Apacer

Apacer AL100/AL110 Spectroradiometer

User's Manual

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Version 3.0

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1. Introduction

Thank you for purchasing Apacer AL100/AL110 Spectroradiometer! To fully enjoy the benefits of this product, please read the important information and instructions in this manual carefully and keep it in an easily accessible place for future reference.

Please make sure you read the following safety instructions thoroughly to avoid harming yourself or damaging your spectroradiometer before, during, and after using this product.

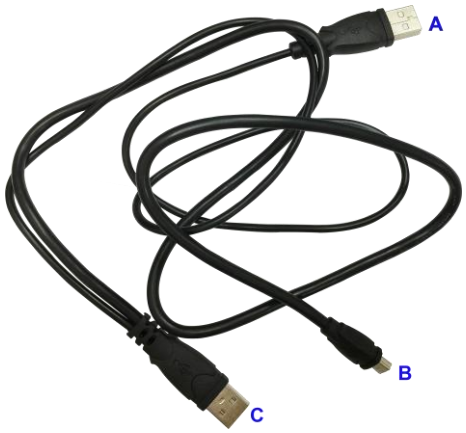
- **Power supply**: Power can be supplied to the spectroradiometer via an AC adaptor or a computer connected to the instrument via a USB cable. However, to make sure the unit runs smoothly, we recommend using the AC adaptor that comes with the package.
- **Environment**: Keep away from an area with a high dust or humidity level and corrosive gases. Make sure the environment does not experience abrupt changes in temperature; otherwise, measurement accuracy can be highly affected.
- **Vibration and collision**: The spectroradiometer is equipped with highly sophisticated optical components. To prevent it from falling or collision, do not place it near any moving objects while operating; keep it safe in a box while carrying it around.
- **Dust ingression**: Wipe off dust and dirt with towels or silica cloth. Do not use any chemicals, such as diluents, acetone, or volatile solvents which may damage the spectroradiometer.
- **Storage**: Place the spectroradiometer in a tool box under normal temperature. Do not put it in cars or expose it to environment with high temperature, humidity, or dust.
- **Calibration**: A measuring instrument like spectroradiometer may fail to produce valid data after being used for a period of time. To ensure optimum accuracy, we recommend you send the instrument back to the original manufacturer for calibration on a yearly basis. Please contact Apacer or your dealer for detailed information.
- **Maintenance**: Never dismantle the spectroradiometer by yourself. If encountering any breakdowns, please contact your dealer or the original manufacturer for assistance.

2. Before You Start

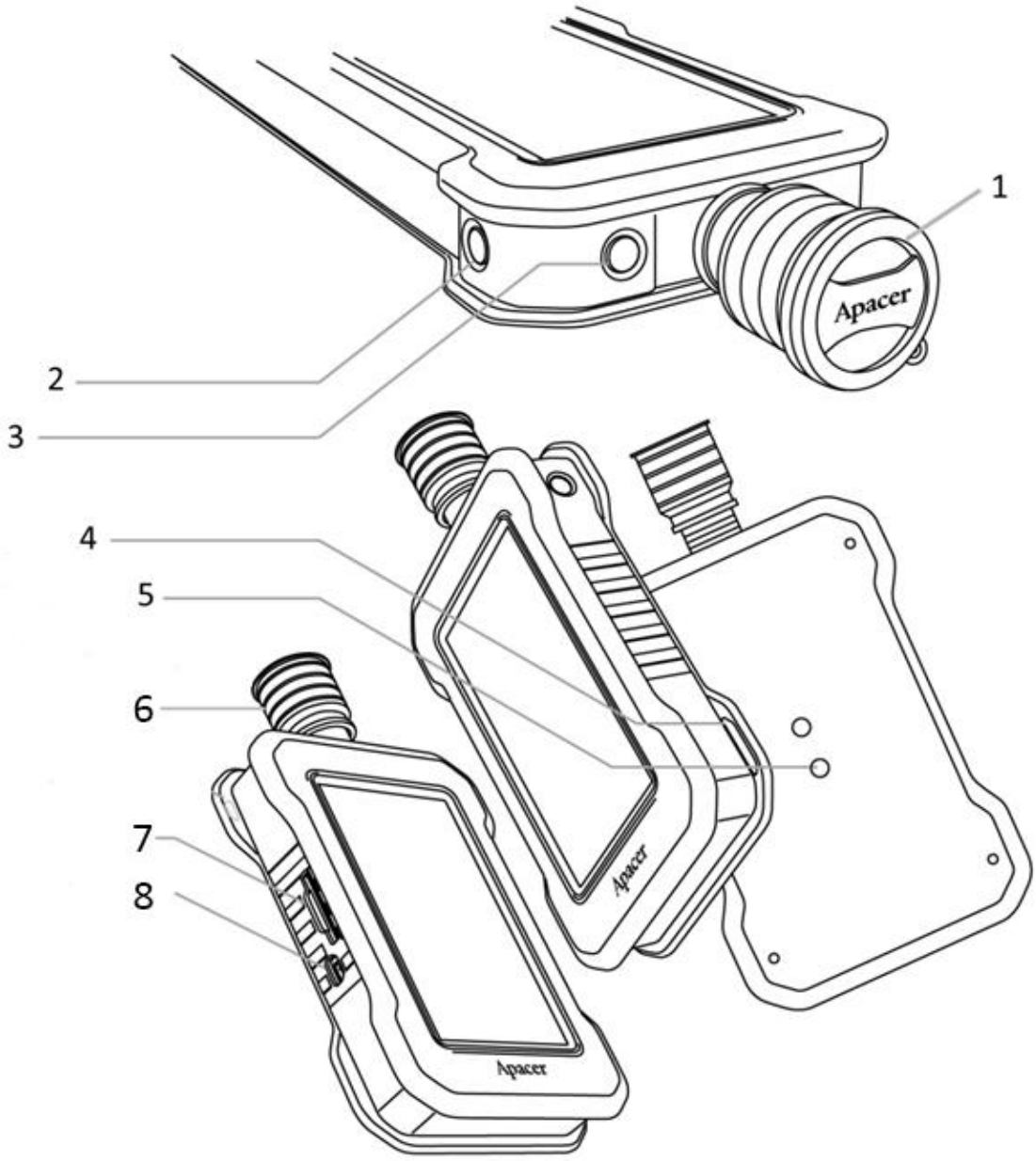
Apacer AL100/AL110 Spectroradiometer is a device designed to measure the spectral power distribution, including parameters of luminance, chromaticity, spectrum, color rendering index (CRI), CIE 1931, and CIE 1976, of the light sources emitted from LCD panels ranging from CCFL, LED, to OLED screens.

2.1. Package Contents

The following items are included with AL100/AL110 Spectroradiometer and pass strict inspection before they leave the factory. Please check the package contents before using. If anything is missing or damaged, contact Apacer or the dealer from whom you purchased the instrument.

<table>
<tr><th>AL100/AL110 main unit x 1</th><th>Lens cap x 1</th></tr>
<tr><td rowspan="3"> 
</td><td> 
</td></tr>
<tr><th>8GB SD card x 1</th></tr>
<tr><td> 
</td></tr>
<tr><th colspan="2">Adapter x 1</th></tr>
<tr><td colspan="2">  </td></tr>
<tr><th colspan="2">USB-Y cable x 1</th></tr>
<tr><td rowspan="6"> 
</td><th>A: Secondary connector</th></tr>
<tr><td>Used to connect to the USB port of the supplied adapter for extra power supply.</td></tr>
<tr><th>B: Mini USB connector</th></tr>
<tr><td>Used to plug into the USB port of the main unit.</td></tr>
<tr><th>C: Primary connector</th></tr>
<tr><td>Used to transfer data and supply power at the same time.</td></tr>
</table>

2.2. Spectroradiometer at a Glance



No.	Item	Description
1.	Lens cap	Covers and protects the lens from being damaged when the instrument is not in use. It can also be used to prevent light penetration for zero calibration.
2.	Measure button	Press or tap **Measure** on the home screen to take measurements of the spectral power distribution of a source.

No.	Item	Description
3.	Power	Long press to power on/off the instrument, or long press both the Power and Measure buttons on the unit for ten seconds to force shutdown. Please note that if for some unknown reason the instrument cannot be shut down, contact the original manufacturer or dealer to arrange a product inspection. Any attempt to dismantle the device may have an irrevocable impact on, or cause a loss of, the product's original efficacy, resulting in the immediate invalidation of Apacer's warranty and additional cost of replacement parts.
4.	Strap hole	Strap the instrument to your hand to prevent it from falling.
5.	Tripod socket	Used to mount the instrument on a tripod.
6.	Lens hood	Measure the spectrum of light source with or without the lens hood depending on the panel size: ■ With the hood: Large-sized panels. ■ Without the hood: Small-sized panels (handheld devices, such as mobile phones and tablets). For more information, see "Setting up Measuring Distance".
7.	SD card slot	Insert the supplied SD card here.
8.	USB port	Connect the mini USB connector of the supplied USB cable to the instrument here, and plug the primary connector into an available port on your computer.

3. Getting Started with Spectroradiometer

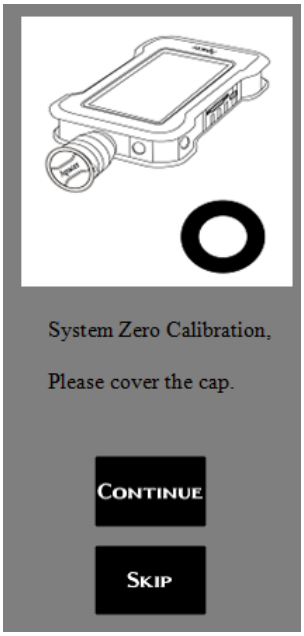
This chapter explains how to use your AL100/AL110 Spectroradiometer without being connected to a computer via a USB cable and ASR, desktop application designed for AL100/AL110 Spectroradiometer, start up and zero calibrate the device, view system information, manage settings for the instrument, manage measuring methods, and view measurement data.

3.1. Starting up and Calibrating the Spectroradiometer

To ensure measurement accuracy, we suggested you calibrate the spectroradiometer upon every system startup. Follow the steps below to start the calibration.

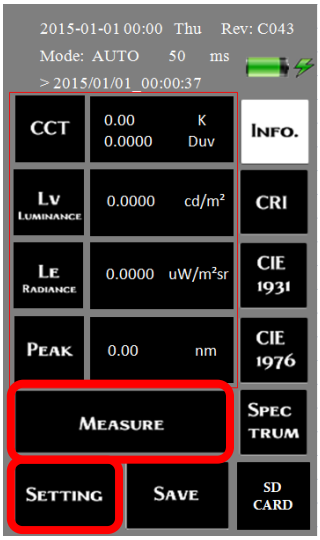
To start up and calibrate your spectroradiometer:

1. Long press the power button on the device to power on.
2. Cover the lens with the lens cap to start calibrating the device, and do either of the following:
   - Tap **Continue** to calibrate the unit.
   - Tap **Skip** if you do not want to perform calibration now. You may calibrate the unit later by going to **Setting**. See “Managing Settings” for more information.



3. The gear icon will appear when the system begins calibrating. Depending on the calibrating status, do either of the following:

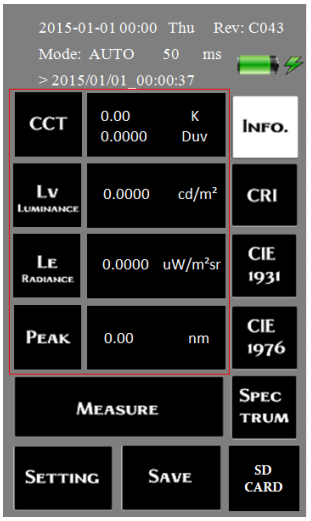
   - **Successfully calibrated**: You can start measuring the spectrum of light source by tapping **Measure** on the device screen or press the physical Measure button on the side of the unit. However, in case you want to configure system settings before measuring in order to capture results data as accurately as possible, tap **Setting**. See “Managing Settings” for more information.



   - **Calibration failed**: The calibration results can be affected by potential error sources such as external lighting during a calibration. If ambient lighting is detected, an error message will appear. Please make sure the lens is covered with the lens cap, and tap **Continue** to perform the calibration once again.

3.2. Viewing System Information

You can view the following system information on the home screen.

Information	Description	Display
2015-01-01 00:00 Thu	System date and time. Can be modified at **Settings** > **Date Time**.	
Rev: C043	Firmware version.	
Mode: AUTO	Integration mode. Can be modified at **Settings** > **Auto Int. Time**. Options include manual integration (**Off**) and auto integration (**On**).	
50 ms	Integration time. Can be adjusted at **Settings** > **Auto Int. Time**.	
> 2015/01/01 00:00:37	Indicates the date and time a measurment is taken and is used as directory name of the measured data saved in the SD card. This can only appear when an .sps file is selected to display. See “Viewing Measurement Data” > **SD Card** for more information.	
	Power indicator.	

3.3. Managing Settings

Apacer AL100/AL110 Spectroradiometer provides a variety of settings that allow you to configure the instrument to measure the spectral power distribution of the light source with more ease, effectiveness, and efficiency.

On the home screen, tap **Setting** to configure settings for the device. Manage and modify the settings options listed in the table with the navigating buttons:

- **Done**: Tap to save the settings when finished.
- **Return**: Tap to exit the settings screen you are navigating and return to the previous page.
-  : Tap to see more settings options available on other pages.

Option	Description
Auto Int. Time	This option allows you to obtain the best exposure by turning on/off the setting depending on your need: **On (Auto Integration)**: When set to on, the instrument will take measurements of a source automatically at optimal timing when ambient environment provides appropriate lighting. **Off (Manual Integration)**: When set to off, you can take measurements whenever you want by tapping the **Measure** button. Select the integration time with the + and – buttons. Maximum time permitted can be up to 60,000 milliseconds. Once finished, tap ⮌ to return to the previous screen and tap **Done** to apply the setting.
Power Save	This option allows you to activate power saving mode by specifying the time for the screen to go off when the instrument is not in use. When the mode is set to on, you can tap + or – to adjust the time. Maximum time permitted can be up to 300 seconds. Once finished, tap ⮌ to return to the previous screen and tap **Done** to apply the setting. If you want to go back to the screen you were on before the screen is off, press the physical Power button on the unit.

Option	Description
Continue Mode	This option allows you to take measurements continuously for the length of time specified in **Auto Int. Time** with the mode set to on or off. Tap **On**/**Off** to enable/disable the continue mode and tap **Done** to apply the setting. With the mode enabled, measurements will be taken once you tap **Measure** on the home screen. You can view the variations of different light sources in CCT, luminance, radiance, and peak values by tapping the columns on the right of the screen. To stop measuring, tap **Continue** on the home screen or press the physical Measure button on the side of the unit. Please note that with the Continue Mode set to on, only the final set of data will be archived. To record all data captured during the specified time, please connect the instrument to a computer and launch the ASR application.
Screen Reverse 180	Turn on the option to rotate the screen 180°. This allows you to adjust the orientation of the screen in response to the direction of the light source.
Language	Tap to select your display language among English, Traditional Chinese, and Simplified Chinese. Once finished, tap **Done** and the setting will come into effect immediately.
Measuring Angle	This option allows you to choose an appropriate measuing angle to take measurements of a source. Settings options include 2° and 10°. The default setting is 2°, which is the proper choice for measuring a source emitted from panels, while 10° is designed to take measurements of sources apart from those emitted from panels. Tap to make a selection and tap **Done** to apply the setting. For data accuracy, we suggest you configure the setting to 2°.
Date Time	Tap **Set** to set the date and time. Then tap the date or time field you want to change. The selected field will be highlighted. Tap + or – for changes, and tap **Set** when done. Once finished, tap to return to the previous screen and tap **Done** to apply the setting.
Touch Calibrate	Calibration of the touch screen is necessary when your touch screen responds inaccurate or erratic. Tap **Set** and then tap “+” on the screen three times to calibrate the touch screen of the instrument. A confirmation dialog will appear when the calibration is finished. Tap anywhere of the screen to return to the **Setting** menu, and tap **Done** to apply the setting.

Option	Description
Low Light Mode	Turn on the option to extend the measuring time. When the light source is too low for measurements to be taken with auto integration (3 seconds), you may need to consider allowing additional light to pass through the lens, in order to ensure optimum spectral data can be captured. Tap **On**/**Off** to enter the **Low Light Mode** page, and then tap + or – to adjust auto integration time from 3 to 60 seconds. Once finished, tap ↩ to return to the previous screen and tap **Done** to apply the setting. Please note that the low light mode can only be activated when the light source is extremely low and when **Auto Int. Time** is set to on. Otherwise, measurements will be taken based on the time set for manual integration by default. To avoid overexposure, this mode remains off when the light source is already bright enough.
Backlight Adjust	Tap digital to adjust screen brightness.
Alarm Beep	This option allows you to decide whether to make the instrument beep when the Measure button on the side of the unit is pressed. However, please note that the instrument will not beep if you tap **Measure** on the home screen. Tap **On**/**Off** and tap **Done** to apply the setting.
Factory Default	Tap **Set** to restore to factory default settings, and tap **Done** to apply the setting.
Zero Calibration	Tap **Set** to calibrate the instrument. This option functions the same as system zero calibration which is available when the instrument is powered on.
Average Times	In order to prevent the measured data from being biased, you may configure the instrument to produce an average value of sets of data by taking multiple measurements of a source. Options include 1, 4, 9, 16, and 25 times. Please note that the measuring time increases with the number of average times.

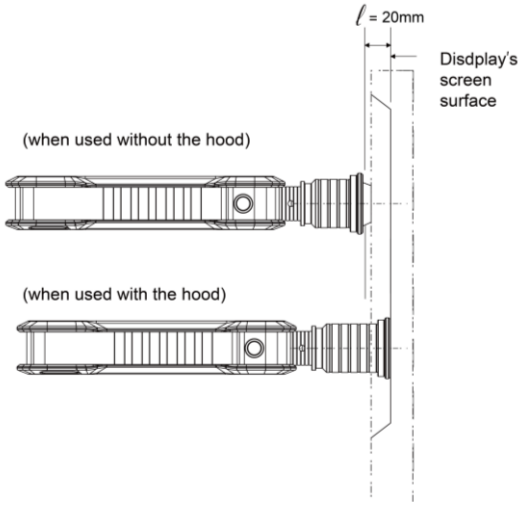
Option	Description
RGB Calibration	Measurements taken on different instruments can vary. This option allows you to correct the measured values obtained from calibration source based on those from calibration target whose color space serves as a standard via the ASR application. AL100/AL110 can save up to five sets of calibration data. Tap **On/Off** to enter the **RGB Calibration** page and tap **On** to select a file from **Table #1-5** to apply its calibration values. Once finished, tap ⮌ to return to the previous screen and tap **Done** to apply the setting. Measurements taken thereafter will be calibrated in accordance with the values from the selected data until you disable the setting. Please note that the measured values used to calibrate those produced on AL100/AL110 are generated via the ASR application and can only be selected for calibration on your spectroradiometer once being saved to the instrument via the utility. For more detailed instructions, see the user's manual for ASR or the video tutorial available on Apacer's website.
Spectral Calibration	In addition to RGB calibration, AL100/AL110 also allows you to calibrate spectral values. Before calibrating, please contact Apacer's sales representative to send you the Intenstity Calibration Tool, with which you can save up to five spectral table indexes serving as a standard to calibrate spectral data obtained on your instrument. To start calibrating, tap the number field ranging from **0** to **5** which corresponds to the spectral table index saved in the Intensity Calibration Tool. Once finished, tap **Done** to apply the setting. Measurements taken thereafter will be calibrated in accordance with the values from the selected table.

3.4. Setting up Measuring Distance

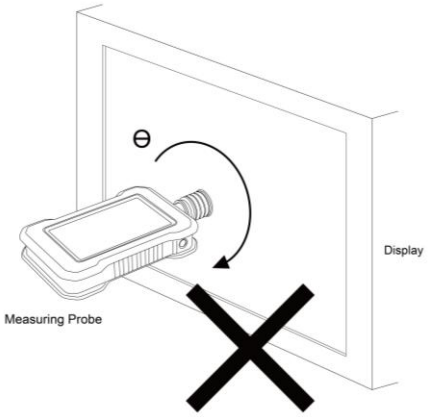
While measuring spectrum of light sources emitted from the panel of target device, follow the instructions below to set up the distance between Apacer AL100/AL110 Spectroradiometer and the panel.

To set up the measuring distance between the spectroradiometer and the device screen:

1. Position the panel of the target device and make sure it stands still. (A flat panel display is taken here for example.)
2. Mount your spectroradiometer on a tripod, and do the following to take measurements of light spectrum:
   - **Without the hood**: Recommended for small-size panels. Make sure that the spectroradiometer stays vertical with the panel, and that the distance between the measuring probe of the spectroradiometer and the screen of the device is ≦ 20mm.
   - **With the hood**: Recommended for large-size panels. Make sure that there is no room reserved between the screen of the device and the hood, and that the spectroradiometer stays vertical with the panel. This method can not only prevent external lighting from disturbing the source light to affect the measurement results, but also allow you to keep the instrument within a fixed measuring distance.



3. When taking measurements, make sure the measuring angle remains unchanged to ensure higher reproducibility.



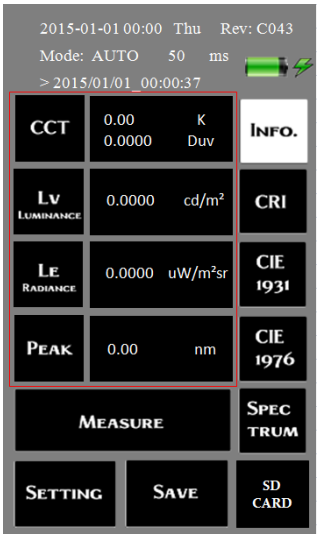
3.5. Viewing Measurement Data

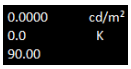
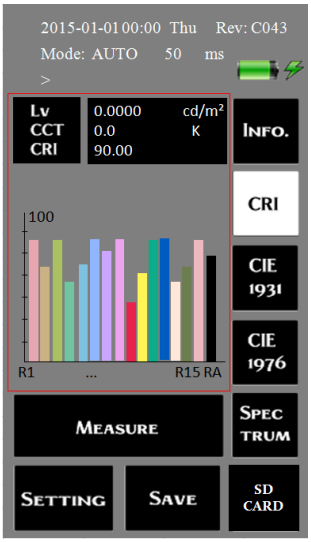
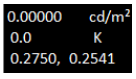
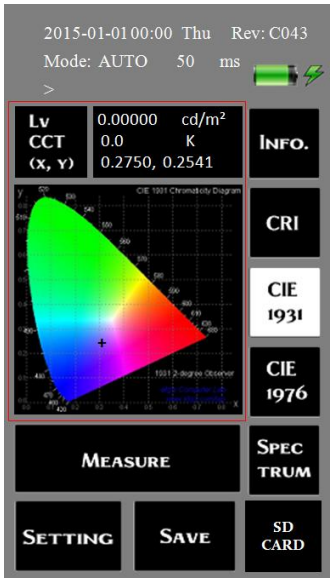
Once the settings described in “Managing Settings” are completed, you can do either of the following to take measurements:

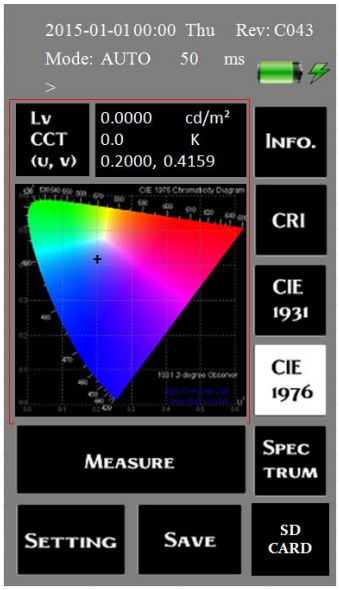
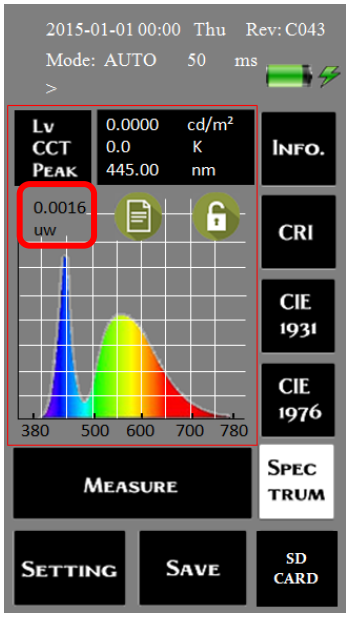
- Press the physical Measure button on the side of the instrument.
- Tap **Measure** on the home screen.

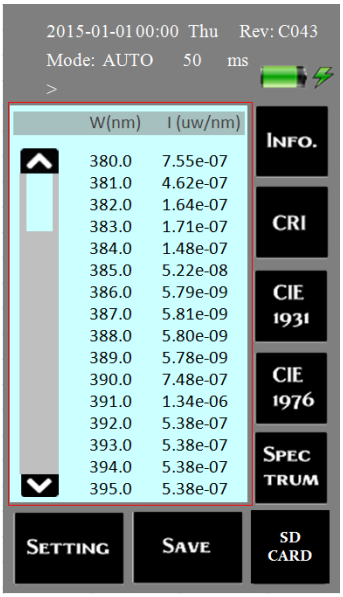
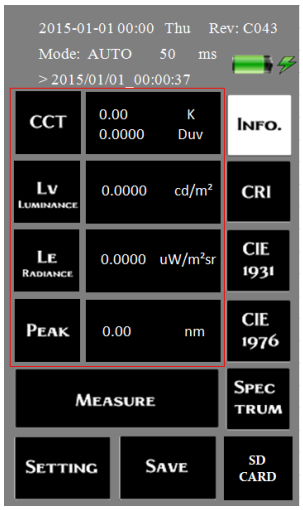
While measuring, please make sure the lens stays vertical with and is placed tightly against a panel, in order to ensure higher reproducibility of the measured values.

After the measurements, tap the **Info**, **CRI**, **CIE1931**, **CIE1976**, **Spectrum**, and **Data** buttons on the right as illustrated below to view the results which can be saved into the SD card that accompanies the package. Insert the SD card into the SD card slot, and then tap **Save** to save the results as text files with .sps extension. You can also export the files as .csv or .xls file format via the ASR application by connecting the instrument to a computer.

Button	Description	Display
INFO.	Tap to display measurement data, including color temperature, luminance, radiance and peak wavelength value. You may tap the value 0.0000 cd/m² of **LV Luminance** and 0.0000 uW/m²sr of **LE Radiance** to change the way values are displayed to 0.000E+00, or tap **Peak** to view tristimulus values (XYZ).	

Button	Description	Display
CRI	Tap to display color rendering index, in which luminance, color temperature and CRI values, and a bar chart with R1-R15 and RA values will be displayed. You may tap  to change the way luminance value is displayed.	
CIE 1931	Tap to display CIE 1931 color diagram, in which luminance, color temperature and xy values will be displayed. The + appearing on the diagram represents the (x, y) value. You may tap  to change the way luminance value is displayed.	

Button	Description	Display
CIE 1976	Tap to display CIE 1976 color diagram, in which luminance, color temperature and u'v' values will be displayed. The + appearing on the diagram represents the (u', v') value. You may tap 0.0000 cd/m² / 0.0 K / 0.2000, 0.4159 to change the way luminance value is displayed.	
SPEC TRUM	Tap to display spectrum diagram, in which luminance, color temperature and peak wavelength values will be displayed. You may tap 0.0016 uw/nm to switch to 30100 count.	

Button	Description	Display
	Tap  to display spectral data. You may view the data of different wavelengths by scrolling up or down. To compare the spectra of different light sources, switch the value displayed on the upper-left corner of the diagram to  , and then tap  to lock the Y-axis.	
SAVE	Tap to save the measured data into the SD card inserted in the instrument as text files with .sps extension. The files can be opened with Microsoft Word or ASR application.	

Button	Description	Display
SD CARD	Tap to view the measured data saved in the SD card. The root directory (indicated as .\) and subdirectory (categorized by date) can display up to 15 items per page. Tap ^/ v to navigate through items and tap ↵ for selection.