

FEASA LED ANALYSER INFRA-RED VERSION



User Manual for Infrared Models



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FEASA LED ANALYSER INFRA-RED VERSION



About this Manual

Feasa operates a policy of continuous development. Feasa reserves the right to make changes and improvements to any of the products described in this document without prior notice.

Feasa reserves the right to revise this document or withdraw it at any time without prior notice.

This manual is written for Feasa Infrared LED Analysers. These Analysers have been designed to test Infra-Red LED's only.

The 20-IR model will test up to 20 LED's, the 10-IR will test up to 10 LED's and the 3-IR will test up to 3 LED's all with a Peak Wavelength range of 700nm - 950nm.

The 20-IRP model will test up to 20 LED's, the 10-IRP will test up to 10 LED's and the 3-IRP will test up to 3 LED's with a Peak Wavelength range of 700nm - 900nm.

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Introduction

Important Safety Information

When using the Feasa -IR (Glass Fiber version) Eye protection must be worn at all times when handling the Led Analyser or the Fibers. Care should be taken when handling the bare ends of the Fibers because they are composed of glass and may scratch unprotected areas.

Infrared protection should be worn when working with Infrared LED's and sources. Infrared light is invisible to the naked eye and may cause damage to the eye or skin if exposed to high levels of radiation.

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IMPORTANT INFORMATION for Programmers

set Commands

The *Set* commands are used to adjust various settings in the LED Analyser such as Intensity, Exposure and offsets.

The *Set* commands are written to the on-board Flash.

These settings remain programmed in the Analyser even when the power is removed. The Led Analyser has a capacity limit of approximately 100,000 writes to the flash.

Use the *Set* command only to store relevant information on the Led Analyser. Please refrain from using *Set* commands in your high volume production programs as this constant writing to the Flash will eventually corrupt the Led Analyser.

Commands are transmitted and received using ASCII characters and are **case-insensitive**. All commands must be terminated with a **<CR>** or **<LF>** character.

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FEASA LED ANALYSER INFRA-RED VERSION



Introduction

The Infrared Series of Feasa LED Analysers have been designed to test Infrared LED's only. The Analyser is supplied in 3, 10, 20 channel versions with Plastic Fibers 700-900nm Peak Wavelength range and Glass Fibers 700-950nm Peak Wavelength range.

Infrared LED's are invisible to the naked eye when lighted and these Analysers can be used to test the Peak Wavelength and Relative Power (Intensity) of these LED's.

The Feasa 20-IR Analyser has 20* Glass Fiber-Optic Light Guides which are mounted individually over the LEDs to be tested.

The Feasa 20-IRP Analyser has 20* Plastic Optical Fiber Light Guides which are mounted individually over the LEDs to be tested.

Emitted Light from the LEDs is guided through these Fiber-Optic Light Guides to the Analyser where the Peak Wavelength and Intensity are tested. The test results can then read out of the Analyser through the Serial or USB Interfaces.

The USB Interface is 2.0 compatible and the Serial Interface is RS-232C compatible.

Peak Wavelength and Intensity values are output as ASCII strings through the USB and Serial Interfaces.

* There are 10 channel and 3 channel versions available.

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FEASA LED ANALYSER INFRA-RED VERSION



Intensity

Intensity is a measure of the amount of light being emitted by the LED.

The Analyser tests the Intensity of each LED and outputs this value to the Test System. The value is output as a number in the range **0 - 99,999**. The Analyser is calibrated to a fixed standard and all measurements are relative. The Intensity output reading is NOT part of the *International System of Units* and is not an absolute or traceable unit of colour measurement. It is part of the Wavelength and Relative intensity (WI) system of describing colour.

The Infra Red Analyser is set to measure Intensity on a **Linear** scale.

Factors that influence Intensity Measurement:-

- The position of the Fiber in relation to the LED.
- Offset from the Optical Centre of the LED.
- The Gap between the end of the Fiber Light Guide and LED to be measured.
- The condition of the Fiber end. It must be kept clean with a 90° Cleave.
- Is the LED Static or Flashing ?
- External Influences – Other LEDs in close proximity, Ambient Lighting.

There are 6 capture ranges each with an intensity output range of 0 to 99,999. Feasa recommends that the UUT readings should be in the 50K to 90K range for the best stability.

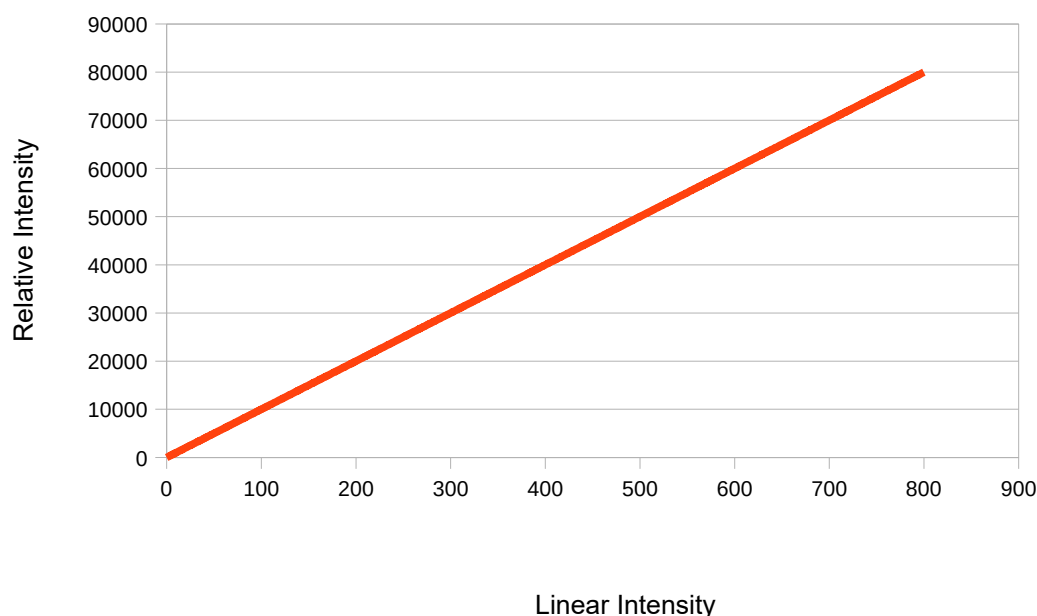


Figure 1. Relative Intensity Response

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Setting Tolerance Limits for Peak Wavelength and Intensity

The test procedure requires the user to set the Pass/Fail limits for Peak Wavelength and Intensity for each LED which then become the standard against which LEDs to be tested are compared.

The Pass/Fail limits for Peak Wavelength are chosen, in conjunction with manufacturer's specifications, from measurements taken from a sample number of typical LEDs.

Sample Peak Wavelength Pass/Fail Limits

LED	Minimum	Maximum
830	820	840
880	870	890
900	891	910
930	910	950

Figure 2.

The Pass/Fail limits for intensity are chosen from the average intensity values from a number of sample LEDs.

Sample Intensity Pass/Fail Limits on a single capture range. Eg C2

Intensity Value	Upper Limit	Lower Limit	Comments
1250	1500	1000	Dim LED
25000	28000	22000	Average LED
60000	64000	56000	Bright LED

Figure 3.

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Physical Layout



Figure 4a (Front Panel).

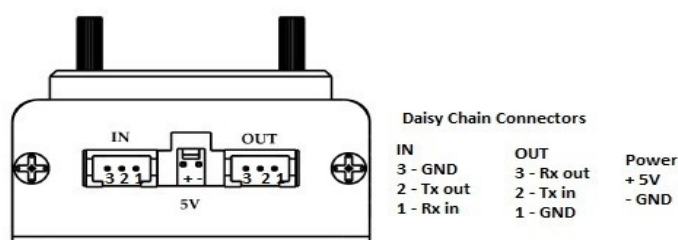


Figure 4b (Rear Panel).

This shows the layout of the Connectors viewed from the edge of the board.

Figure 4a shows the physical layout of the Feasa x-IR / IRP Analyser Front Panels.

Figure 4b shows the physical layout of the Feasa x-IR / IRP Analyser Rear Panels.

These units are enclosed in a Red Aluminium Case. The Serial port is a 3 pin connector with the cables supplied and the USB connector is the mini usb again the cable is supplied with the unit.

Please refer to the Fixturing Guidelines Manual for connector pin out details.

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USB Port Control

Connect the LED Analyser to the PC using the supplied USB cable.

Power is supplied through the USB Cable so there is no need to plug in the Power cable.

The installed Software Driver will configure the USB Port automatically.

The USB Port is configured as a Virtual Com Port and will be designated a name such as COM5, COM6, etc.

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Serial Port Control

For serial communications the LED Analyser must be connected from the 3-pin Serial Connector to the PC or Controller using the supplied serial cable (LA-SER-02).

5VDC @ 200mA must be supplied to the 2-pin Power Connector using the Power Cable provided (LA-PWR-01). See figure 7. ***Prolonged Voltages > 7V can damage the Analyser.***

The Green LED should turn on to indicate the Analyser is ready for use.

The default serial communications settings are **57,600 Baud, 8 Data bits, 1 Stop bit and No Parity.**

The baud rate can be changed to any of the following:- 9600, 19200, 38400, 57600, 115200. See the [setbaud](#) command for more details.

Serial Connector (RS232C)

<i>Pin</i>	<i>Signal</i>	<i>Pin on 9-Pin D-type</i>
1	Tx from LED Analyser	2
2	Rx from LED Analyser	3
3	GND	5

Power Connector

<i>Pin No</i>	<i>Signal</i>
1	Power (5V DC)
2	GND

Figure 5.

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Capture Commands

The Capture commands are used to capture the Peak Wavelength and Intensity of the LED's to be tested and store the results in the memory of the Analyser.

These results can be read out later using the GET *DATA* commands.

Commands are transmitted and received using ASCII characters and are **case-insensitive**. All commands must be terminated with a **<CR>** or **<LF>** character.

There are two Programs on the supplied CD that can be used to send commands to the Analyser:- **Feasa LED Analyser Terminal** and the **Feasa LED Analyser Test** Programs.

The **Feasa LED Analyser Terminal** is a command line program that can be used to send commands and receive results from the Analyser. This allows the user to view the command codes and responses from the Analyser.

The **Feasa LED Analyser Test** Program allows the User to test all the LED's together. Pass and Fail limits can be set and results can be printed and logged.

Alternately, the User may generate a customised Program that sends commands and receives data through the virtual USB Com Port.

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FEASA LED ANALYSER INFRA-RED VERSION



Capture Mode

AUTO CAPTURE - Store LED Data

Transmit	Receive
Capture c	OK OK

Description

This command instructs the LED Analyser to capture and store the Peak Wavelength and Intensity of all the LED's positioned under the fibers. The Analyser automatically determines the correct settings to capture the LED data. In the case of a 20 channel unit the data for all 20 LED's is captured simultaneously and stored in internal memory of the LED Analyser. The data is stored until the power is removed or another **capture** command is issued. When completed the Analyser will transmit the character **OK** on the receive line to the transmitting device (i.e. the PC).

This command uses a wide Intensity range to be able to test dim and bright LED's simultaneously. However, if the LED's to be tested are of similar Intensity then better results may be obtained by using the [Capture#](#) command described on the next page.

Example:

The PC transmits **capture** to the LED Analyser and the LED Analyser sends **OK** to the PC to acknowledge that the command is completed.

capture
OK

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FEASA LED ANALYSER INFRA-RED VERSION



Capture Mode

MANUAL CAPTURE - Store LED Data for a specific range

Transmit	Receive
CAPTURE# C#	OK OK

Where:

represents the ranges 1, 2, 3, 4, 5.

The LED brightness level for each range is as follows:-

Range 1 = Low
Range 2 = Medium
Range 3 = High
Range 4 = Super
Range 5 = Ultra

Description

This command uses a pre-selected exposure time designated Range1, Range2 etc. For low light or dim LED's use Range 1 and for brighter LED's use higher ranges. The higher ranges lead to faster test times because the exposure time is shorter.

This command instructs the LED Analyser to read and store the Peak Wavelength and Intensity of all the LED's positioned under the fibers using a fixed range.

The range setting must be specified. The data is stored until the power is removed or another **capture** command is issued. When completed the Analyser will transmit the character **OK** on the receive line to the transmitting device (i.e. the PC).

Example:

The PC transmits **capture** to the LED Analyser and the LED Analyser sends **OK** to the PC to acknowledge that the command is completed.

capture2
OK

There are 5 manual capture ranges each with an intensity output range of 0 to 99,999. Feasa recommends that the UUT readings should be in the 55K to 85K range for the best stability.

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FEASA LED ANALYSER INFRA-RED VERSION



Capture Mode

AUTO CAPTUREPWM - Store PWM LED Data

Transmit	Receive
CAPTUREPWM CPWM	OK OK

Description

Pulse-Width-Modulated(PWM) LED's are switched on and off rapidly to save power and to control Intensity. The Analyser automatically determines the correct settings required to execute the test.

This command uses the *auto-ranging* feature and a pre-set *averaging factor* to capture the LED data. This command is useful if it is required to test very dim and very bright PWM LED's together.

The command instructs the LED Analyser to read and store the Peak Wavelength and Intensity of all the LED's positioned under the fibers. The data is stored until the power is removed or another **capture** command is issued. When completed the Analyser will transmit the character **OK** on the receive line to the transmitting device (i.e. the PC).

Example:

The PC transmits **capturepwm** to the LED Analyser. The Analyser sends **OK** to the PC to acknowledge that the command is completed.

capturepwm
OK

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FEASA LED ANALYSER INFRA-RED VERSION



Capture Mode

Manual CAPTUREPWM - Store PWM LED Data for a specific Range

Transmit	Receive
CAPTURE#PWM@@ C#PWM@@	OK OK

Where:

represents the exposure Range 1 – 5.

@@ represents an averaging factor in the range 1 - 15.

Description

This command allows the User to specify the *exposure range* and an *averaging factor* when testing PWM LED's. Select the *exposure range (1-5)* to match the *Intensity of the LED's*. The Analyser tests these LED's by taking a number of readings and averaging the results. A larger factor will lead to more stable results. The *averaging factor* is a number in the range 1-15.

This command instructs the LED Analyser to read and store the Peak Wavelength and Intensity of all the LED's positioned under the fibers. The data is stored until the power is removed or another **capture** command is issued. When completed the Analyser will transmit the character **OK** on the receive line to the transmitting device (i.e. the PC).

capture1pwm05
OK

There are 5 manual capture ranges each with an intensity output range of 0 to 99,999. Feasa recommends that the UUT readings should be in the 55K to 85K range for the best stability.

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Get Data Commands

The *get data* commands are used to read out the Peak Wavelength and Intensity data stored by the *capture* commands.

The data from the last *capture* command remains in memory until a new *capture* command is issued or the power is removed from the Analyser.

Commands are transmitted and received using ASCII characters and are **NOT case-sensitive**. All commands must be terminated with a **<CR>** and **<LF>** characters. When the Analyser sends a response each line is terminated with a **<CR>** and **<LF>** characters.

Under Range Condition

An under range condition will occur when insufficient light from the LED reaches the sensor for the range selected. This will be indicated by **0000 00000** for Peak Wavelength and Intensity.

If this condition occurs select the next **lower** range and test again.

Over Range Condition

An over range condition will occur when too much light from the LED reaches the sensor for the range selected by the switch. This will be indicated by **0000 99999** for Peak Wavelength and Intensity.

If this condition occurs select the next **higher** range and test again.

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FEASA LED ANALYSER INFRA-RED VERSION



Get Data Mode

getIR## - Return the Peak Wavelength and Intensity values

Transmit	Receive
Getir## getirall	wwwwww iiii

Where:

represents the Fiber Number and is a number in the range 01 – 20.

www represents the Peak Wavelength value

iiii represents the Intensity value

Description

This command is used to return the Peak Wavelength and Intensity values for the LED under the Fiber number ##.

This command should be preceded by a **capture** command to ensure valid LED data is stored in the memory of the LED Analyser. The data for each LED can only be read out one-at-the-time, in any order. Note: it is important for the PC to use 01, 02, 03, etc to indicate Fibers 1, 2 and 3, etc.

Example:

The PC transmits **getir01** to the LED Analyser to instruct it to send the stored Peak Wavelength and Intensity data for the LED positioned under Fiber No 1. The LED Analyser will return a string **wwwwww iiii** to the PC.

getir01
0850 68123

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FEASA LED ANALYSER INFRA-RED VERSION



Get Data Mode

getWavelength## - Get the Peak Wavelength

Transmit	Receive
Getwavelength## getwavelengthall	XXX

Where:

represents the Fiber Number and is a number in the range 1 – 20.
xxx represents the peak wavelength of the LED in nanometers.

Description

This command is used to get the value of the Peak Wavelength for the LED under the Fiber number **##**.

This command should be preceded by the **capture C** command to ensure valid LED data is stored in the memory of the LED Analyser. The **C1-C5** commands are available but are not as accurate. The data for each LED can only be read out one-at-the-time, in any order.

Example:

The PC transmits **getwavelength01** to the LED Analyser to instruct it to send the stored peak wavelength for the LED positioned under Fiber No 1. The LED Analyser will return a string **xxx** to the PC.

getwavelength01
513

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Get Data Mode

getINTENSITY## - Get the Intensity

Transmit	Receive
Getintensity## getintensityall	IIIII

Where:

represents the Fiber Number and is a number in the range 01 – 20.

IIIII represents the Intensity value.

Description

This command is used to get the Intensity value for the LED under the Fiber number **##**.

This command should be preceded by a **capture** command to ensure valid LED data is stored in the memory of the LED Analyser. The data for each LED can only be read out one-at-the-time, in any order. Note: it is important for the PC to use 01, 02, 03, etc to indicate Fibers 1, 2 and 3, etc.

Example:

The PC transmits **getintensity01** to the LED Analyser to instruct it to send the stored XY Chromaticity data for the LED positioned under Fiber No 1. The LED Analyser will return a string **IIIII** to the PC.

getintensity01
06734

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Get Data Mode

getWI## - Get the Peak Wavelength & Intensity

Transmit	Receive
Getwi## getwiall	XXX YYYYY

Where:

represents the Fiber Number and is a number in the range 1 – 20.
xxx represents the peak wavelength of the LED in nanometers.
YYYYY represents the intensity of the LED.

Description

This command is used to get the value of the Peak Wavelength for the LED under the Fiber number **##**.

This command should be preceded by the **capture C** command to ensure valid LED data is stored in the memory of the LED Analyser. The **C1-C5** commands are available but are not as accurate. The data for each LED can only be read out one-at-the-time, in any order.

Example:

The PC transmits **getwi01** to the LED Analyser to instruct it to send the stored peak wavelength & Intensity for the LED positioned under Fiber No 1. The LED Analyser will return a string **xxx yyyyy** to the PC.

getwi01
513 12345

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Get Data Mode

getSIGNALLEVEL## - Get the Relative Intensity in a percentage of the Range

Transmit	Receive
getsignallevel## getsignallevelall	iii%

Where:

represents the Fiber Number and is a number in the range 01 – 20.

all represents the 20 Fibers in a Feasa 20F, or 3 Fibers in a 3F.

iii% represents the intensity value in percentage terms of the LED under fiber ##. This 3-digit number is in the range 001 – 100. 000% represents no Intensity or under range(i.e. the LED is off) and 999% will represent over range or the LED is too bright.

Description

This command is used to get the level of Intensity in percentage terms for each range for the LED under the Fiber number ##. This command should be preceded by a **capture** command to ensure valid LED data is stored in the memory of the LED Analyser. The data for each LED can be read out one-at-the-time, in any order.

Note: it is important for the PC to use 01, 02, 03, etc to indicate Fibers 1, 2 and 3, etc.

Alternatively use the *getsignallevelall* command to read back the LED data for all 20 leds in one command.

Example:

The PC transmits **getsignallevel01** to the LED Analyser to instruct it to send the stored Intensity data for the LED positioned under Fiber No 1. The LED Analyser will return **iii%** to the PC.

getsignallevel01
050%

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Get Data Mode

getIntGain - Get the Intensity Gain Factor

Transmit	Receive
getIntGain##	xxx

Where:

represents the Fiber Number and is a number in the range 01 – 20.

xxx represents the Intensity gain value. Default 100.

Description

This command is used to get the Intensity gain value for each Fiber.

The default values set at the factory are 100 i.e. 100% of nominal. The values can be adjusted by the [SetIntGain](#) command.

Example:

The PC transmits **getintgain01** to the LED Analyser to instruct it to send the stored intensity gain data for Fiber No 1.

getIntGain01
100

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Get Data Mode

getfactor - Get the exposure Factor

Transmit	Receive
getfactor	xx

Where:

xx represents the exposure factor value. The default value is 01. The ranges is 01 - 15

Description

This command is used to get the exposure factor value for all Fibers.
The default value set at the factory are 01. The values can be adjusted by the [SetFactor](#) command.

Example:

The PC transmits **getfactor** to the LED Analyser to instruct it to send the stored exposure factor for all Fibers. The default value is 01.

getfactor
01

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getWAVELENGTHOFFSET@@ - Get the Peak Wavelength Offset

Transmit	Receive
getwavelengthoffset@@	+/-XX

Where:

@@ represents the Fiber Number and is a number in the range 1 – 20.
+/- xx represents the wavelength offset set of the LED in nanometers.

Description

This command is used to get the value of the Dominant Wavelength Offset set for Fiber number @@.

The range of value that can be programmed is +/-99, however setting a value of greater than +/-10 would probably indicate an error in your measurement setup

Example:

The PC transmits **getwavelengthoffset01** to the LED Analyser to instruct it to send the programmed dominant wavelength offset for the LED positioned under Fiber No 1. The LED Analyser will return a string **+/- xx** to the PC.

getwavelengthoffset01
+07

General Commands

getBAUD - Get the Baud Rate

Transmit	Receive
getBAUD	X bps

Where: **X** = 9600, 19200, 38400, 57600, 115200 for **Serial RS232 Port**

Where: **X** = 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600 for **USB Port**

Description

This command will get the baud rate of the Serial and USB Port's that the Analyser is communication through.

The default Port settings of the Analyser are 57,600, 8 Data bits, 1 Stop bit and No Parity.

It can also be seen on the comment section of the Feasa terminal window.

Example:

To get the baud rate of the Analyser transmit the command **getbaud** to the Analyser.

getbaud
57600 bps

General Commands

getHW - Get the Hardware Version

Transmit	Receive
getHW	Feasa XX-YY

Where: XX-YY is an alphanumeric value.

Description

This command will return the hardware version the Analyser.

Example:

The PC transmits **gethw** to the LED Analyser and it will return **Feasa XX-YY** to the PC.

gethw
Feasa 20-IR
or
Feasa 20-IPR

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General Commands

getSTATUS - Get a summary of the Led Analyser details

Transmit	Receive
getstatus	See details below

Information Received back from the Analyser:

Serial number : Xyyy
Firmware Version : Iyyy
Exposure Factor : 01
Capture : Manuel 04
Number of Fibers : 05
Calibration date: yyy/mm/dd

Description

This command will return a summary of the Led Analyser details.

Example:

The PC transmits **getstatus** to the LED Analyser and it will return to the PC.

Led Analyser STATUS

Serial Number : 123G
Firmware Version :IR03
Exposure Factor: 01
Capture : Manuel 04
Number of Fibers : 20
Calibration date: 2018/06/21

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General Commands

getSERIAL Get the Serial Number of the Analyser

Transmit	Receive
getSerial	xxxx

Where: xxxx is an alphanumeric value. (Always 4 characters)

Description

This command will return the Serial Number of the Analyser. This is a unique number and is useful if multiple LED Analysers are used in a System. The Controlling Software can query each LED Analyser for it's Serial Number to ensure the correct Analyser is being controlled.

Example:

The PC transmits **getserial** to the LED Analyser an it will return **xxxx** to the PC.

getserial
75A6

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General Commands

getVERSION - Get the Firmware Version

Transmit	Receive
getVersion	xxxx

Where: xxxx is an alphanumeric value. (Always 4 characters)

Description

This command will return the Version Number of the firmware in the Analyser.

Example:

The PC transmits **getversion** to the LED Analyser and it will return **xxxx** to the PC.

getversion
IR09

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General Set Commands

General Set Commands

IMPORTANT INFORMATION for Programmers

set Commands

The *Set* commands are used to adjust various settings in the LED Analyser such as Intensity, Exposure and offsets.

The *Set* commands are written to the on-board Flash.

These settings remain programmed in the Analyser even when the power is removed. The Led Analyser has a capacity limit of approximately 100,000 writes to the flash.

Use the *Set* command only to store relevant information on the Led Analyser. Please refrain from using *Set* commands in your high volume production programs as this constant writing to the Flash will eventually corrupt the Led Analyser.

Commands are transmitted and received using ASCII characters and are **case-insensitive**. All commands must be terminated with a **<CR>** or **<LF>** character.

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FEASA LED ANALYSER INFRA-RED VERSION



Set Data Mode

SetIntGain - Set the Intensity GainFactor

Transmit	Receive
SetIntGain##xxx	OK

Where:

represents the Fiber Number and is a number in the range 01 – 20.
xxx represents a 3 digit gain factor, default 100.

Description

This command allows the user to adjust the Intensity Gain Factor for each Fiber. This is useful when it is required to balance all or some of the Fibers to give the same Intensity when Testing similar LED's. The Factory default setting is 100. The value for each Fiber can be adjusted from 050 – 200.

These values are stored permanently in memory and can only be changed by using the *setIntGain* command again.

The command [getIntGain](#) will display the current stored gain setting.

Example:

Set the Intensity gain for Fiber 1 to 095.

setIntGain01095
OK

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FEASA LED ANALYSER INFRA-RED VERSION



Set Data Mode

SetFactor## - Set the Exposure Factor

Transmit	Receive
SetFactor##	OK

Where:

represents the Factor Number and is in the range 01 – 20 (default 01).

Description

This command allows the user to adjust the *Exposure Factor* for **all** Fibers. This is useful when it is required to test very dim LED's. The Factory default setting is 01. The value can be adjusted from 01 to 20. The exposure time will be increased when the factor is increased which will lead to longer test times. Try the low range(*capture1*) first before adjusting the Exposure Factor.

These values are stored permanently in memory and can only be changed by using the *setFactor* command again.

The current value can be read out using the [getfactor](#) command.

Example:

Set the Factor Number for all Fibers to 05.

setfactor05
OK

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FEASA LED ANALYSER INFRA-RED VERSION



Set Data Mode

set WAVELENGTHOFFSET@@±## - Set the wavelength Offset

Transmit	Receive
setwavelengthoffset##±xx	OK

Where:

@@ represents the Fiber Number and is a number in the range 01 – 20.
xx represents the wavelength offset value (±99).

Description

This set command is used to set an offset to the wavelength value. The limit of the offset is ±99. This command is useful when the user wishes to set the wavelength to be the same as that specified by the LED Manufacturer. The default value of the offset is 00. The offset is stored in non-volatile memory and will remain at the programmed setting until changed by a new *setwavelengthoffset* command.

Example:

The PC transmits **setwavelengthoffset01-05** to the LED Analyser to instruct it to set the wavelength offset on Fiber 01 to -05.

setwavelengthoffset01-05
OK

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FEASA LED ANALYSER INFRA-RED VERSION



Set Data Mode

setBAUD - Change the baud rate

Transmit	Receive
Setbaudxxxxx	OK

Where: **X** = 9600, 19200, 38400, 57600, 115200 for **Serial RS232 Port**

Where: **X** = 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600 for **USB Port**

Description

This command will change the baud rate of the Serial and USB Port's in the Analyser.

The default Port settings of the Analyser are 57,600, 8 Data bits, 1 Stop bit and No Parity. If an incompatible baud rate is selected the Analyser will not respond. Please disconnect and reconnect the Analyser to return the Analyser to the default 57600 bps. A correct baud rate selected will remain stored in memory even after power off. The command getbaud will return the set baud rate. It can also be seen on the comment section of the Feasa terminal window.

Test times are improved by increasing the baudrate from the default to higher values and this can be further enhanced by decreasing the latency (windows default 16) to latency of 1. Refer to the App Note in the documentation folder of the CD to carry out this.

Example:

To change the baud rate to 19,200 transmit the command **setbaud19200** to the Analyser .

setbaud19200
OK

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FEASA LED ANALYSER INFRA-RED VERSION



Daisy Chain Mode

There are two options when connecting the Daisy Chain Function USB and Serial RS232 :

Daisy Chain USB Wiring Method:

The Daisy chain is a method used to communicate with multiple Feasa Analyser units to save connections and simplify the wiring.

The 1st Led analyser in the chain is connected to the computer using the USB cable supplied. The remaining LED Analysers are interconnected in a Daisy Chain Bus using the cables provided. The Daisy Chain OUT connector on Led Analyser No1 is connected to the Daisy Chain IN Connector on Led Analyser No2 and so on.(See Fig 9a below). Each Analyser except for No1 must be powered to 5V @220mA. This completes your wiring requirements.

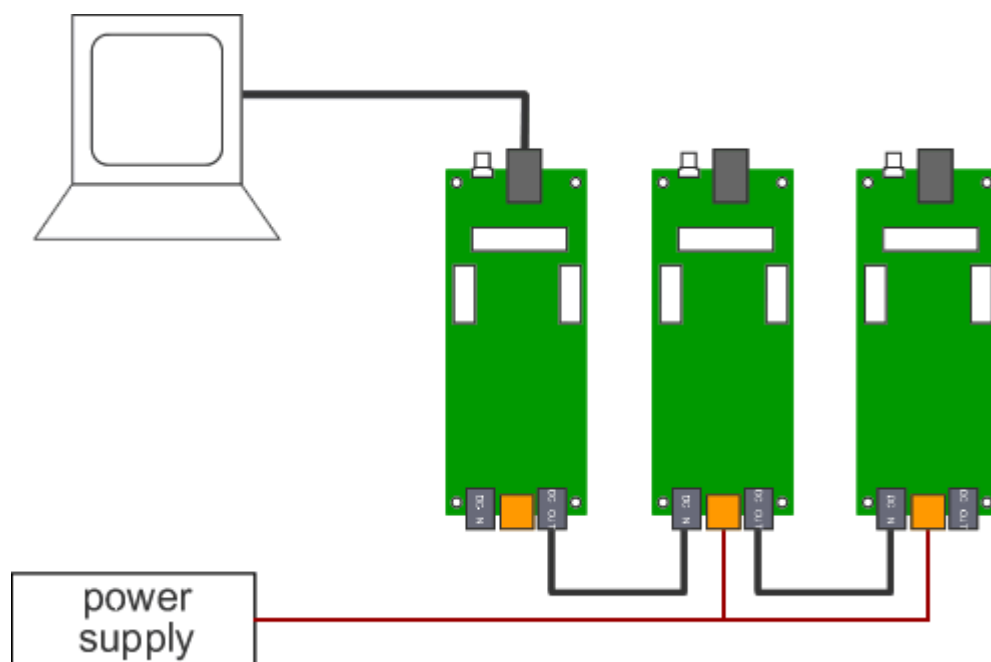


Figure 9a USB Setup

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Daisy Chain Mode

Daisy Chain Serial RS232 Wiring Method:

The Daisy chain is a method used to communicate with multiple Led Analyser units to save connections and simplify the wiring.

The 1st Led analyser in the chain is connected to the computer using the Serial cable supplied. The remaining LED Analysers are interconnected in a Daisy Chain Bus using the cables provided. The Daisy Chain OUT connector on Led Analyser No1 is connected to the Daisy Chain IN Connector on Led Analyser No2 and so on.(See Fig 9b below). Each Analyser must be powered to 5V @220mA. This completes your wiring requirements.

Please Ensure the RS232 GND (pin3) and the PSU GND are connected together.

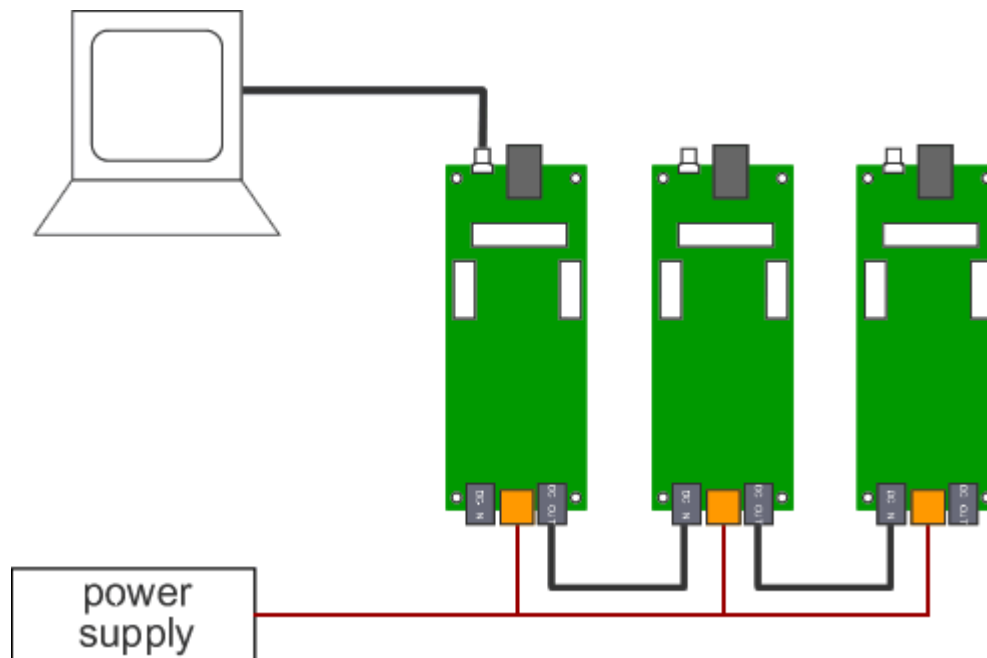


Figure 9b Serial Setup

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Daisy Chain Communication

Daisy Chain Baudrate:

The default Port settings of the Analysers are 57,600, 8 Data bits, 1 Stop bit and No Parity. If an incompatible baud rates are selected the Analyser will not respond. Please disconnect the Analysers from the Daisy Chain and reconnect each Analyser in turn using USB or Serial RS232 port and set the required baudrate. All baudrates must be the same for communication purposes. A correct baud rate selected will remain stored in memory even after power off. The command getbaud will return the set baud rate. It can also be seen on the comment section of the Feasa terminal window.

Test times are improved by increasing the baudrate from the default to higher values and this can be further enhanced by decreasing the latency (windows default 16) to latency of 1. Refer to the App Note in the documentation folder of the CD to carry out this.

The LED Analyser connected to the computer receives a command and this command is received by all the other LED Analysers through the Daisy Chain Bus. All Analysers in the chain are active but only the selected LED Analyser is active to give result Data. All responses received by the Computer will be from this active LED Analyser.

Daisy Chain Identification:

Each LED Analyser is identified using a unique 4-character *Serial Number*. This *Serial Number* is fixed to each Analyser or can be read out using the [getSerial](#) command.

Feasa provides a **Terminal Program** on the CD for the customers use. When you connect your 1st analyser the terminal program will detect which port you are connected to. At this time you have the option of connecting to the Standalone option or the Daisy Chain option from the drop down box. If you select the Daisy Chain option you will be asked for the serial Number of the 1st analyser in your chain.

There are a number of commands which are used to control the Analysers in the Daisy Chain. These commands are described on the following pages.

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Daisy Chain Mode

BusFree - Deactivate any active Analysers

Transmit	Receive
busfree	OK

Description

This command is used to deactivate any active Analysers on the Daisy Chain Bus. This will free the Bus to allow an Analyser to be made active. This command should be issued at the start of a sequence. It is the responsibility of the Controlling Computer to issue commands and monitor the responses. If an Analyser does not respond within 500mSec then the Controlling Computer should issue a new BusFree command and report an error.

The Analyser connected to the computer will operate as a standalone unit after the command is issued.

Example:

The PC transmits **busfree** to free up the Daisy Chain Bus.

busfree
OK

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Daisy Chain Mode

BusGet#### - Activate a LED Analyser

Transmit	Receive
busget####	OK

Where:

represents the Serial Number of the Analyser.

Description

This command will activate the LED Analyser with the specified Serial Number. This command should be preceded by a *BusFree* command. All the *Capture*, *Set*, *Get*, etc commands can now be used with the active Analyser in the chain.

It is the responsibility of the Controlling Computer to issue commands and monitor the responses. If an Analyser does not respond within 500mSec then the Controlling Computer should issue a new *BusFree* command and report an error.

Example:

The PC transmits **BusGet####** to the Master LED Analyser to instruct it to activate the LED Analyser with Serial Number ####.

busgetF044
OK

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Daisy Chain Mode

BusC - Initiate Capture for all LED Analyser's

Transmit	Receive
busc	OK

Description

This command will cause all LED Analysers in the Daisy Chain to initiate a capture sequence using the Automatic Range Mode. To specify a Range manually see the command *BusC#* on the next page.

After the capture cycle use the command [BusGet####](#) to activate a specific LED Analyser. All the standard commands can then be used to read back the LED Test data.

Example:

The PC transmits **busc** to instruct all LED Analysers in the Daisy Chain to initiate a Capture cycle.

busc
OK

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Daisy Chain Mode

BusC# - Initiate Capture for all LED Analyser's

Transmit	Receive
busc#	OK

Where:

represents the ranges 1, 2, 3, 4, 5.

The LED brightness level for each range is as follows:-

Range 1 = Low
Range 2 = Medium
Range 3 = High
Range 4 = Super
Range 5 = Ultra

Description

This command uses a pre-selected exposure time designated Range1, Range2 etc. For low light or dim LED's use Range 1 and for brighter LED's use higher ranges. The higher ranges lead to faster test times because the exposure time is shorter.

This command should be preceded by a [BusFree](#) command.

This command instructs all LED Analyser's in the Daisy Chain to capture and store the Colour and Intensity of all the LED's positioned under the fibers using a fixed range.

The range setting must be specified. The data is stored until the power is removed or another capture command is issued. When completed the Analyser will transmit the character OK on the receive line to the transmitting device (i.e. the PC). Example:

The PC transmits **busc#** to instruct all LED Analysers in the Daisy Chain to initiate a Capture cycle.

busc2
OK

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FEASA LED ANALYSER INFRA-RED VERSION



Daisy Chain Mode

BusC#pwm@@ - Store PWM LED Data for a specific Range

Transmit	Receive
Busc#pwm Busc#pwm@@	OK OK

Where:

- # represents the exposure Range 1 – 5.
- @@ represents an averaging factor in the range 1 - 15.
- @@ If the @@ digits are omitted then a default setting of 07 is used.

Description

This command allows the User to specify the *exposure range* # and an *averaging factor* @@ when testing PWM LED's. Select the *exposure range* # (1-5) to match the **Intensity** of the LED's. The Analyser tests these LED's by taking a number of readings and averaging the results. A larger Averaging factor will lead to more stable results but increased Test Times. The *averaging factor* @@ is a number in the range 1-15. If this number is omitted from the command the default value is 07.

This command instructs the LED Analyser to read and store the Colour and Intensity of all the LED's positioned under the fibers. The data is stored until the power is removed or another **capture** command is issued. When completed the Analyser will transmit the character **OK** on the receive line to the transmitting device (i.e. the PC).

busc1pwm10
OK

There are 5 manual capture ranges each with an intensity output range of 0 to 99,999. Feasa recommends that the UUT readings should be in the 55K to 85K range for the best stability.

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Daisy Chain Mode

BusCE#### - Poll each LED Analyser to verify a capture is complete

Transmit	Receive
busce####	0 or 1

Where:

represents the Serial Number of the Led Analyser.

If reply is 1 Then Capture is complete

If reply is 0 No Capture

No reply Led Analyser is busy - Timeout 10mS

Description

This command is used to verify that after a [busc](#) (global capture) each Analyser in the chain has complete its capture.

The PC transmits **busce####** to chech each LED Analysers in the Daisy Chain has complete a Capture cycle.

BusceF123 (Where F123 is the s/n of the Analyser)
1

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Daisy Chain Mode

Ports Description and Wiring.



Figure 10

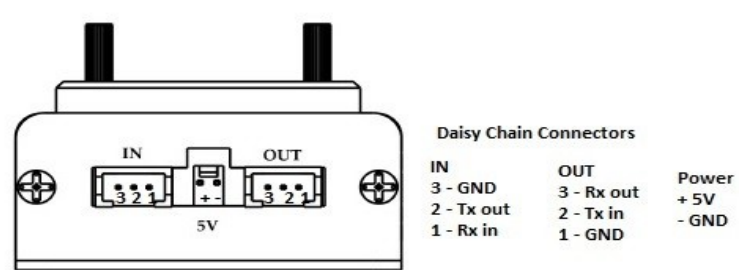
The Daisy Chain Connectors are shown on the right-hand side of figure 10.
The D_OUT connector is connected to the D_IN connector of the next Analyser in the chain.

The Power Connector is used to supply +5V DC to each Analyser in the chain.
Allow 220mA @5V for each Analyser and ensure the wiring is adequate to supply the current without incurring large voltage drops. **For reliable operation it is necessary to have 5V at the Power Connector of each Analyser.** Do not exceed 6V for a prolonged period as this will damage the Analyser.

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Daisy Chain Mode

Daisy Chain Pinout



PIN	D_IN	D_OUT
1	RX_in	RX_out
2	TX_out	TX_in
3	GND	GND

Figure 11

Figure 11 shows the layout of the Connectors viewed from the edge of the board. The *GND* line of *D_OUT* is connected with the *GND* line of *D_IN*, the *RX_out* of *D_OUT* is connected to *RX_in* of *D_IN* and the line *TX_in* of *D_OUT* is connected to the line *TX_out* of *D_IN*.

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Daisy Chain Mode

Step-by-Step method for Daisy Chaining

To successfully implement Daisy chaining the following steps are recommended:-

1. Decide how many Analysers are to be daisy chained.
2. Make a list of the Serial Numbers of the Analysers and note the order in which they will be interconnected. For example we have 4 analysers as follows:

Chain Order	Serial No	Comments
1	F304	Tests D40 – D59 Connected to PC
2	F461	Tests D60 - D69
3	F201	Tests LED01 – LED20 All White
4	F006	Tests LED21 – LED40 All Red

3. Set the required baud rate on each Analyser (All baudrates must be the same).
4. Locate the Daisy Chain cables and connect the Daisy_Out of s/n F304 to the Daisy_In of s/n F461. Connect Daisy_Out of s/n F461 to Daisy_In of s/n F201. Connect Daisy_Out of s/n F201 to Daisy_In of s/n F006.
5. Next locate the 2-pin Power cable supplied to s/n F461, s/n F201 and s/n F006 Analysers. It is necessary to apply 5V @220mA to each of these Analysers in the chain. The green power Led should be visible on these 3 analysers.
6. Connect s/n F304 to the PC using the usb cable. The green power led should come on. If you don't have a usb port available and only a Serial port please connect the s/n F304 to the PC using the Serial Cable provided **AND** connect the 2 pin power connector to the 5V 220mA supply.
7. The supplied Terminal Program can be used to verify the operation of the Daisy Chain. Connect to the port on which the 1st Analyser is installed. See [USB Port Control](#)
8. Send **capture** to verify the communications with the 1st Analyser. The response should be **OK**.
9. Send **getserial** and the response should be **F304**.

Daisy Chain Mode

10. To connect to Analyser 2 (s/n F461) send:-

busfree

OK

Response from the Analyser

busgetF461

OK

Response from the Analyser

The host computer is now connected to Analyser 2 (s/n F461).
This can be verified by requesting the Serial Number:-

getserial

F461

Response from the Analyser

All the LED Analyser commands can now be directed to Analyser 2.

11. To connect to Analyser 3 (s/n F201) send the following:-

busfree

OK

Response from the Analyser

busgetF201

OK

Response from the Analyser

12. It is possible to instruct all Analysers in the chain to capture LED data simultaneously. This makes programming easier and saves time. There are six capture commands in total but only one can be used at a time. The commands are **busc**, **busc1**, **busc2**, **busc3**, **busc4** and **busc5**. **Busc** uses the automatic capture range whereas **busc1** – **busc5** use pre-selected manual ranges.
13. If you are have difficulty reading from Analysers at the end of your chain please verify your voltage to each of these units is 5V.

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FEASA LED ANALYSER INFRA-RED VERSION



Daisy Chain Mode

Example

Busfree	'free the bus
OK	
busc3	'All Analysers capture using range 3 High
OK	
busceF304	'poll the analyser F304
1	
busgetF304	'Connect to the Analyser F304
OK	
getserial	'Confirm s/n of the Analyser
F304	
gethsi01	'Get the Data for Fiber 1
000.51 100 36491	
gethsi02	
.	
.	
gethsi20	
120.51 100 66542	'Data for Fiber 20
busfree	
OK	
busceF461	
1	
busgetF461	'Connect to the next Analyser F461
OK	
getserial	'Confirm to Analyser
F461	
gethsi01	'Get the Data for Fiber 1
000.51 100 36491	
gethsi02	
.	
gethsi20	'Get the Data for Fiber 20

Repeat this sequence for all Analysers in the chain.

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General Commands

help - Command Summary Listing

Transmit	Receive
help	Command listing

Description

This command will generate a summary listing of all the LED Analyser commands. This is useful when using a terminal program such as HyperTerminal.

Example:

To generate the listing transmit **help** to the Analyser .

help

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Step-by-Step approach to Testing a LED

Standard Capture Mode

To Test the Peak Wavelength and Intensity of up to 20 LEDs simultaneously carry out the following:

1. Ensure that the LEDs to be Tested are turned on and that the fibers are centered over the LEDs.
2. To test the Peak Wavelength and Intensity first send the command **capture** to the LED Analyser. The LED Analyser will return the characters **OK** indicating that the Peak Wavelength and Intensity data for the LEDs has been stored in the internal memory.
3. Transmit the command **getir01** to retrieve the results for Fiber 1. Any fiber can be queried by sending the command **getir##** to the LED Analyser, where **##** is the fiber number in the range **01 to 20**. The LED Analyser will return the results in the format **wwwwww iiiiii** where **wwwwww** indicates the Peak Wavelength in *nanometers* and the **iiiiii** value indicates the intensity value of the light in the range **00000 to 99999**.
4. If a value of **0000 00000** is returned this indicates an under range condition and that the LED may be turned off.
5. If a value of **0000 99999** is returned this indicates an over range condition and that the LED is too bright.
6. In general, try to keep the Intensity less than 80,000 and greater than 20,000.

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PWM LED Mode

Effect of PWM on Intensity Testing

The effect of Pulse Width Modulation (PWM) of a typical LED on the Analyser Intensity can be seen in Figure 9. In this graph the LED will always be on at 100% modulation. When the modulation has been reduced to 50% (i.e. the LED is off 50% of the time) the relative Intensity drops to approximately 90%.

At 20% modulation (the LED is off 80% to the time) the relative Intensity drops to approximately 50%.

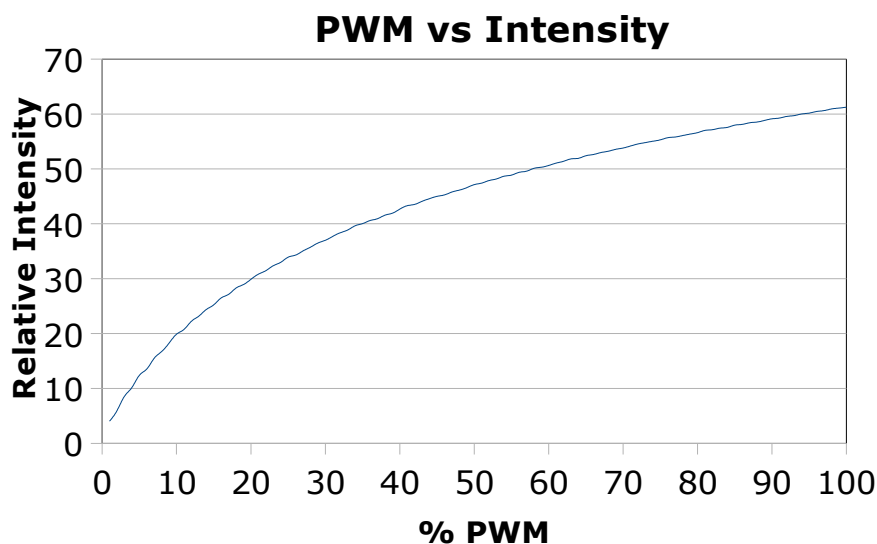


Figure 9: Relative Intensity versus Modulation

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Step-by-Step approach to Testing a PWM LED

PWM LED Mode *

To test PWM LEDs use the following commands on the LED Analyser for Fiber 1:

1. Decide how many readings are required to test the PWM LED's. The Analyser can be programmed to take between 1 and 15 readings. The more readings that are taken the greater the stability of the results.
2. Send the command **CAPTURE#PWM@@**, where @@ is the number of readings to take and # is the Intensity range. The LED Analyser will capture and store the Peak Wavelength and Intensity data for all fibers. The LED Analyser will respond with the Characters **OK** indicating that the command has been completed.
3. To read back the Peak Wavelength and Intensity of the LED under fiber ## send the command **getir##** to the LED Analyser. The LED Analyser will return the data in the format **www iiii** where **www** indicates the Peak Wavelength in *nanometers* and the **iiii** value indicates the intensity value.

* If the switching frequency for the LED > 100Hz then stable results can be obtained using the capture# commands. These commands are quicker to execute and will save test time.

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Intensity Response

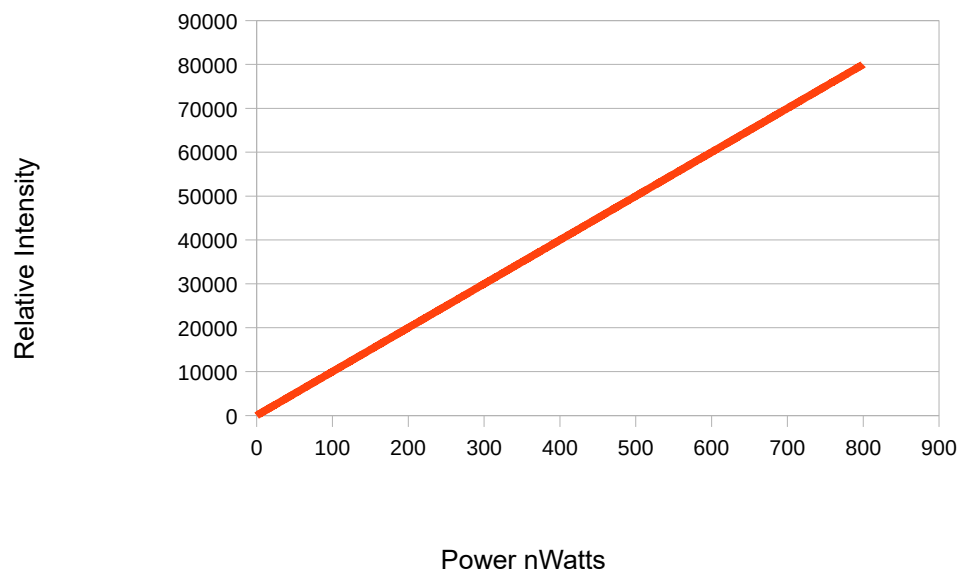


Figure 10: Relative Intensity vs Power using the Medium Range for the LED Analyser

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FEASA LED ANALYSER INFRA-RED VERSION



Command Summary

COMMAND	DESCRIPTION
Busfree	Free the Daisy Chain Bus of the active Analyser
Busget####	Make Analyser #### active on the Daisy Chain Bus
BusC	All Analysers on the Daisy Chain to Auto Capture
BusC#	All Analysers on the Daisy Chain to Manual Capture
Capture	Capture LED Peak Wavelength and Intensity Data - Auto Range
Capture#	Capture LED Peak Wavelength and Intensity Data - Manual Range
Capture#PWM@@	Capture LED Peak Wavelength and Intensity Data PWM Mode
getIR##	Get the Peak Wavelength and Intensity for a LED
getSerial	Get the Serial Number of the Analyser
getwavelength##	Get the dominant Peak Wavelength for the LED
getwi##	Get the Peak Wavelength and Intensity for a LED
getintensity##	Get the Intensity for the LED
getVersion	Get the Firmware Revision of the Analyser
getHW	Get the Hardware Version of the Analyser
Setbaud	Set the baud rate of the Serial and USB Port
help	Command Summary Listing

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FEASA LED ANALYSER INFRA-RED VERSION



Specifications

Part Number(s)

Feasa 20-IR	LED Analyser with 20 Glass Fibers
Feasa 10-IR	LED Analyser with 10 Glass Fibers
Feasa 3-IR	LED Analyser with 3 Glass Fibers
Feasa 20-IRP	LED Analyser with 20 Plastic Fibers
Feasa 10-IRP	LED Analyser with 10 Plastic Fibers
Feasa 3-IRP	LED Analyser with 3 Plastic Fibers

Physical

Dimensions 127mm x 57mm x 55mm (L x W x H) – Feasa 20-IR, Feasa 20-IRP
Dimensions 86mm x 57mm x 55mm (L x W x H) - Feasa 10-IR, 3-IR, 10-IRP, 3-IRP
Fiber Length 0.6m
Fiber Diameter 1.0mm (Plastic), 1.1mm (Glass)
Fiber Core Diameter 0.6mm
Number of Fibers 3, 10, 20
Operating Temperature Range -IR 0°C to +110°C, -IRP 0°C to +50°C

Electrical

Supply Voltage 5.0V
Supply Current 180 mA
USB 2.0 Interface, Serial RS232 Interface
Output Data Format Peak Wavelength and Intensity

Optical

Total Operating Peak Wavelength -IR Range 700 nm to 950 nm
Total Operating Peak Wavelength -IRP Range 700 nm to 900 nm

Accuracy

Peak Wavelength Range 700nm – 730nm $\pm$ 30nm
Peak Wavelength Range 730nm – 900nm $\pm$ 10nm
Peak Wavelength Range 900nm – 950nm $\pm$ 30nm

Repeatability

Peak Wavelength < 1%
Intensity < 1%

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FEASA LED ANALYSER INFRA-RED VERSION



Warranty

1. Feasa Enterprises Limited (herein referred to as Feasa) warrants Feasa hardware, accessories and supplies against defects in materials and workmanship for the period of one year. If Feasa receives notice of such defects during the warranty period, Feasa will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.
2. Feasa warrants that Feasa software will not fail to execute its programming instructions, for the period of one year, due to defects in material or workmanship when properly installed and used. If Feasa receives notice of defects during the warranty period, Feasa will replace software media which does not execute its programming instructions due to such defects.
3. Feasa does not warrant that the operation of Feasa products will be uninterrupted or error free. If Feasa is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product to Feasa.
4. Feasa products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.
5. The warranty period begins on the date of delivery.
6. Warranty does not apply to defects resulting from:
 - (a) improper or inadequate maintenance or calibration,
 - (b) software, interfacing, parts or supplies not supplied by Feasa,
 - (c) unauthorized modification or misuse,
 - (d) operation outside the published environmental specifications for the product, or
 - (e) improper site preparation or maintenance.
7. TO THE EXTENT ALLOWED BY LOCAL LAW, THE ABOVE WARRANTIES ARE EXCLUSIVE AND NO OTHER WARRANTY OR CONDITION, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED AND FEASA SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, AND FITNESS FOR A PARTICULAR PURPOSE.
8. TO THE EXTENT ALLOWED BY LOCAL LAW, THE REMEDIES IN THIS WARRANTY STATEMENT ARE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES. EXCEPT AS INDICATED ABOVE, IN NO EVENT WILL FEASA OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE WHETHER BASED IN CONTRACT, TORT, OR OTHERWISE.

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