DSS WLA501, WLA502, WLA 503

The Deep Space Systems WLA50X cameras are derived from the highly capable GoPro Hero 4 camera electronics. The WLA50X cameras include a wide range of features including a 12 MP camera with 4K video, along with wireless connectivity.

Size, Weight and Power:
• Size: 30 x 2.6 x 3 in. (W x D x H) Weight 0.25 lbs.
• 5 VDC Power, 7.3 Watts Peak (Heater Mode) 4.9W Average

Performance:
• 12 Megapixel (3840 = 216)/ CMOS Image Sensor
• 4K Video @ 30fps at Full Resolution
• In Flight Commandable H.264 compression
• 5.8 GHz WIFI Interface
• Onboard data storage, fully Flight Programmable

The capabilities added by Deep Space Systems’ installation of a Heater-Illumination-Power (HIP) board include:
• Built In Closed Loop Heater Control (enabled upon command)
• Over-temperature shutdown protection
• LED Illuminator with beam focusing lens
• Power supply diodes for over-voltage and electro-static discharge (ESD) protection

Environmental Qualification
• Qualified operational baseplate temperature range in vac: -155°F to 209°F (-100°C to 100°C)
• Radiation Tolerant (proton and heavy ion radiation tested)
• Random Vibration: 22.93 G rms Qual for 730 seconds
• Shock: 7187 Gs, Qual Peak Gs
• Aluminum-to aluminum and connector body to aluminum bonding < 2.5 milliohms
• 40 dB shielding attenuation from 30kHz to 40GHz

Other Specifications
• 4K Video at 30 fps (recording)
• 1080P Video at 120 fps (recording)
• 720P Video at 240 fps (recording)
• 12 Mp Full resolution stills
• Up to 720P Streaming via WiFi
• Auto and Manual Shutter Control and Exposure
• Manual control of White Balance, Color, ISO Limit
• Sharpness, Shutter, and Exposure Value Compensation
• .jpg and .mp4 files stored in internal 128 GB MicroSD Card
• HTML/FTP file transfer via WiFi
• 5.8 GHz WiFi
• Internal Autoexec Sequence, Reconfigurable In Flight
• 3 qualified lenses (many optional lenses available)
• May be operated in a fully wired mode (no RF emissions)

Video Modes:
<table>
<thead>
<tr>
<th>Mode</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>4K @ 30 fps</td>
<td>3840x2160</td>
</tr>
<tr>
<td>1080p @ 120 fps</td>
<td>1920x1080</td>
</tr>
<tr>
<td>1080p @ 60 fps</td>
<td>1920x1080</td>
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<tr>
<td>1080p @ 30 fps</td>
<td>1920x1080</td>
</tr>
<tr>
<td>720p @ 120 fps</td>
<td>1280x720</td>
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<tr>
<td>720p @ 60 fps</td>
<td>1280x720</td>
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<tr>
<td>720p @ 30 fps</td>
<td>1280x720</td>
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</table>
DSS WLA501 Shown
(Solar Array Camera for the Orion Multi Purpose Crew Vehicle)
DSS WLA501, WLA502, WLA503

Part # WLA501 89° FOV Medium Field of View Lens w/ included Illuminator LEDs and Polycarbonate lens cover

Flight Unit in Test Configuration

Black Coating denotes Crew Cabin flight article for Orion EM-1

Orion Solar Array Camera Locations

WRA501 with WiFi Patch Antenna on Titanium Solar Array Bracket
WLA501 Random Vibration Levels

Solar Array Wireless Cameras, Nominal Ascent Random Vibration, Acceptance Envelope - Combined

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>ASD (g²/Hz)</th>
<th>dB</th>
<th># of Octaves</th>
<th>Slope (dB/Oct)</th>
<th>Area</th>
<th>g RMS</th>
<th>Slope (dB/Hz)</th>
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<tbody>
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<td>15.26</td>
<td>-0.02</td>
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</table>

Duration (Sec/Axis): 60

Tolerance: +/- 1.5 dB Overall (gRMS): +1.0 dB

WLA501 Shock Qualification Levels

Solar Array Wireless Cameras, Protoqualification/Qualification (Proto MPE + 3 dB) Shock Test Level

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>ASD (g²/Hz)</th>
<th>dB</th>
<th># of Octaves</th>
<th>Slope (dB/Oct)</th>
<th>Area</th>
<th>g RMS</th>
<th>Slope (dB/Hz)</th>
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<tr>
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<td>0.00</td>
<td>2.40</td>
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</tr>
</tbody>
</table>

Other Deep Space Systems Products

WRA 50X Wired Camera

WRA 50X Wired HD Inspection Camera

Weight ≤ 0.67 lbs.

5.3 Megapixel (2592 x 2048) CMOS Sensor
75 fps at Full Resolution
In Flight Commandable Manual Controls
USB 3.0 Interface
Compatible with USB 2.0 at lower data rates
Qualifiable interfaces include FireWire and Ethernet
Pixel Size: 4.8 x 4.8 microns
Optical Format: 1 in
Peak Quantum Efficiency (QE): 53% at 550 nm
Fixed-Pattern Noise (FPN) < 1% of signal
Photo Response Non-Uniformity (PRNU) < 2% of signal
Dynamic Range: 53 dB
Bit depth: 8- or 10-bit
Responsivity at 550 nm:
24 LSB/10 ns/cm², 4.6 V/µlux.s
Example Frame Rates:
- 75 fps at 2592 x 2048
- 183 fps at 1980 x 1020
- 250 fps at 1280 x 1024
- 813 fps at 640 x 480

CCA501 Camera Controller
(WiGig, WiFi, 4 X USB3.0, 1000T Ethernet, HDMI, 480GB)

Video and Imaging Camera System for The Orion Multipurpose Crew Vehicle

Orion Full EDU Ship Set (Less OpNav Camera)