



Accuracy – narrow band light sources

Objective

A test was done in order to test the accuracy of measuring dominant wavelength with ICAM from DELTA Light & Optics, Denmark. The standard factory calibration was used during the full test.

Set up

Two tests with two set ups was performed.

One set up was 3 LEDs mounted behind an opaque diffuse acrylic plate. This was done in order to simulate an LED back light unit. All 3 diodes (red, green, blue) were measured with the ICAM and with the spectrometer SR-3 from Topcon Techno House.

Red	Green	Blue
37 nm	59 nm	53 nm

Table 1 Full width half max values of the LED's.

For the second set up was used a Bentham TM300 Monochromator to realize a variety of very narrow banded light sources. ICAM was mounted directly in front of the monochromator. The Full width half max value of all light sources from the monochromator is app. 4 nm.

Results

In Table 2 the measurement results of the first setup are shown. For this test we defined the measurement from SR-3 to be "the true value".

	ICAM	SR-3	Difference
Red	629.9 nm	628.6 nm	1.3 nm
Green	547.9 nm	548.1 nm	-0.2 nm
Blue	472.4 nm	472.3 nm	0.1 nm

Table 2

In Table 3 the results of the monochromatic measurements are shown

Bentham TM300	ICAM	Difference
630.0 nm	628.5 nm	1.5 nm
625.0 nm	624.7 nm	0.3 nm
620.0 nm	619.7 nm	0.3 nm
600.0 nm	600.5 nm	-0.5 nm
580.0 nm	580.5 nm	-0.5 nm
560.0 nm	559.9 nm	0.1 nm
551.0 nm	550.9 nm	0.1 nm
550.5 nm	550.5 nm	0 nm
540.0 nm	539.9 nm	0.1 nm
520.0 nm	520.2 nm	-0.2 nm
500.0 nm	500.2 nm	-0.2 nm
480.0 nm	480.2 nm	-0.2 nm
460.0 nm	459.7 nm	0.3 nm
450.0 nm	448.6 nm	1.4 nm

Table 3

Conclusion

In test 1 we tried to simulate the measurement of an LED (R,G,B) backlight unit. The chosen LEDs make too large a triangle in the CIE diagram, but they were chosen in order to challenge the system. As the measurement will get more difficult the closer to the corners of the CIE diagram the red and blue gets, due to very low signals in some channels, we are sure that the accuracy only gets better on "real" BLU's.

Test 2 shows that the accuracy on dominant wavelength is within ± 0.5 nm in the 460 nm to 625 nm interval. It also shows that the resolution is good (see 550.5 and 551). When out of this interval the system is less accurate. This was expected as the signal in the individual channels (Z, Y and Z) is very low when outside the interval.

We can conclude that the ICAM has an accuracy that makes it a very suitable instrument for measuring narrow banded light sources used within the display industry.

