DLP® 0.45 WXGA NIR Chipset
DLP4500NIR & DLPC350

Introducing the first ever Texas Instruments (TI) DLP® chipset optimized for use with near infrared (NIR) light. This cost effective, programmable light steering solution is ideal for use in industrial sensing equipment for the field or production line and can enable new markets for spectrometers, single pixel cameras, laser marking equipment, NIR projection and more.

How the DLP 0.45 WXGA NIR Chipset Works

TI offers a dedicated DLP 0.45 WXGA NIR Chipset which consists of the DLP4500NIR digital micromirror device (DMD) and DLPC350 Digital Controller. The complete chipset is designed to give engineers fast, easy and reliable control of the DMD to speed product development. The DLP4500NIR is optimized for light steering solutions in the near infrared range including:

- Spectroscopy
- Single Pixel Cameras
- Laser Marking
- 3D Machine Vision
- Pattern Projection
- Optical Choppers
- Microscopes

The DMD is a programmable, high speed spatial light modulator. Each micromirror of the DMD can be individually deflected about a hinged axis. The deflection angle of each micromirror (±12°) is controlled by changing the binary state of the underlying CMOS memory cell followed by application of a mirror reset pulse. Convenient and reliable operation of the DMD is orchestrated by the DMD controller, with micromirror driver circuitry integrated into the DMD. In addition, TI offers firmware for the Digital Controller to enable advanced control of the DMD for pattern and high speed light steering applications.

DLP NIRscan™: Get Started Today

The DLP NIRscan evaluation module (EVM) featuring the 0.45 WXGA NIR Chipset contains everything a designer needs to start developing a DLP-based spectrometer right out of the box.

DLP-based spectrometer optical engine
- 1350 – 2450 nm wavelength range
- >30,000:1 signal to noise ratio for <1 second measurements
- Single-element Extended InGaAs Detector
- Dimensions: 7 ½” L x 4 ½” W x 3 ¾” H

Electronics
- AM3358 Sitara™ Cortex-A8 Microprocessor
- ADS1255 Very Low Noise Delta-Sigma ADC

Transmittance sampling module including halogen lamp
- Compatible with reflective or fiber-based sampling modules
- 3 disposable cuvettes to jump start development

Embedded Linux operating system based on BeagleBone Black architecture running web server
- Connect through USB or Ethernet—no download required!
- Open source code available

Available reference design from TI Designs

DLP 0.45 WXGA NIR Chipset

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<th>DLP4500NIR Key Features</th>
<th>DLPC350 Key Features</th>
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<tr>
<td>Optimized for 700-2500 nm light</td>
<td>Convenient, reliable DMD control</td>
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<td>Over 1 million micromirrors (912 x 1140 array)</td>
<td>High speed pattern rates up to 4225 Hz</td>
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<td>Side illuminated for simplified optics</td>
<td>Pixel accurate Pattern Sequence Mode</td>
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<td>Polarization independent aluminum micromirrors</td>
<td>Two configurable I/O triggers</td>
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Spectroscopy Using DLP Technology

In a spectrometer, the DMD acts as a programmable wavelength filter. In a typical configuration, broadband light enters through a slit, and a grating is used to disperse the wavelengths of light across the micromirror array. Columns of micromirrors are then used to select which wavelengths are directed onto a single element detector, and micromirror rows apply an attenuation factor. The DMD facilitates a spectrometer architecture that uses a larger, single detector to displace an expensive array detector.

This powerful and programmable design architecture enables analysis of liquids and solids with higher performance at lower price points while using a smaller form factor suited for both field analysis and inline manufacturing processes.

Performance:
- Capture more light from a sample
- Better signal-to-noise ratio (SNR)
- Low power, more portable solutions

Programmability:
- More flexible, faster, accurate measurements
- “Optimize as you go” analysis
- Measure diverse substances with a single end equipment

Cost:
- Utilize lower cost single element detectors
- Consistent unit-to-unit performance in volume production

Portability:
- Robust architecture
- Temperature-independent switching characteristics

Block Diagram of Spectrometer using DLP Technology
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