Cooling: The 1100 can cool CCDs below –100°C by crycooling and is available with thermoelectric cooling as well.

Multiple read speeds are available: Common readout speeds start at 100kHz per port, and can achieve MHz speeds (per port) as well depending on the CCD selection.

Low read noise: sub 5e-RMS noise performance. Low noise and high pixel full-well with 16-bit digitization provides large dynamic range performance.

Multi-port readout: Up to 16 outputs are supported.

Sensors available: The 1100 is designed to accommodate multi-port (>4 ports) CCD which includes the 10k x 10k 16-port 9µm pixel sensor from STA and the 9k x 9k 10µm pixel CCD from e2v.

Binned imaging: Serial and parallel binding, for reduced area and high speed is provided.

Shutter: The camera incorporates an internal flexible shutter drive that can be used with a variety of common shutters. Outputs are also available that can signal an external shutter driver.

Trigger: Dual trigger inputs can be configured for a variety of operations, such as expose and read on trigger or shift line and read for externally paced TDI readout.

Fiber optic communication: Fiber optic cable to a computer through a proprietary PCI or PCIe card is provided.

Software: Included with every camera is our SI Image software suite for camera control, data manipulation and archiving. The native file format is FITS. C++ and LabView SDKs are available upon request.

SI's 1110S camera is designed to accommodate the very large area multi-port single-chip CCD sensors coming onto the market today. The 100+ megapixel CCDs require a camera capable of utilizing the 16 output ports in a cryo cooled dewar so the requirements of the most demanding scientific applications can be exceeded. It provides device-limit performance in a very compact configuration.
**Camera Details**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryo cooling</td>
<td>One compressor housed in supplied cabinet with braided stainless steel lines running to camera head, up to 100’</td>
</tr>
<tr>
<td>Window details</td>
<td>Many AR coatings are available by custom order. Typical Broadband specs: &lt;1% Reflectivity per surface, 450-800nm</td>
</tr>
<tr>
<td>CCD to mounting surface</td>
<td>~20mm, depends on CCD and options</td>
</tr>
<tr>
<td>Read speeds</td>
<td>Software selectable, customizable</td>
</tr>
<tr>
<td>Camera weight</td>
<td>About 25lbs, depending on options</td>
</tr>
<tr>
<td>Read ports</td>
<td>16 max, 8 minimum depending on CCD</td>
</tr>
<tr>
<td>Shutters</td>
<td>Camera can trigger a shutter controller</td>
</tr>
</tbody>
</table>

**Cabinet Details**

- **TOP VIEW**
- **FRONT VIEW**

All camera specifications are subject to change. Contact SI for details on configuring a camera specific to your application.
1110S CCD Camera

Shutterless Optical 1110S

Customer Mounting Holes:

M6X1.0 - 6H THRU ALL
8 PL EQ SP ON 203.20[8.000] BC

215.90 8.500
162.00 6.378

22.5°

95.22 3.749
239.10 9.413
304.83 12.001

15.00 .591
9.40 .370
33.30 1.311

AA

STA1600 Image Plane
Window
Vacuum Chamber
Backplate
Electronics Enclosure

176.00 6.929
182.00 7.165
0 .000
95.22 3.749
239.10 9.413
304.83 12.001
33.66 1.325
40.01 1.575
15.00 .591
9.40 .370
33.30 1.311

Computer Data Link
Trigger
Shutter
Cryo Cooling Lines
Camera Power

Vacuum Port

Customer Mounting Holes:

M6X1.0 - 6H 8.00[.315]
16 PL EQ SP ON 205.00[8.071] BC

11.25°

VIEW A-A
SCALE 1 : 3

Camera Power
Vacuum Port

Shutter

Software selectable, customizable

Read speeds

About 25lbs, depending on options

Read ports

16 max, 8 minimum depending on CCD

Shutters

Camera can trigger a shutter controller

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Astronomy: The demanding requirements of Astronomical observations, high sensitivity, low read noise, low dark current are all satisfied by the performance of an 1110S camera. Astronomers around the world have utilized SI’s renowned skills to exceed the imaging requirements of their applications.

Refer to the CCD manufacturer’s website for updated QE data, but just a small example of the different backside AR coatings available from two potential manufacturers is shown below:

- **Normal QE at -100°C, Standard silicon devices**
- **SN9441 QE -100°C in PEPSI Dewar**

**Typical Camera Performance With An e2v 9k CCD**
- Typical read noise 100kHz: 3.5e-
- Typical read noise 1MHz: 9.8e-
- Typical dark current -100°C: 0.001e-/pixel/sec
- Non-linearity: <1%, 200e- to 100ke-
- CCD size: Approximately 90 x 90mm
- CCD pixel size: 10.0 µm
- CCD pixel dimension: 9k x 9k
- AR coatings available: e2v standard coatings

**Typical Camera Performance With An STA 1600 CCD**
- Typical read noise 100kHz: 4.5e-
- Typical read noise 800kHz: 9.8e-
- Dark Current: 0.001e-/pixel/sec
- Non-linearity: <1%, 200e- to 100ke-
- CCD size: 95.04mm x 95.04mm
- CCD pixel size: 9.0 µm
- CCD pixel dimension: 10560 x 10560
- AR coatings available: Blue and Broadband