

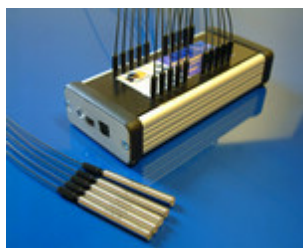
Feasa LED 测试仪 (Feasa LED Analyser)

➤ 前言

目前 LED 检测的方法有专用分析仪和人工目测，专用仪器配置多、成本高、专业性强，对使用者的要求高，主要面对大型企业的研发部门；一些技术实力和资金有限的小型企业普遍采用人工目测的方法，其缺点显而易见，对检测人员的经验有所要求，工作量大，容易视觉疲劳，导致漏检和误判，最终导致效率低下。

Feasa LED 测试仪可以充分发挥在 PCBA 组装制程控制中的作用，在组装有 LED 的 PCBA 生产过程中，通过对标准品 PCBA 的 LED 的颜色和亮度进行一次学习，读取一个相对值作为标准值，并设置标准值的上下限，然后批量读取待测 PCBA 上的 LED 相对值与标准值进行比对，从而判断良品和不良品，有效地保证测试精度，结合 ICT 在线测试和功能测试，不用增加测试工位，提高了效率，达到快速、全自动化，避免人为漏判。

➤ Feasa LED 测试仪的使用 Using the Feasa LED Tester(Analyser):



Feasa LED 测试仪是一个测量系统，能够实现快速和自动测试 LED 的颜色和亮度。每个 LED 分析仪能同时测量多达 20 个通道的不同颜色和强度的 LED 光源。从光纤采集光源，进行测量和分析。该装置是专为 LED 和液晶显示器等设计的自动测试装置。

The Feasa LED Analyser is a measurement system that allows fast and automatic testing of both the color and intensity (Brightness) of Light Emitting Diodes (LEDs). testing of both the color and intensity (Brightness) of Light Emitting Diodes (LEDs). Each LED Analyzer can simultaneously measure up to 20 different light sources for Color and Intensity. Light from the LEDs is collected by Plastic Optical Fibers (POF) and carried to the LED Analyzer board for measurement and analysis. The unit has been designed for testing LED's and other lighting devices such as LCD Displays automatically.

该分析结果可以通过并行接口、RS232 串行接口或 USB 接口读取，读回所需信息的时间小于 1.5 秒，这使得它非常适合集成在自动测试设备 (ATE)。对于超过 20 个通道的 LED 测量，可以串联多个 LED 测试仪同时使用。

The result of the analysis can be read out via the parallel interface, RS232 serial interface or USB. The time needed to read back the information is less than 1.5 seconds, which makes it very suitable to integrate in automatic test equipment (ATE). For applications with more than 20 LEDs multiple LED Analysers can be used together.

LED 测试仪可用于功能测试 系统和 ICT 在线测试系统的应用程序。测试的应用范围从 LED 的显示器和移动电话，汽车照明等，在电子 行业生产线检查系统中也被应用于替代人工视觉。

The LED Analyser can be used for both Functional testing and for In-Circuit test applications. The applications range from testing LED's and Displays in mobile phones, lighting systems in the automobile industry or position checking of electronics components in production lines. It has also been implemented in artificial vision applications.

Feasa LED 测试仪是一个功能强大，高度精确，高重复性，适应性强，使用方便，快速，全自动化 LED 颜色和强度测量 仪器，广泛应用于 PCB 业界和测试设备。

In summary the Feasa LED Analyser is a powerful, highly accurate, highly repeatable, adaptable, easy to use, fast and fully automated LED color and intensity measurement sensor which has found many applications in the PCB industry on both functional and In-Circuit test equipment.

➤ Feasa LED 测试仪的优势 Advantages of the Feasa LED Analyser

>该系统的设计保证了良好的重复性和颜色的判别。

The design of the system ensures an excellent repeatability and color discrimination.

>高度准确地测量 LED 色彩。

Highly accurate representation of the LED color in different color space.

>安装方便。

Easy installation.

>使用 1mm 的光纤 (POF) ，可轻松地使用现成的工具。

Uses 1mm plastic optic fiber (POF) which can be worked on easily using many off the shelf tools.

>非常适合用在小空间。

Very suitable for applications where space is at a premium.

>可以修改 LED 分析仪传感器的灵敏度。

Possibility to modify the sensitivity of the LED Analyser sensor.

>闪烁和 PWM (脉宽调制) ，也可以进行测试。

Blinking and PWM (Pulse Width Modulation) LEDs can also be tested.

>串行 RS232, ICT 和 USB 接口。

Serial RS232, ICT and USB interfaces available.

>LED 分析仪使用的系统，可以测量和测试所有类型 LED 的颜色和亮度。

All types, colors and brightness of LED's can be measured and tested using the LED Analyser system.

>从 2 到 20 个通道，以适应任何类型的应用。

Different versions of the tester, featuring from 2 to 20 channels to adapt it easier to any kind of application



➤ Feasa LED 测试仪的应用 Applications of the Led Analyser

<p>LED 指示灯 Indicator LEDs</p> <p>服务器 RJ45 连接器指示灯 RJ45 Connectors</p> <p>显示面板 Display Panels</p> <p>应急信号灯 Emergency Signals</p> <p>交通信号灯 Traffic Lights</p> <p>铁路信号灯 Railway Signals</p>	<p>汽车 Automotive</p> <p>行驶照明灯 Daytime Running Lights</p> <p>刹车灯 Brake Lights</p> <p>高位刹车灯 Centre High Mount Stop Lights</p> <p>转向信号灯 Side Turn Signals</p> <p>紧急报警灯 Emergency Stop Signal</p>
<p>内发光指示灯 (汽车及航空电子) Interior Lights</p> <p>仪表盘 Dashboard</p> <p>地图灯 Map Lights</p> <p>环境灯 Mood Lights</p>	<p>LCD 背光 LCD Backlighting</p> <p>电视 TV</p> <p>笔记本/电脑显示器 Notebook/PC</p> <p>手机面板 Cell Phones/Smart Phones</p>
<p>航空照明 Aviation Lighting</p> <p>着陆灯 Landing Lights</p>	

➤ Feasa LED 测试仪的参数 SPECIFICATIONS

INTERFACES 接口:

INTERFACES	Feasa I	Feasa F
USB	NO	YES
RS232	YES	YES
10/20 Pin Port - Frequency Out	YES	NO
10/20 Pin Port - Synchronous Serial	YES	NO
Daisy Chain	NO	YES

注:

- 1、USB 接口可以直接为 LED 测试仪供电，不需要额外提供外部电源。波特率达 460800。
USB offers a very simple interface to the LED Analyser with no requirement for an additional power supply. Very high baud rates, up to 460800 baud, are available.
- 2、RS232 串口波特率达 115200，需要额外提供外部电源。
The **RS232 Serial Port** is easy to use with a max baud rate of 115200. It requires the use of an external power supply.
The 20pin ICT Port can be used in either Frequency Out or Synchronous Serial Mode.
- 3、Frequency Out 应用于 RS232 串口不能访问的情况下，用三个频率表示 LED 的颜色与亮度。
The Frequency Out protocol can be used where access to an RS232 Serial Port is not available. Three frequencies are used to represent the Color and Intensity of the LEDs.

4、Synchronous Serial 应用于当使用者的资源受限或者没有其它端口可供选择的情况下。

The Synchronous Serial protocol is suitable when tester resources are limited or no other options are available.

5、Daisy Chain 接口可以将多个 LED 测试仪使用菊花链连接器连接在一起，只需要一个 RS232 串行端口或 USB 端口连接多达 30 个 LED 测试仪。

Multiple LED Analysers can be connected together using the Daisy Chain Connectors. Only one RS232 Serial Port or USB Port is required to connect up to 30 LED Analysers.

TEST TIME 测试时间:

测试速度取决于 LED 的亮度，亮度高的测试时间短，亮度低的测试时间长。根据 LED 的光强（亮度）一次同时测试 20 个 LED 的时间最快达 1.2ms。从光纤中读取数据，平均每根光纤大约 5ms。见下面举例：

The speed of the test is dependent on the intensity of the LEDs being tested, i.e. Bright LEDs have a shorter Test Time, Dimmer LEDs have a longer Test Time. The capture (measurement) of up to 20 LEDs is done in parallel and can be achieved in times as fast as 1.2ms depending on the Intensity (Brightness). The data is read back from each fiber sequentially and takes approximately 5ms per fiber, for example:

Ultra High Brigh LEDs:

1 LED ---捕捉时间 2ms 加上数据读取时间 5ms，总共 7ms。

1 LED ---Capture Time is 2ms and Read Back is 5ms, Total 7ms

20LED's---捕捉时间 2ms 加上数据读取时间 100ms，总共 102ms。

20LED's---Capture Time is 2ms and Read Back is 100ms, Total 102ms

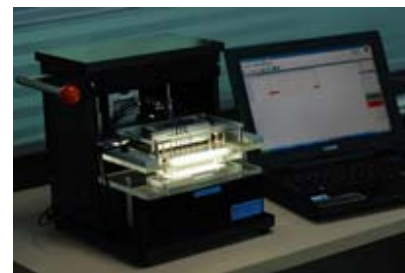
Dim LEDs:

1 LED ---捕捉时间 650ms 加上数据读取时间 5ms，总共 655ms。

1 LED ---Capture Time is 650ms and Read Back is 5ms, Total 655ms

20LED's---捕捉时间 650ms 加上数据读取时间 100ms，总共 750ms。

20LED's---Capture Time is 650ms and Read Back is 100ms, Total 750ms



USB、RS232 端口测试捕捉时间 USB / RS232 SERIAL PORT – TEST CAPTURE TIMES

类型 Range	捕捉时间 Capture Time
C (Auto Capture)	350ms
C1 (Low Intensity)	650ms
C2 (Medium Intensity)	200ms
C3 (High Intensity)	22ms
C4 (Super High Intensity)	4ms
C5 (Ultra High Intensity)	2ms

每根光纤读取时间一般保持在 5ms 时间左右。

The Read Back Time per fiber is always approximately 5ms.

ICT 捕捉时间与 USB/RS232 串口相同。但是，数据读取时间取决于于被测量的频率。使用安捷伦 i3070 的读取的时间大约是 400ms 至 700ms。

For ICT the Capture Times are the same as USB/RS232 Serial Port. However, the Read Back Times are dependent on the frequencies being measured. Using an Agilent i3070 the Read Back Times are 400ms to 700ms approximately.

OUTPUTS 输出:

USB / RS232	<ul style="list-style-type: none"> - Red, Green, Blue (RGB) - Hue, Saturation, Intensity (HSI) - Dominant Wavelength - CCT - CIE xy - CIE u'v'
Frequency Out	<ul style="list-style-type: none"> - Hue, Saturation, Intensity (HSI)
Synchronous Serial	<ul style="list-style-type: none"> - Red, Green, Blue (RGB) - Hue, Saturation, Intensity (HSI) - CCT - CIE xy

DRIVERS/SOFTWARE 驱动及软件:

Feasa provides a comprehensive suite of Drivers and Software for ease of use.

类型 ITEM	Feasa I	Feasa F
Test Models for Agilent i3070	YES	NO
Test Code for Teradyne	YES	NO
DLL used for Testing	YES	YES
Programming examples in Labview, C++	YES	YES

In addition, Feasa also provides a number of programmes to allow for the most efficient and appropriate use of the analyser.

MODEL 型号:

Feasa LED Analyser	Feasa I	Feasa F
3 Channel 通道	Part No.: Feasa 3I	Part No.: Feasa 3F
5 Channel 通道	Part No.: Feasa 5I	Part No.: Feasa 5F
10 Channel 通道	Part No.: Feasa 10I	Part No.: Feasa 10F
20 Channel 通道	Part No.: Feasa 20I	Part No.: Feasa 20F

SPECIFICATIONS 参数:

项目 ITEM	Feasa I	Feasa F
光学 OPTICAL		
总的工作波长范围 Total Operating Wavelength Range	450nm to 650nm	450nm to 650nm
精确度 ACCURACY		
主波长 Dominant Wavelength	± 5nm @ 550nm	± 5nm @ 550nm
相对色温 Correlated Color Temperature	± 200K @ 2856K	± 200K @ 2856K
色度 – 典型 Chromaticity – Typical	± 0.01 @ x=0.33, y=0.33	± 0.01 @ x=0.33, y=0.33
重复性 REPEATABILITY		
主波长 Dominant Wavelength	± 1nm	± 1nm
相对色温 Correlated Color Temperature	± 50K @ 2856K	± 50K @ 2856K
色度 xy Chromaticity xy	± 0.0015	± 0.0015
色相 Hue	< 1	< 1
饱和度 Saturation	< 1%	< 1%
亮度 Intensity	< 1%	< 1%
电子学 ELECTRICAL		
工作电压 Supply Voltage	5.0V	5.0V
工作电流 Supply Current	180mA	180mA
物理学 PHYSICAL		
外形尺寸 of 3, 5, 10 Channel Dimensions of 3, 5, 10 Channel	100mm x 29mm x 50mm	86mm x 57mm x 55mm
外形尺寸 of 20 Channel Dimensions of 20 Channel	140mm x 29mm x 50mm	127mm x 57mm x 55mm
光纤长度 Fiber Length	0.6m	0.6m
光纤外径 Fiber Diameter	1.0mm, incl. cladding	1.0mm, incl. cladding
光纤最小弯曲半径 Minimum Bend Radius of Fiber	15mm	15mm
工作温度范围 Operating Temperature Range	0°C to +50°C	0°C to +50°C

Feasa Infra-Red (IR) LED Tester 红外线 LED 测试仪



Feasa 多通道红外线 LED 波长及亮度自动化测试仪。

Feasa's Multichannel Automatic Infra-Red LED test solution for fast Wavelength & Intensity measurement.

红外线 LED 测试仪选择使用特别的光纤，所以必须配备专门为红外线 LED 测试仪设计的采光头一起使用。

The IR LED Tester has a unique fiber which has been specially selected and prepared and must be used in conjunction with the Feasa Optical Head that was specifically designed for Infra-Red LED Testing.

>工作范围: 700nm to 950nm Operating Range 700nm to 950nm

>重复精度高 Excellent Repeatability for Wavelength & Intensity

>安全和监视的理想应用 Ideal for Security & Surveillance Applications

>有 3 通道和 10 通道两种型号供选择 Available in 3 and 10 Channel Models

>提供软件 Supplied with Software

INTERFACES 接口:

提供一个简单方便的 USB 接口到测试仪，不需要额外的外部供电，波特率高达 460800。

USB offers a very simple interface to the LED Analyser with no requirement for an additional power supply. Very high baud rates, up to 460800 baud, are available.

RS232 接口易于最大波特率为 115200，需要一外部电源供电。

The **RS232 Serial Port** is easy to use with a max baud rate of 115200. It requires the use of an external power supply.

多个 LED 测试仪可以使用 Daisy Chain 接口串联，而只需使用一个 USB 或者 RS232 接口连接到电脑，最多可支持 30 个 LED 测试仪串联。

Multiple LED Analysers can be connected together using the Daisy Chain Connectors. Only one RS232 Serial Port or USB Port is required to connect up to 30 LED Analysers.

TERMINAL SOFTWARE 终端软件:

终端软件非常简单易用，当设备与电脑连接后，发送红外线 LED 测试指令，测试结果将自动出现在软件窗口，并能保持测试结果，以便调试试验，其主要特点如下:

The Feasa Terminal is an easy to use program which connects to the IR LED Tester and allows a command to be sent. Sent commands and responses are displayed on the window for review and can be saved for future reference or for debug purposes. Key features include:

- 可连续发送多个指令到测试仪

Script processor allows multiple commands to be sent to the Analyser sequentially

- 所以的指令可以保存记忆

All commands can be saved to keep a record the command sequences

- 可以使用键盘的箭头键发送指令，提高调试的速度

Commands can be recalled using the up-arrow key on the keyboard to speed up the debug process

USER GAINS SOFTWARE

软件界面简单易用，并且允许调整测量输出强度，这些调整时为了补偿从通道到通道的测量输出强度的细微的参数变化，可以手动或者自动调整，主要特点如下:

This program provides an easy to use interface with the IR LED Tester to allow adjustment of measured intensity.

These adjustments are used to compensate for small variations in the measurement output from channel to channel.

Adjustments can be made manually or Automatically. Key features include:

- 自动调整各测量通道的输出强度

Automatic adjustment of the Output Intensity of each Measurement Channel

- 手动精细调整每个测量通道（光纤）

Manual adjustment for fine tuning of each Measurement Channel (fiber)

- 可以记忆之前保存的调整值

Recall previously store adjustment values

- 调整值可以保存，以便将来查看

Save adjustments to a file to be recalled later

SPECIFICATIONS 参数:

内容 ITEM	参数 Specification
光学 OPTICAL 总的工作波长范围 Total Operating Wavelength Range	700nm to 950nm
精度 ACCURACY 波长 Wavelength 700nm to 900nm 波长 Wavelength 900nm to 950nm	+ 10nm + 20nm
重复性 REPEATABILITY 波长 Wavelength 强度 Intensity	+ 5nm < 1%
电子学 ELECTRICAL 电压 Supply Voltage 电流 Supply Current	5.0V 180mA
物理学 PHYSICAL 尺寸 Dimensions 光纤长度 Fiber Length 光纤外径 Fiber Diameter 光纤最小弯曲半径 Minimum Bend Radius of Fiber 工作温度范围 Operating Temperature Range	86mm x 57mm x 55mm 0.6m 1.0mm, incl. cladding 50mm 0°C to +50°C

Model and Type 型号:

Type	Model
Wavelength 700nm to 900nm Feasa 3 Channel Infrared LED Analyser Feasa 10 Channel Infrared LED Analyser Feasa 20 Channel Infrared LED Analyser	Part No.: Feasa 3IR Part No.: Feasa 10IR Part No.: Feasa 20IR
Wavelength 750nm to 950nm Feasa 3 Channel Infrared LED Analyser Feasa 10 Channel Infrared LED Analyser Feasa 20 Channel Infrared LED Analyser Optical Head Infrared(IR) LED Analyser	Part No.: Feasa 3IRS Part No.: Feasa 10IRS Part No.: Feasa 20IRS Part No.: OH-8IR

Feasa Life LED 寿命测试仪 Feasa LED Life Tester



Feasa LED 寿命测试仪加速了 LED 从 -65° C 到 125° C 的测试和检验。用于测试的光纤已经经过了很专业的挑选，可以在 -65° C to +125° C 的温度下使用。Fease 光学头材料也是经过精挑细选的，使其能够承受极限温度。当寿命测试仪在进行运行时，测试仪置于烤箱外面对 LED 进行连续检测。

Feasa's LED Life Tester offers accelerated testing and monitoring of LEDs from -65°C to +125°C. The Fiber used in the tester has been specially selected and prepared for use in temperatures of -65°C to +125°C. The Feasa Optical Heads have been designed from selected materials to withstand extreme temperatures. The Tester sits outside the oven and the LEDs are monitored continuously during the Life Time Test.

INTERFACES 接口:

提供一个简单方便的 USB 接口到测试仪，不需要额外的外部供电，波特率高达 460800。

USB offers a very simple interface to the LED Analyser with no requirement for an additional power supply. Very high baud rates, up to 460800 baud, are available.

RS232 接口易于最大波特率为 115200，需要一外部电源供电。

The **RS232 Serial Port** is easy to use with a max baud rate of 115200. It requires the use of an external power supply.

多个 LED 测试仪可以使用 Daisy Chain 接口串联，而只需使用一个 USB 或者 RS232 接口连接到电脑，最多可支持 30 个 LED 测试仪串联。

Multiple LED Analysers can be connected together using the Daisy Chain Connectors. Only one RS232 Serial Port or USB Port is required to connect up to 30 LED Analysers.

TEST SOFTWARE 测试软件:

测试软件能在固定的时间间隔内连续不断的对 LED 进行测试，在 1 秒和数小时之内的数据能及时存到硬盘，以备以后查看报告和绘制图形。

The Test Software has the ability to continuously test LEDs at fixed time intervals. Between 1 second and multiple hours data can be saved to disk for later retrieval, reporting and graphing of results.

测试软件可以配置发送邮件，当测试出现错误和测试结束时发送一封邮件。

The Test Software can be configured to send an email on error and also at the end of a test sequence.

SPECIFICATIONS 参数:

ITEM	Specification
光学 OPTICAL	
红色峰值波长 Red Peak Efficiency Wavelength	615nm
绿色峰值波长 Green Peak Efficiency Wavelength	540nm
蓝色峰值波长 Blue Peak Efficiency Wavelength	465nm
总的工作波长范围 Total Operating Wavelength Range	450nm to 650nm
精度 ACCURACY	
白色 White	$x = + 0.0015, y = + 0.0015$
红色 Red (615nm)	+ 3nm
绿色 Green (540nm)	+ 4nm
蓝色 Blue (465nm)	+ 3nm
色温 CCT	
电子学 ELECTRICAL	
电压 Supply Voltage	5.0V
电流 Supply Current	180mA
物理学 PHYSICAL	
尺寸 Dimensions	127mm x 57mm x 55mm
光纤长度 Fiber Length	1 Meter
光纤外径 Fiber Diameter	1.0mm, incl. cladding
光纤最小弯曲半径 Minimum Bend Radius of Fiber	50mm
工作温度 Operating Temperature Range	-65°C to +125°C

Model and Type 型号:

Type	Model
Feasa 5 Channel LED Life Tester	Part No.: Feasa 5LT
Feasa 10 Channel LED Life Tester	Part No.: Feasa 10LT
Feasa 20 Channel LED Life Tester	Part No.: Feasa 20LT

Feasa Optical Heads 配套光学采光头

Feasa 光学采光头是为了保证测试 LED 光强度的稳定性而设计的，小巧而坚固，提供高精度和高重复性的光源采集，其解决如下问题：

The Feasa Optical Heads have been designed to ensure stability in testing the intensity of LEDs. The robust and compact design delivers consistent and repeatable readings, + 1mm with <10% Intensity change. They address the following issues:

- 光纤固定困难 Compensation for LED Placement
- 重复精度不高 Repeatable Intensity Readings
- 环境光的干扰，导致光源采集的灵敏度下降 Reduced sensitivity to ambient light

配套光学采光头的使用 Using the Optical Heads :

OH-2 用于高度受限制的情况下。

OH-2 is used when height is restricted.

OH-3 用于大多数情况下。

OH-3 is suitable for most applications.

OH-4 用于 90° 弯脚或者横插 LED 的情况下。

OH-4 is ideal for testing 90° side emitting LEDs.

OH-5 用于元器件密集的 PCB 板或者相邻 LED 间距小的情况下。

OH-5 is most suitable when LEDs are close together on Printed Circuit Boards.

OH-6 用于直径较大的 LED 和检测高亮 LED，特别适合于环境光较亮的情况下。

OH-6 has a large diameter, 8.00mm and is used with large diameter LEDs. Designed for testing High Brightness LEDs, particularly suitable for Daytime Running Lights.

OH-7LT 用于 LED 寿命测试仪

OH-7LT is used with the LED Life Tester.

OH-8IR 用于红外线 LED 测试仪

OH-8IR is used with the IR LED Tester.

注：为了保证光源采集的精度，采光头与被测 LED 的距离尽量保持在 3mm 至 5mm 之间，可根据实际情况适当调整。

The typical gap between the LED being tested and the Optical Head is between 3mm and 5mm but may vary significantly depending on the application.

SPECIFICATIONS 参数:

型号 Model and Type	直径 (外径) Outer Diameter	长度/高度 Length/Height	安装安全距离 (中心到中心) Distance Centre to Centre
OH-2	4.55mm	25.00mm	5.00mm
OH-3	4.55mm	50.00mm	5.00mm
OH-4	4.55mm	59.00mm	5.00mm
OH-5	3.55mm	49.00mm	4.00mm
OH-6	8.00mm	50.00mm	9.00mm
OH-7LT	4.55mm	39.00mm	5.00mm
OH-8IR	4.55mm	50.00mm	5.00mm



OH-2 Optical Head



OH-3 / OH-5 / OH-6 Optical Head



OH-4 Optical Head