

Cooled CCD Camera Data Sheets

Princeton Instruments has the broadest line of cooled CCD cameras of any manufacturer in the world. Rather than attempt to address every imaging application with one or two camera models, Princeton Instruments offers over 35 different cameras for imaging applications, not including variations such as UV coating or MPP operation.

Cooling and Vacuum

All Princeton Instruments unintensified CCD cameras are cooled for optimal performance. Two methods of cooling are available: thermoelectric, models TE/CCD, TEA/CCD, RTE/CCD, and PentaMAX, or liquid nitrogen cooling, model LN/CCD.

Princeton Instruments TE/CCD, TEA/CCD, RTE/CCD, and PentaMAX cameras use a four-stage peltier device to cool the CCD. To prevent condensation and contamination from occurring, these cameras can either be evacuated or nitrogen backfilled. As indicated by the following pages (values given for TE/CCD and TEA/CCD cameras only), cameras under vacuum reach lower temperatures, while nitrogen backfilled detectors are relatively maintenance free.

There are three means of dispersing the heat of the peltier: passive air, forced air, or circulating coolant. The following pages give values for air circulation, available only on TEA/CCD, RTE/CCD, and PentaMAX cameras, and tap water/chilled coolant

circulation, available on all TE/CCD and TEA/CCD models. Chilled coolant must be provided by a closed circulator, available from companies such as Neslab. The RTE/CCD model also offers passive cooling.

Princeton Instruments LN/CCD cameras use liquid nitrogen to cool the CCD. Several types of dewars are available, including large capacity (1.5 liters) and all-directional (for operation in any orientation). Because of the extremely low operating temperatures, these cameras should only be operated under vacuum.

CCD Blemish Defects

CCDs are generally available in several cosmetic grades, as specified by the manufacturer. For every system, Princeton Instruments independently confirms that the CCD meets or exceeds these specifications. In many cases, Princeton Instruments offers cameras with superior performance (fewer or no defects). Contact the factory or your sales representative for information on a specific array.

Window Specifications

All Princeton Instruments camera windows are required to meet strict specifications. For applications involving highly collimated light or coherent radiation, special grade windows may be required. See page 122 for more detailed window specifications. Coated windows are also available to further optimize performance.



The model TEA/CCD cooled camera.

Individual Specifications

The following pages are specifications for individual Princeton Instruments imaging cameras. PentaMAX, Small Cooled (model RTE/CCD), rectangular format, and line scan cameras are described in the sections discussing these specialized cameras.

Some cameras are available with or without MPP, as discussed in *Selection of CCD Arrays*. This feature affects dark charge. Readout noise, another important but confusing camera specification is given as values for total readout noise RMS. Peak-to-peak values are generally 5 times higher.

All of these cameras are operated by Princeton Instruments universal controllers with interfaces to various computers.

These cameras represent the state-of-the-art of CCD camera technology. As such, the information on the following pages is subject to change without notice. Please contact your sales representative for the most current information.



Two dewar options for the model LN/CCD camera.