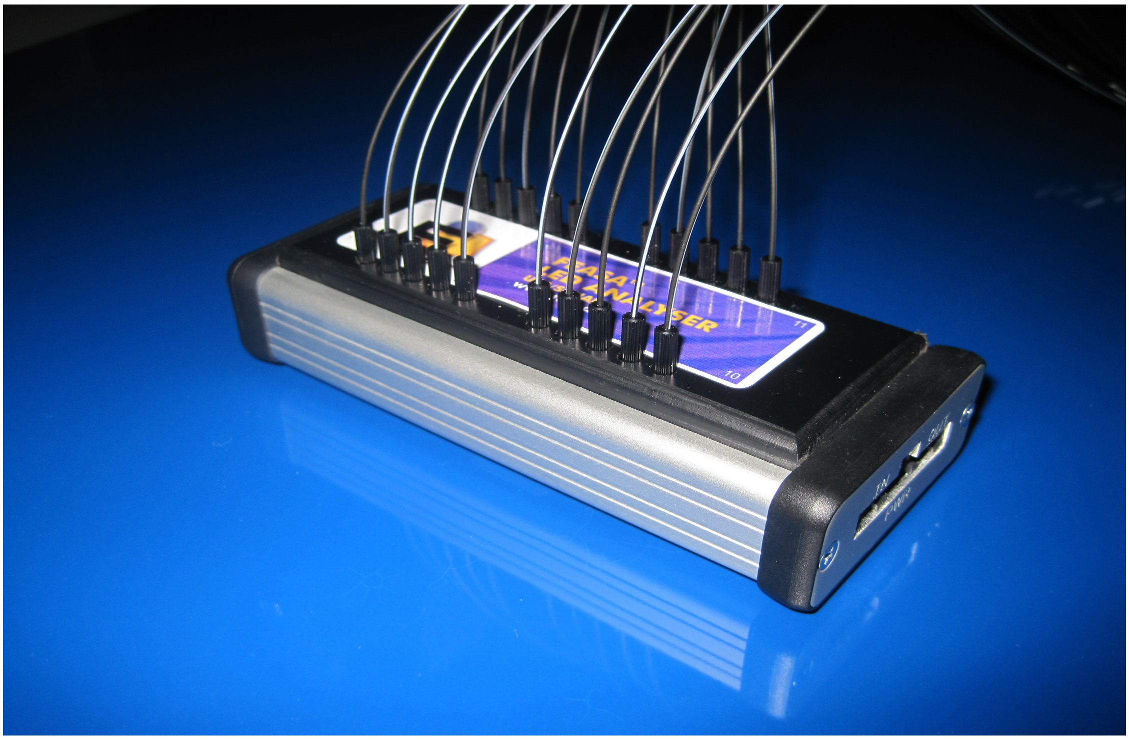
TESTING BLINKING LED's

LED ANALYSER APPLICATION NOTE



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About this Application Note

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Introduction

Blinking or Flashing LED's are often used to indicate a status or error condition. Usually the rate at which LED's blink is in the region 0.5Hz – 3Hz. This Application describes a method by which the Feasa LED Analyser can be used to test the Colour, Intensity and Frequency of blinking LED's.

User Software Program

The User Software program can be used to illustrate the principle involved in testing a blinking or flashing LED. This program can be found on the CD supplied with the Analyser.

There are a number of factors that influence the performance of the LED Analyser when testing blinking LED's:-

1/ The Intensity of the LED when it is on determines which Capture Range should be used. Brighter LED's require higher ranges and thus have shorter capture times. The capture time for each range is shown in Figure 4.

2/ A number of readings must be taken in succession and stored in a Table. The readings must record when the LED is on and off. If the LED is on for a very short time then the Analyser may miss the time when the LED is on.

3/ The best results are obtained if the On/Off times are approximately equal i.e. 50% duty cycle. Frequencies up to 10Hz and higher can be measured if the higher ranges can be used and efficient programming techniques are employed.

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Connect the LED Analyser to the PC

Connect the LED Analyser to a PC and open the User Software Program as shown in Figure 1.

Place Fiber 1 from the LED Analyser over the Blinking LED. Click on the *Connect* button to connect the Software to the LED Analyser. In this example a Red LED blinking at 1Hz has been placed under Fiber 1.

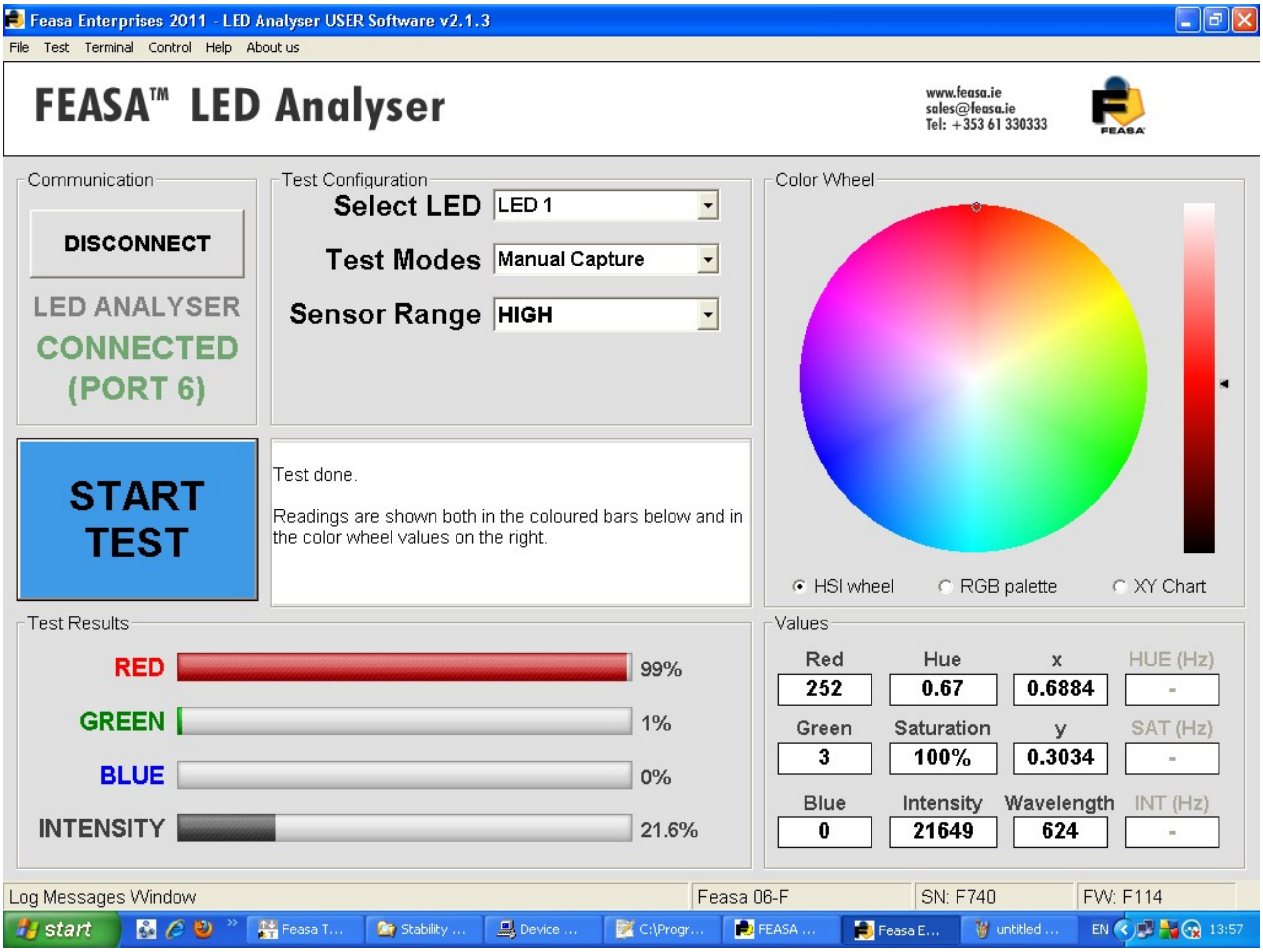

Figure 1

TESTING BLINKING LED's

At the top of the Screen are some command options. Click on *Test→Start Stability Analysis* and the screen shown on Figure 2 will appear. There are a number of options that can be entered. In this example 50 readings will be taken with the Sensor Range set to *High*. *Data to Measure* should include at least one function that measures Intensity.

Click on the *Start Analysis* button.

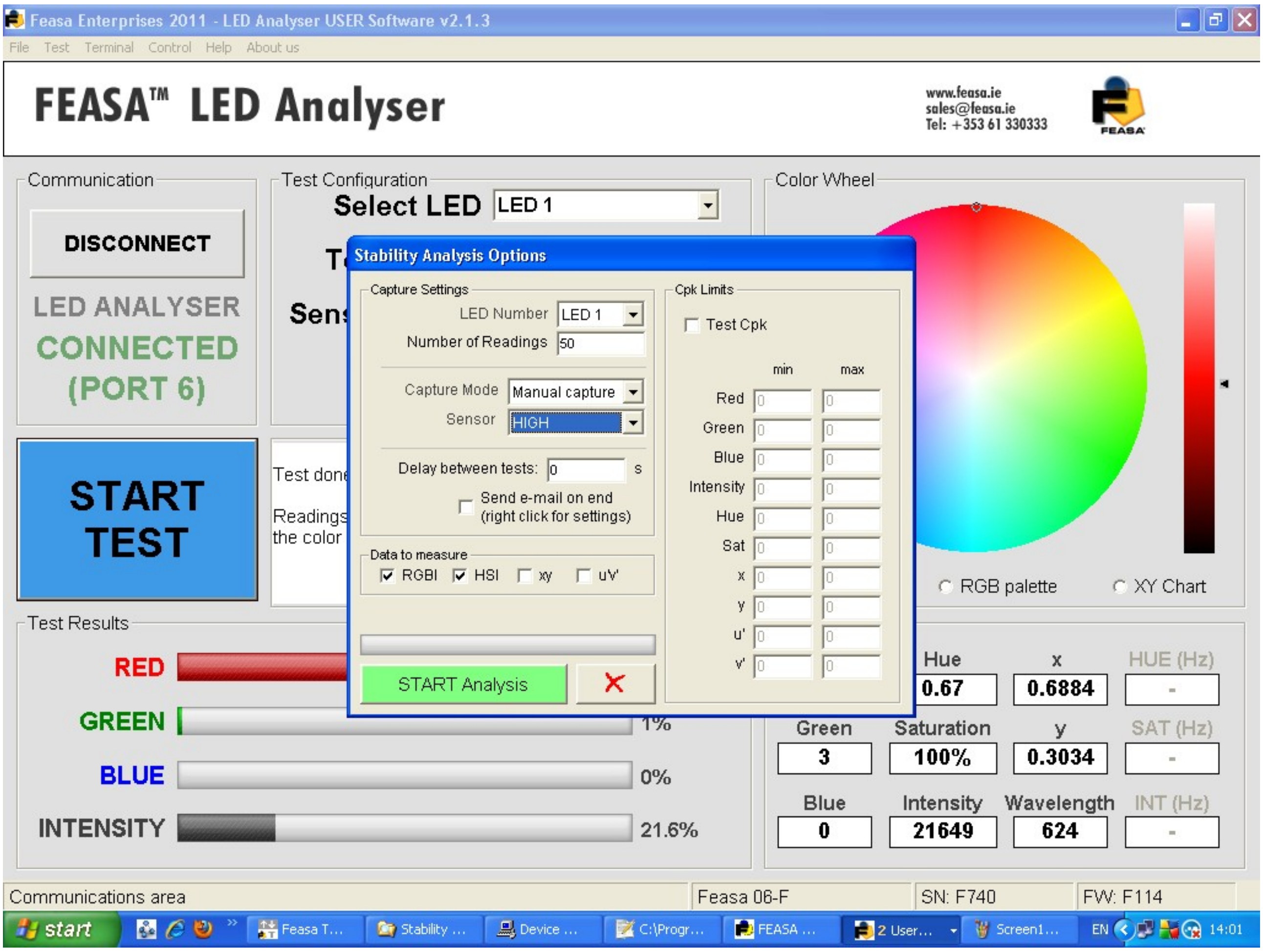

Figure 2

TESTING BLINKING LED's

The screen shown in Figure 3 will appear. Notice that the parameter *Intensity* has been selected at the bottom of the screen.

This graph shows the LED Intensity recorded by the Analyser over 50 readings. It can be easily seen from the Intensity values that the LED is switching on and off.

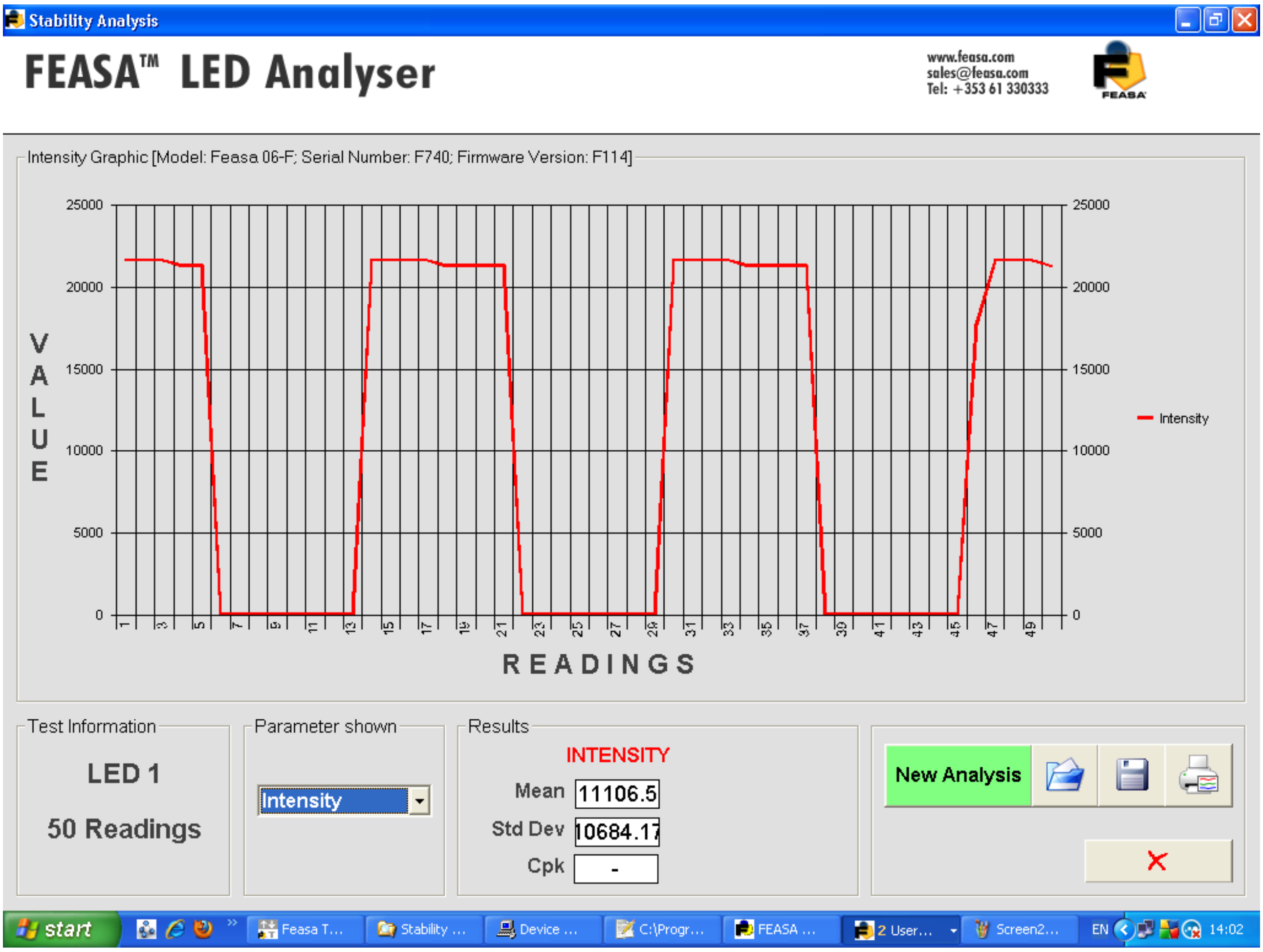

Figure 3

TESTING BLINKING LED's

Calculate the Frequency of the LED

In order to calculate the frequency of the LED the time to take each reading must be determined.

Figure 4 shows the Capture Time for each range. A certain amount of time must be added to allow for software overhead. In the case of the User Software program the overhead is 40mSec per capture.

CAPTURE RANGE	CAPTURE TIME
LOW (1)	600mSec
MEDIUM (2)	200mSec
HIGH (3)	20mSec
ULTRA (4)	2 mSec
SUPER (5)	600 uSec

Figure 4

To calculate the frequency of the blinking LED first measure the time to take all the readings. Measure the number of On/Off cycles by examining the Intensity data. This is displayed in graphical form by the software (See Figure 3).

The frequency of the LED = Number of cycles / Time to take all the readings.

To include this functionality into a Custom Solution a program would have to be written to take a number of readings and store the results in a table. Figure 5 shows a table that can be output from the User Software. The table would have to be parsed to locate the transitions in Intensity. The frequency is calculated by measuring the total time taken and dividing this into the number of cycles.

Red	Green	Blue	Intensity	Hue	Sat
252	3	0	21649	0.67	100
252	3	0	21649	0.67	100
252	3	0	21649	0.67	100
252	3	0	21318	0.68	100
252	3	0	21318	0.68	100
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
252	3	0	21649	0.67	100
252	3	0	21649	0.67	100
252	3	0	21649	0.67	100
252	3	0	21649	0.67	100
252	3	0	21318	0.68	100
252	3	0	21318	0.68	100
252	3	0	21318	0.68	100
252	3	0	21318	0.68	100
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
252	3	0	21649	0.67	100
252	3	0	21649	0.67	100
252	3	0	21649	0.67	100
252	3	0	21649	0.67	100
252	3	0	21318	0.68	100
252	3	0	21318	0.68	100
252	3	0	21318	0.68	100
252	3	0	21318	0.68	100
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
0	0	0	0	-1	-1
251	4	0	17742	0.89	100
252	3	0	21649	0.67	100
252	3	0	21649	0.67	100
252	3	0	21649	0.67	100
252	3	0	21318	0.68	100

Figure 5