

DLP® Ultra-mobile Near-Infrared Spectrometer with Bluetooth Connectivity

About Test Results

The DLP Ultra-mobile Near-Infrared (NIR) Spectrometer reference design utilizes Texas Instruments' DLP technology in conjunction with a single-element InGaAs detector to deliver high performance measurements in a portable form factor that is more affordable than expensive InGaAs array detector or fragile rotating grating architectures. This design features multiple TI components, highlighted by the DLP2010NIR Digital Micromirror Device, DLPC150 Digital Controller, and DLPA2005 Power Management.

The reference design includes compact battery-operated architecture, supports Bluetooth low energy for wireless connectivity, and TI Tiva processor to leverage cloud databases for real-time lab equivalent analytics.

The spectrum data contained below was measured from one DLP NIRscan™ Nano evaluation module (EVM) to provide an example from a typical unit. The spectrum data was acquired using the EVM's Line Scan, which was configured for 248 data points across a wavelength range of 900 nm to 1700nm and captured with a 1s total scan time. Please note performance will vary between EVMs due to variations in manufacturing and reference spectra from the user's catalog of spectral characteristics. The performance data is not guaranteed.



DLP NIRscan Nano Evaluation Module

Related Documentation From Texas Instruments

DLPC150 Data Sheet: *DLP Digital Controller for Advanced Light Control*, TI literature number [DLPS048A](#)

DLP2010NIR Data Sheet: *0.2 WVGA Near-Infrared DMD*, TI literature number [DLPS059](#)

Programmer's Guide: *DLPC150 Programmer's Guide User's Guide*, [DLPU031](#)

Application Note: *DLP® for Spectroscopy*, TI literature number [DLPA049](#)

Selection Guide: *DLP® Products for Spectroscopy*, TI literature number [DLPT020](#)

If You Need Assistance

Refer to the [DLP and MEMS TI E2E Community support forums](#)

Spectrum Analysis

This chapter provides test data of wavelength absorbance spectrums from eight commercially available samples.

When a spectrum is captured, the output can potentially be used to:

- Identify an unknown material by comparison to a catalog of spectral characteristics
- Determine the presence of a substance of interest
- Inspect a quantity of material to determine concentration limits of certain substances
- Analyze the chemical composition of a sample using PCA (Principal Component Analysis) and Chemometrics

To measure the absorbance of such samples, the following procedure is used on a system with the DLP® NIRscan™ Nano GUI installed:

Make Reference Scan in the NIRscan™ Nano GUI:

1. Click on the "New/Edit/Export/Import" button in the Scan control box to invoke the Scan Configuration dialog box.
2. The Scan Configuration dialog box has three sections:
 - The top left section displays previous scan configurations saved to the PC.
 - The top right section displays the scan configurations saved on the DLP NIRscan Nano EVM.
 - The bottom section displays the scan configuration parameters of the selected PC or DLP NIRscan Nano EVM stored scan configuration.
3. Click New button on the top left section of the Scan Configuration dialog. Then type the desired spectral range between 900 and 1700 nm.
4. Select the width in nm that corresponds to the smallest wavelength content that you want to resolve.
5. Enter the desired number of wavelength points captured across the spectral range.
6. Enter the Number of scans to average for corresponding back-to-back scans to average.
7. Enter a configuration name and click save.
8. Close the Scan Configuration dialog by clicking OK.

Take Sample Scan:

Once a scan configuration is selected, define a reference by scanning a reflective reference standard. Then click on the Set as Reference button. After these steps, scanning any sample will allow the plot of absorbance.

To display previous scans, click on the "scans" button under the Texas Instruments logo. A sub-window will pop up displaying the previous scans stored in the PC. The files are stored with the name of the scan configuration appended with the date and time of the scan. Selecting one of the files and clicking on the "Display spectrum" plots that file. Click on the "hide" button to hide this sub-window.

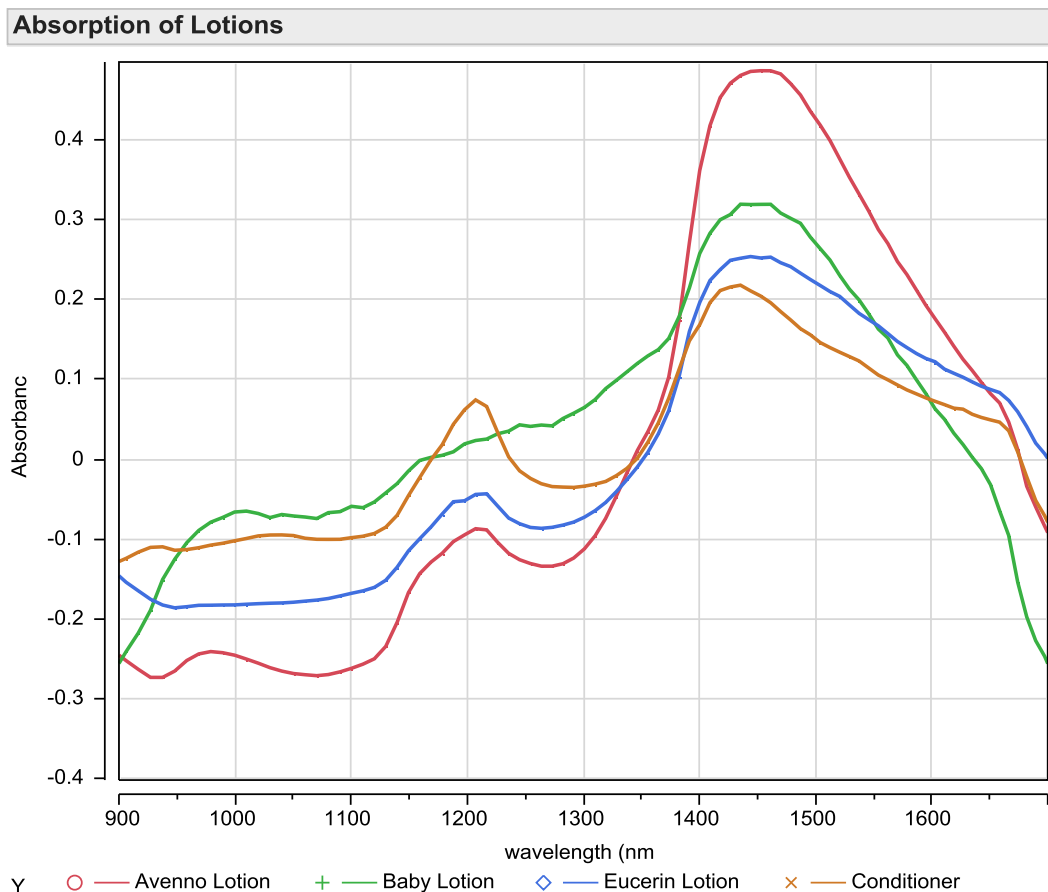


Figure 1. Wavelength Absorbance Spectrum Comparison of Brand Moisturizers on Skin

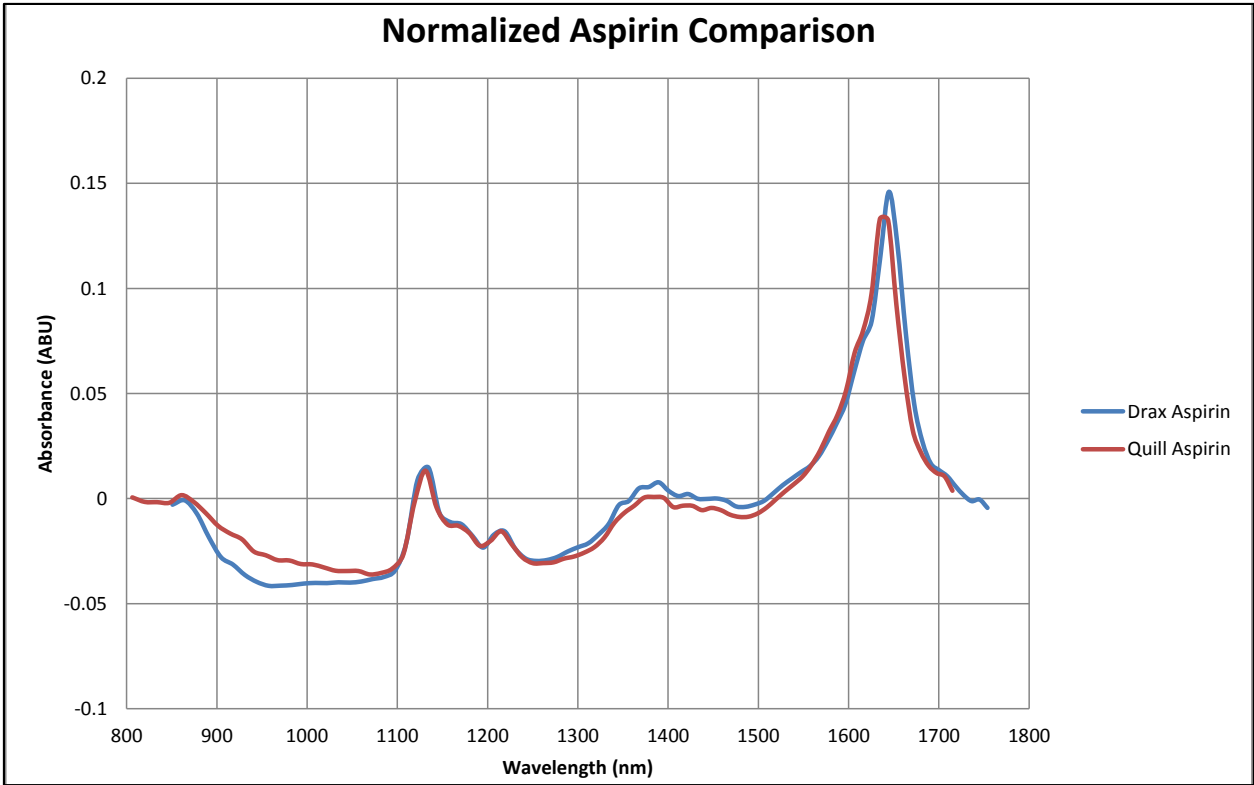


Figure 2. Wavelength Absorbance Spectrum Comparison of Drax Aspirin and Quill Aspirin

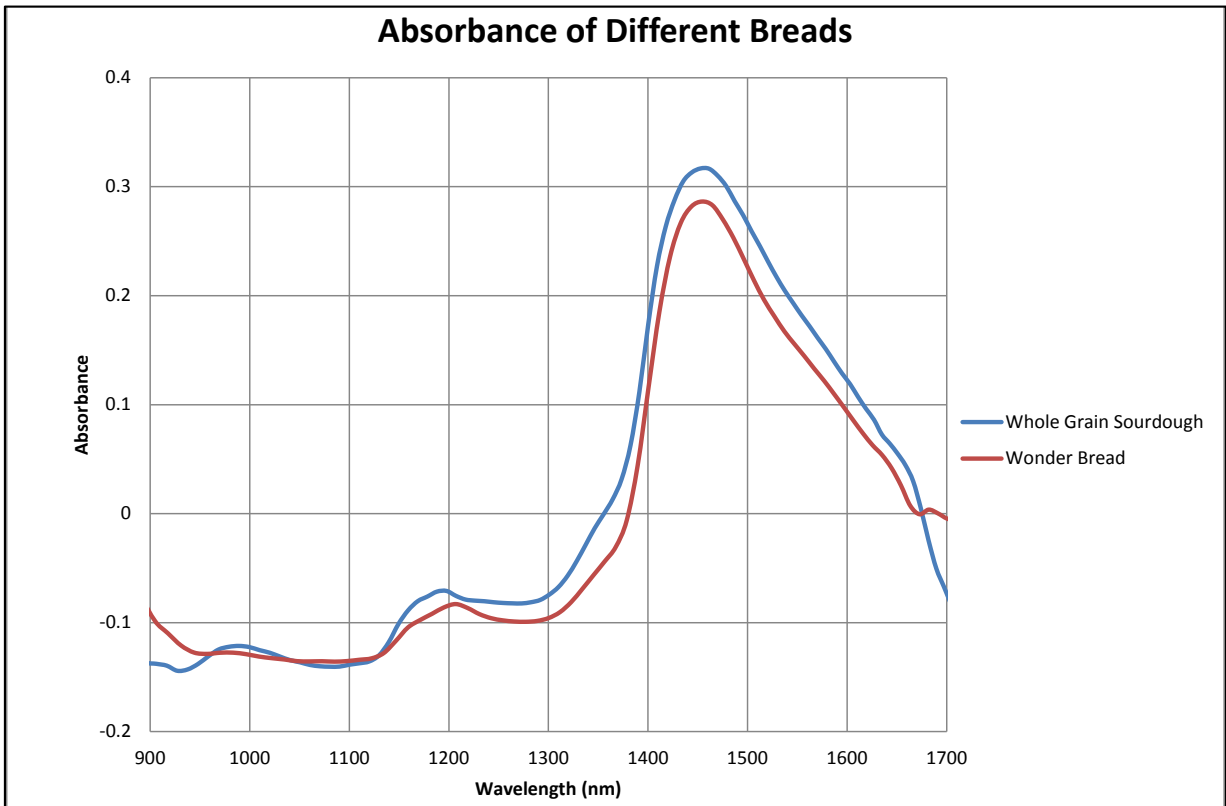


Figure 3. Wavelength Absorbance Spectrum Comparison of Whole Grain and Wonder Bread

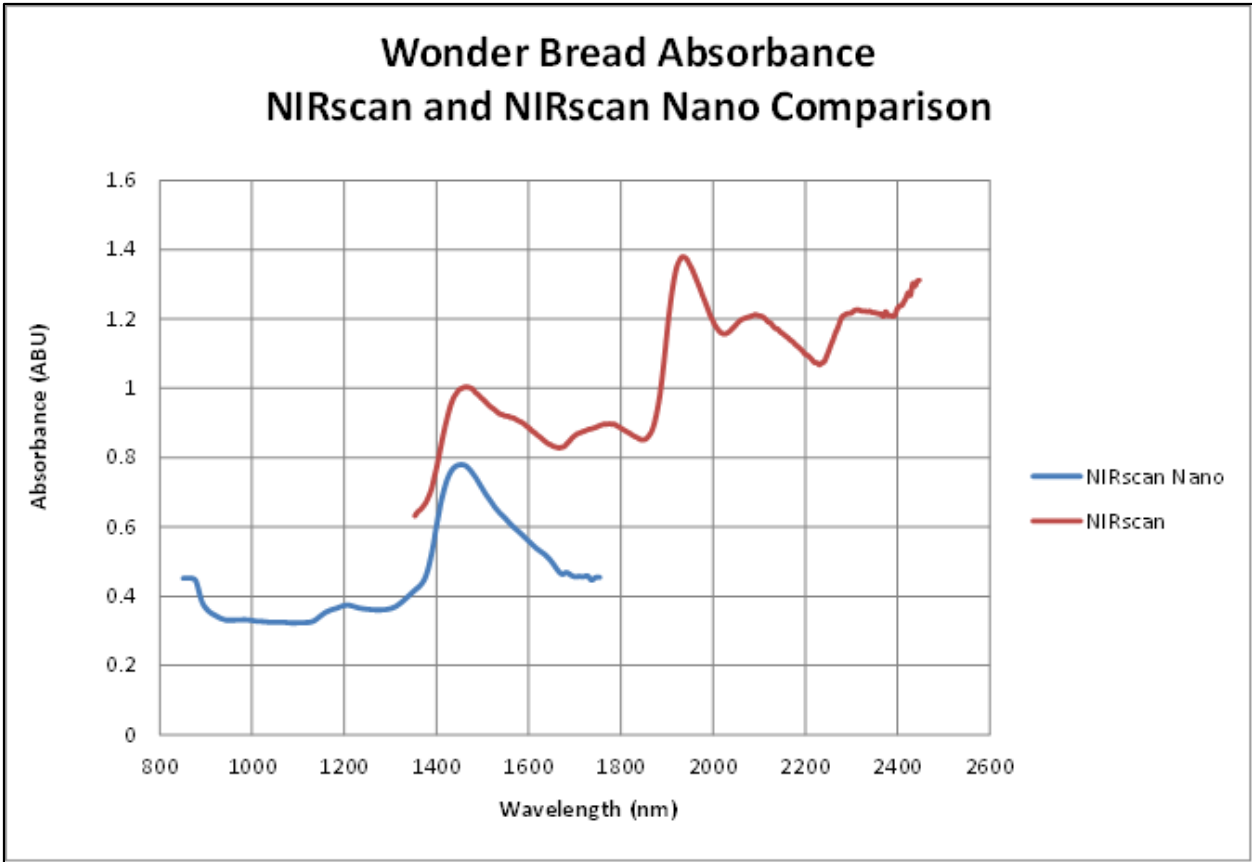


Figure 4. NIRscan and NIRscan Nano Wavelength Absorbance Spectrum Comparison

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