Multi-channel Detectors

Solar Laser Systems offers a line of spectroscopic multi-channel detectors for monochromators and spectrographs (listed in the tables below or other upon the prior agreement with the manufacturer).

Detectors providing data transfer via Full-Speed USB interface (up to 12 Mbit/sec) are powered via the USB port from a PC. Powering of cooled detectors is provided from an external power supply. Power consumption is <6W for non-cooled detectors and <25W for cooled detectors. The thermostabilization system with a built-in Peltier-cooler ensures crystal temperature precision of ±0.1°C.

Parameters of sync pulses
- polarity .................................. positive
- amplitude ................................. 3-5V
- FWHM pulse duration ........ ~10mksec

Requirements to external sync pulse:
- polarity .................................. positive
- amplitude ................................. 3-15V
- FWHM pulse duration ........ 5-20mksec
- Rise time..................................~10mksec

<table>
<thead>
<tr>
<th>Model</th>
<th>(UC-14T2)</th>
<th>(UC-14T3)</th>
<th>UC–14H83</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor type</td>
<td>TCD 1205D</td>
<td>TCD 1304 AP</td>
<td>S8378–1024Q</td>
</tr>
<tr>
<td>Number of pixels</td>
<td>2048</td>
<td>3648</td>
<td>1024</td>
</tr>
<tr>
<td>Pixel size, μm²</td>
<td>14 × 200</td>
<td>8 × 200</td>
<td>25x500</td>
</tr>
<tr>
<td>Active area, mm</td>
<td>28.6</td>
<td>29.1</td>
<td>25.6</td>
</tr>
<tr>
<td>Spectral response range, nm</td>
<td>200 - 1100</td>
<td>200 - 1100</td>
<td>200 - 1000</td>
</tr>
<tr>
<td>Photo sensitivity, V/lx's</td>
<td>80</td>
<td>160</td>
<td>4.4 (22)</td>
</tr>
<tr>
<td>Peak sensitivity wavelength, nm</td>
<td>580</td>
<td>540</td>
<td>500</td>
</tr>
<tr>
<td>Photo response non-uniformity, (%)</td>
<td>±5</td>
<td>±5</td>
<td>±3</td>
</tr>
<tr>
<td>Antiblooming (3)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>ADC Resolution</td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Readout noise, ADC count, rms</td>
<td>&lt; 18</td>
<td>&lt; 14</td>
<td>&lt;4.4(16)</td>
</tr>
<tr>
<td>Data rate (max), kHz</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Frame readout time (min), ms</td>
<td>4.2</td>
<td>7.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Exposure time (min), ms</td>
<td>4.2</td>
<td>7.4</td>
<td>4.2</td>
</tr>
<tr>
<td>Exposure time (max) not less, s</td>
<td>4</td>
<td>0.5</td>
<td>5</td>
</tr>
<tr>
<td>Cooling temperature, °C</td>
<td>Non-cooled</td>
<td>Non-cooled</td>
<td>Non-cooled</td>
</tr>
<tr>
<td>Operation temperature, °C</td>
<td>10 - 30</td>
<td>10 - 30</td>
<td>10 - 30</td>
</tr>
<tr>
<td>Computer interface</td>
<td>Full-Speed USB</td>
<td>Full-Speed USB</td>
<td>Full-Speed USB</td>
</tr>
<tr>
<td>Synchronizations</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
</tr>
<tr>
<td>Size, mm³</td>
<td>66 × 86 ×32</td>
<td>66 × 86 ×32</td>
<td>66 × 86 ×32</td>
</tr>
</tbody>
</table>

(1) Image sensor provides two operational modes: high dynamic or high sensitivity (value in brackets).
(2) Signal level is 50% of saturation.
(3) Antiblooming: the ability to prevent the spilling of excess photocharges from a saturated photoelement to neighboring elements.
(4) Max exposure time is a time for which dark signal reaches 10% of the dynamic range.

<table>
<thead>
<tr>
<th>Model</th>
<th>UC–16H904S</th>
<th>UC–16H912</th>
<th>UC–16H914</th>
<th>UC–16H904D</th>
<th>UC–16H908</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pixels</td>
<td>512</td>
<td>512</td>
<td>512</td>
<td>512</td>
<td>256</td>
</tr>
<tr>
<td>Defective pixels (1)</td>
<td>No</td>
<td>≤5</td>
<td>≤5</td>
<td>No</td>
<td>≤13</td>
</tr>
<tr>
<td>Pixel size, μm²</td>
<td>25 × 500</td>
<td>25 × 250</td>
<td>25 × 500</td>
<td>25 × 500</td>
<td>50x250</td>
</tr>
<tr>
<td>Active area, mm</td>
<td>12,8</td>
<td>12,8</td>
<td>12,8</td>
<td>12,8</td>
<td>12,8</td>
</tr>
<tr>
<td>Spectral response range, nm</td>
<td>0,9 – 1,67</td>
<td>0,9 – 1,67</td>
<td>0,9 – 1,67</td>
<td>0,9 – 1,7</td>
<td>0,9–2,55</td>
</tr>
<tr>
<td>Peak sensitivity wavelength, nm</td>
<td>1,55</td>
<td>1,55</td>
<td>1,55</td>
<td>1,55</td>
<td>2,3</td>
</tr>
<tr>
<td>Photo response non-uniformity, (%) (4)(5)</td>
<td>±5</td>
<td>±5</td>
<td>±5</td>
<td>±5</td>
<td>±10</td>
</tr>
<tr>
<td>Antiblooming (3)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>ADC Resolution</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Readout noise, ADC count, rms (5)</td>
<td>&lt;6</td>
<td>&lt;6</td>
<td>&lt;6</td>
<td>&lt;6</td>
<td>&lt;6</td>
</tr>
<tr>
<td>Data rate (max), kHz</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>Frame readout time (min), ms</td>
<td>4.1</td>
<td>4.1</td>
<td>4.1</td>
<td>4.1</td>
<td>2</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>Exposure time (min), ms</td>
<td>8.2</td>
<td>8.2</td>
<td>8.2</td>
<td>8.2</td>
<td>10 microsecond</td>
</tr>
<tr>
<td>Exposure time (max) not less, ((1) (5)), s</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>3.5</td>
</tr>
<tr>
<td>Cooling temperature, °C</td>
<td>–10</td>
<td>–10</td>
<td>–10</td>
<td>Non cooled</td>
<td>- 20</td>
</tr>
<tr>
<td>Computer interface</td>
<td>Full Speed USB</td>
<td>Full Speed USB</td>
<td>Full Speed USB</td>
<td>Full Speed USB</td>
<td>Full Speed USB</td>
</tr>
<tr>
<td>Synchronizations</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
</tr>
<tr>
<td>Size, mm³</td>
<td>70×80×143</td>
<td>70×80×143</td>
<td>70×80×143</td>
<td>70×80×143</td>
<td>70×80×143</td>
</tr>
</tbody>
</table>

(1) Total number of pixels with dark current, sensitivity nonlinearity and readout noise exceeding maximum value. The first and last pixels are not counted.

(2) Signal level is 50% of saturation. Exposure time is 10ms.

(3) Antiballooning: the ability to prevent the spilling of excess photocharges from a saturated photoelement to neighboring elements.

(4) Max exposure time is time when dark signal reaches 25% of the dynamic range.

(5) All image sensors provide two operational modes: high dynamic or high sensitivity. Parameters in the above table are indicated for the high dynamic mode.

<table>
<thead>
<tr>
<th>Model</th>
<th>UC–16H7306</th>
<th>UC–16H7307</th>
<th>UC–16H7308</th>
<th>UC–16H7316</th>
<th>UC–16H7317</th>
<th>UC–16H7318</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pixels</td>
<td>1024×64</td>
<td>1024×128</td>
<td>1024×256</td>
<td>1024×64</td>
<td>1024×128</td>
<td>1024×256</td>
</tr>
<tr>
<td>Number of active pixels</td>
<td>1024×58</td>
<td>1024×122</td>
<td>1024×250</td>
<td>1024×58</td>
<td>1024×122</td>
<td>1024×250</td>
</tr>
<tr>
<td>Pixel size, μm²</td>
<td>24×24</td>
<td>24×24</td>
<td>24×24</td>
<td>24×24</td>
<td>24×24</td>
<td>24×24</td>
</tr>
<tr>
<td>Active area, mm³</td>
<td>24.6×1.4</td>
<td>24.6×2.9</td>
<td>24.6×6.0</td>
<td>24.6×1.4</td>
<td>24.6×2.9</td>
<td>24.6×6.0</td>
</tr>
<tr>
<td>Spectral response range, nm</td>
<td>200÷1100</td>
<td>200÷1100</td>
<td>200÷1100</td>
<td>200÷1100</td>
<td>200÷1100</td>
<td>200÷1100</td>
</tr>
<tr>
<td>Peak sensitivity wavelength, nm</td>
<td>650</td>
<td>650</td>
<td>650</td>
<td>650</td>
<td>650</td>
<td>650</td>
</tr>
<tr>
<td>Quantum efficiency at peak sensitivity, %</td>
<td>&gt;90</td>
<td>&gt;90</td>
<td>&gt;90</td>
<td>&gt;90</td>
<td>&gt;90</td>
<td>&gt;90</td>
</tr>
<tr>
<td>Photo response non-uniformity,(^{(1)}) %</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
</tr>
<tr>
<td>Antiballooning(^{(2)})</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>ADC Resolution</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Readout noise, ADC count, rms</td>
<td>&lt;7</td>
<td>&lt;7</td>
<td>&lt;7</td>
<td>&lt;7</td>
<td>&lt;7</td>
<td>&lt;7</td>
</tr>
<tr>
<td>Data rate (max), kHz</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>Frame readout time (min) @ area scanning mode, s</td>
<td>0.54</td>
<td>1.07</td>
<td>2.14</td>
<td>0.54</td>
<td>1.07</td>
<td>2.14</td>
</tr>
<tr>
<td>Frame readout time @ line binning mode (min), ms</td>
<td>9.12</td>
<td>9.89</td>
<td>11.42</td>
<td>9.12</td>
<td>9.89</td>
<td>11.42</td>
</tr>
<tr>
<td>Exposure time (min), s</td>
<td>16.7</td>
<td>16.7</td>
<td>16.7</td>
<td>16.7</td>
<td>16.7</td>
<td>16.7</td>
</tr>
<tr>
<td>Exposure time (max) not less, ((3)), s</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cooling temperature, °C</td>
<td>Non-cooled</td>
<td>Non-cooled</td>
<td>Non-cooled</td>
<td>-10</td>
<td>-10</td>
<td>-10</td>
</tr>
<tr>
<td>Operation temperature, °C</td>
<td>10±30</td>
<td>10±30</td>
<td>10±30</td>
<td>10±30</td>
<td>10±30</td>
<td>10±30</td>
</tr>
<tr>
<td>Computer interface</td>
<td>Full Speed USB</td>
<td>Full Speed USB</td>
<td>Full Speed USB</td>
<td>Full Speed USB</td>
<td>Full Speed USB</td>
<td>Full Speed USB</td>
</tr>
<tr>
<td>Synchronizations</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
<td>IN/OUT</td>
</tr>
<tr>
<td>Size, mm³</td>
<td>70×80×143</td>
<td>70×80×143</td>
<td>70×80×143</td>
<td>70×80×143</td>
<td>70×80×143</td>
<td>70×80×143</td>
</tr>
</tbody>
</table>

(1) Signal level is 50% of saturation.

(2) Antiballooning: the ability to prevent the spilling of excess photocharges from a saturated photoelement to neighboring elements.

(3) Max exposure time is time when dark signal reaches 10% of the dynamic range.