pixel which its luminance is higher than 20% compared to the mean luminance of surrounding pixels.

Bright Pixel



Noise

n Testing Purpose

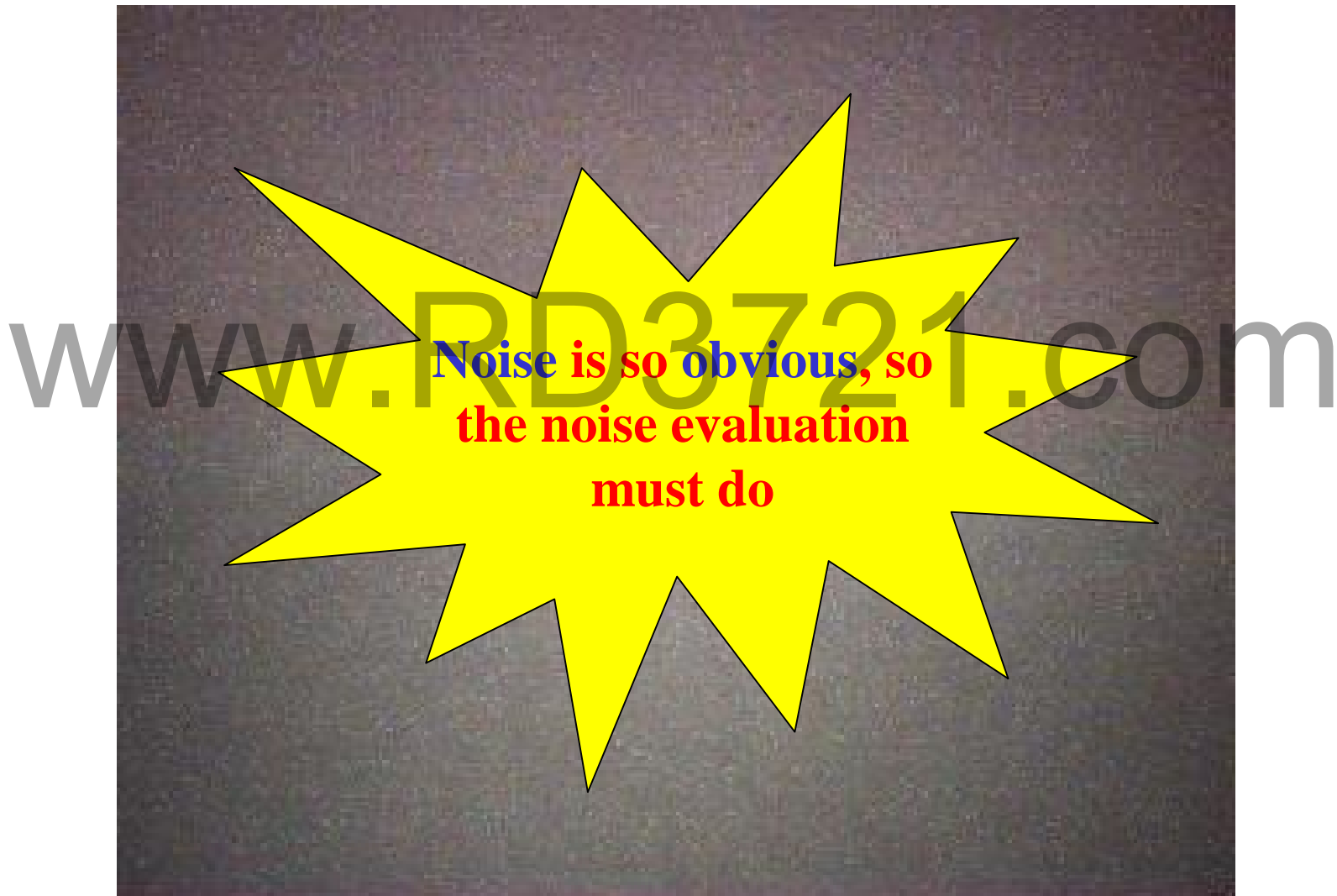
- n Noise will affect the dynamic range of the sensor

n Testing Method

- n Capture an 11-steps image (shown in Fig.1).
- n Calculate the standard deviation of the R, G, B and Y value of each gray scale. (shown in Fig. 2)
- n Make sure all standard deviation is small than 4.

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Noise



Alignment

n Testing Purpose

- n This is to make sure there is no dark corner or displacement of the optical axis due to the holder placement and lens assembly.

n Testing Method

- n The lens should be focused and the uniform light source should be applied.
- n Make sure the brightest spot is at the image center.

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Rotation

- n Testing Purpose

- n This is to ensure the sensor is not rotated so that the image is not rotated.

- n Testing Method

- n Use a test fixture to fix the position of the module and take a picture of the chart that has straight line borders.
 - n Calculate the difference between the border of the chart and the border of the sensing area.
 - n The sensor rotation angle must be small than one degree.

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课程网址: <http://www.edatop.com/peixun/cst/24.html>



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课程网址: <http://www.edatop.com/peixun/hfss/122.html>

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