Progressive Scan Interline Transfer CCD Camera with Digital Output

6612-3000 MODEL

The Cohu Model 6612-3000 Digital Progressive Scan camera enables the user to acquire full frame images of dynamic objects with the noise rejection characteristics of differential LVDS 10-bit digital output and no pixel jitter. The 6612-3000 is designed to be used with external image capture devices and is ideal for use in high-speed “stop action” applications. Progressive scan technology eliminates motion artifacts or smearing of moving objects and provides the full vertical resolution lacking in standard RS-170 video formats. The 1/2” format interline transfer sensor technology, with an array size of 659 (H) X 494 (V), provides excellent sensitivity with low noise.

The Cohu 6612-3000 camera will operate via internal clock or can be configured to accept timing from an external device. The camera provides both analog and digital output. Progressive scan mode will support 30 frames per second from either a single analog BNC connector or 10 bits of digital output from the digital connector. The interlaced mode will enable capture of 60 frames per second via either the dual BNC connectors or 20 bits of digital output from the digital connector. Selection of operating mode, shuttering speed, asynchronous reset triggers, and gain can be controlled through the auxiliary connector or via internal switches. The camera enables single image “snapshot” of events immediately after application of trigger pulse at a maximum of 60 trigger pulses per second.

Analog RS-170 and/or 10-bit digital signals are supported as standard outputs. Analog video output is useful for quick setup of the camera while the Low Voltage Differential Signal (LVDS) output is used to supply frame grabbers with jitter-free input for applications that require extreme precision and accuracy.

The 6612-3000 offers progressive scan capabilities and digital output, making it ideal for applications requiring precise imaging of a fast moving subject.

APPLICATIONS AND FEATURES

Particle Image Velocimetry
High performance specifications and flexible configurations enable high frame rates and accuracy for fluids experiment solutions.

Laser Measurement
In “snap shot mode,” its full frame resolution at fast shutter speeds improves beam measurements.

Machine Vision
60 fps high resolution video output increases system productivity and reduces cost. Asynchronous shuttering supports wide range of in-line inspection systems.

Sub Pixel Interpolation
The CCD imager provides for stable calibration of instruments.

X-Ray Imaging
Full-frame blur-free image with square pixels improves measurement accuracy at twice the speed of RS-170A cameras.

Designed and manufactured in the U.S.A.

COHU
Cohu, Inc. / Electronics Division

ISO-9001 Certified

Operating Modes of the Cohu Model 6612-3000 Camera

The Cohu Model 6612-3000 Progressive Scan camera is designed to be used with an external image capture device (frame grabber) to capture dynamic events. Its various operating modes can be controlled by internal switches or externally through the auxiliary connector. Digital data is provided with 10 bits for up to 30 frames per second (fps) or with 20 bits for up to 60 fps. Analog RS-170 or progressive scan output formats are supported at 30 fps via a single BNC connector, or at 60 fps using dual BNC connectors. Fast shuttering eliminates a strobe light in many applications. The asynchronous reset trigger will immediately acquire a full frame of video. External integration allows direct control over sensor exposure time. Pixel clock output can be added if desired. Request the Cohu frame grabber compatibility reference sheet from your representative or from the technical notes page at www.cohu.com/cctv.

Continuous Operation The camera operates in a traditional CCD camera mode. It uses the internal clock to support all shutter and long-term integration capabilities in progressive scan or interlace modes.

- Crystal or phase lock loop (PLL) This operation allows the camera to genlock to standard RS-170 sync sources
- Programmable high speed shutter, up to 1/10,000 second, and low speed shutter integration up to 16 frames

Snap Shot Operation This mode captures clear images of fast moving subjects.

- Capture initiated with external asynchronous TTL triggers
- Supports all high speed and low speed shutter settings

External Integration Extend the sensor exposure, from 16 ms to several minutes, for low light level applications.

- Allows direct low speed shutter control using an external pulse (duration of pulse determines exposure time)

Video Control Mode and gain settings are controlled either internally with switches and potentiometers or externally through the auxiliary connector.

- Video rates of 30 fps (one BNC connector or 10 bits from the digital connector) or 60 fps (two BNC connectors or 20 bits from the digital connector.)
- Video amplifier gain (up to 28 dB) and channel balance control
- Individual channel gamma control (0.45 to 1)
- Individual channel sharpness control
- Manual or automatic gain control
- Auto iris or DC iris lens control (for use with automatic lenses)

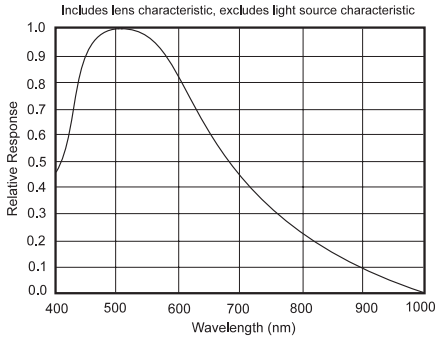
Shutter and Integration Modes of the Cohu Model 6612-3000 Camera

- **No Shutter:** The sensor integrates over the full vertical interval (1/30 second in single channel mode or 1/60 second in dual channel mode).
- **Flickerless:** When using 50 Hz fluorescent lighting, this 1/100-second shutter guarantees exposure to only one fluorescent light cycle.
- **Programmable Shutter:** There are nine settings ranging from one frame to 16 frames.
- **Programmable Integration:** There are eight settings ranging from two fields to 16 fields.
- **External Integration:** Using an external pulse, the integration interval can be set to the desired integration level.

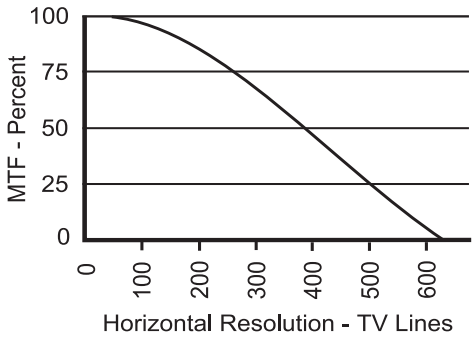
Specifications

Imager	Monochrome, 1/2" format, interline transfer square pixel array
Format	Selectable; interlaced, (RS-170 1 Vp-p) or non-interlaced at 60 frames per second through two connectors, (1 Vp-p), or non-interlaced at 30 frames per second through one connector, (1 Vp-p) LVDS digital video through one D connector; 10-bit parallel data with horizontal, vertical, composite sync, and pixel clock.
Pixel Array	659 (H) X 494 (V)
Pixel Rate	12.2727 MHz
Cell Size	9.9 µm x 9.9 µm
Sync	Internal crystal, external H&V and async reset. Async reset triggers output of one frame of data at exposure set by shutter controls followed by blanked output with H sync. Stability: <20 ns; Jitter: <25 ns.
Sensitivity	3200K faceplate illumination. Full video, no AGC: 4 lux; 80% video, AGC on: 0.15 lux
Gain	AGC/Manual adjustable up to 28 dB. Internal, external, or remote via aux. connector Each channel can be balanced to provide equal gain.
S/N Ratio	Greater than 56 dB (gain 0 dB, gamma 1, in a 0-6 MHz bandwidth)
Gamma	Adjustable .45 to 1.0
Sharpness	Selectable from minimum to maximum, affects both analog and digital
Integration	Switch or external selectable 8-step shutter, (1/60 sec. to 1 /l 0,000). External control of shutter mode, shutter speed, H&V, async reset and integration through the Aux. connector
Output	20 bit, low voltage differential signal (LVDS), 10 bits each channel
Lens Mount	C/CS
Lens Drive	Switch selectable auto iris drive (video), or DC iris drive. (DC level)
Weight	11 oz. (320 g) without lens
Power	12 VDC
Mount	1/4-20 female thread, top and bottom of housing in line with optical axis.
Humidity	Up to 95% relative humidity (non-condensing)
Vibration	Per Mil-STD-810 (E) Method 514.4. Categories 1, 8, and 10 (less lens)
Reliability	MTBF: 20,000 hours (less lens)
Shock	No damage to 30 g, 11 ms duration (less lens).
Altitude	Sea level to 10,000 ft./3,000 meters (508 mm/20" Hg.)
Temperature	-4°F to 158°F (-20°C to 70°C)
Approvals	FCC class "A"; CE EN55022, 50081-1, EN50082-1
Output Cable	40'/12m maximum length typical with CAT3 cable; up to 200'/60m typical with CAT5

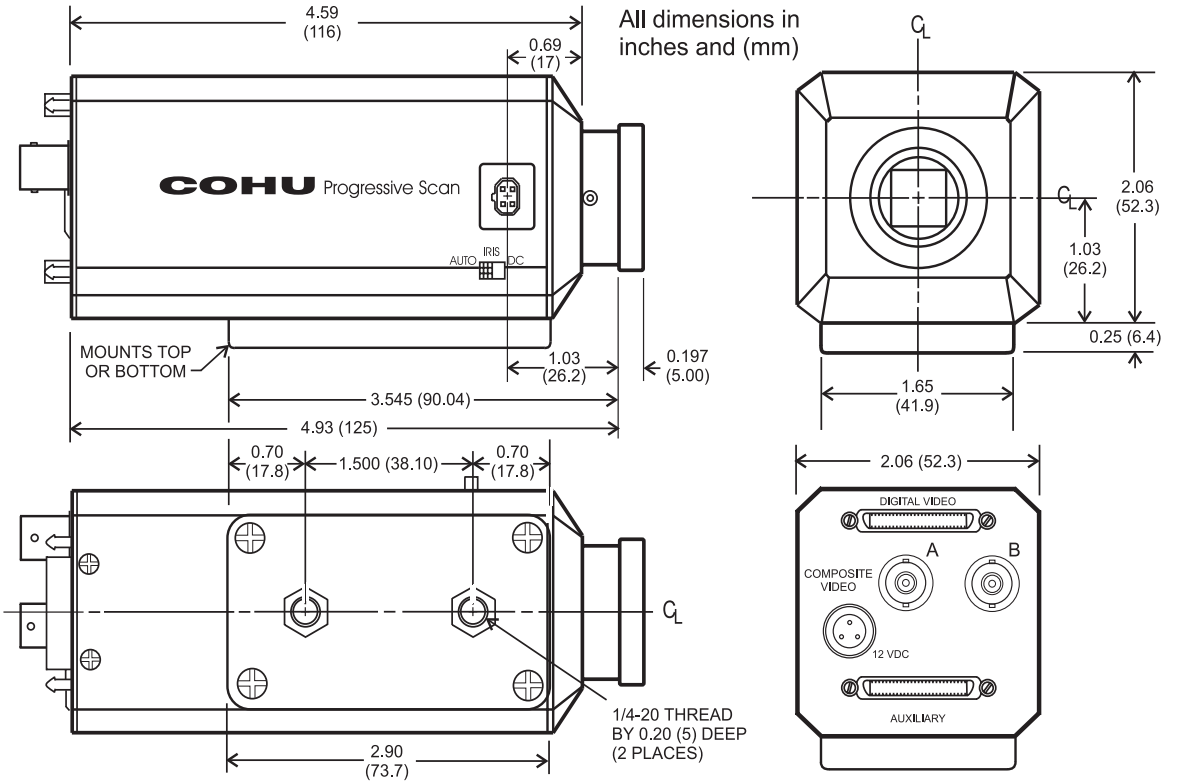
Spectral Response



Modulation Transfer Function



DIMENSIONS



Ordering Information

6612-3000/0000 Monochrome progressive scan camera, digital output. Includes auxialliary connector, power connector, and auto-iris lens connector.

Accessories

8385-5 115 VAC to 12 VDC power supply

ER 3774 System integration cable, 7 ft (2.1 m)

Lenses This camera is designed to support a wide variety of lenses. Contact your Cohu representative for a complete list.

"Equipment manufactured by Cohu does not use any real-time processing that is related to any calendar. Therefore, you will not have a Year 2000 problem with any Cohu camera or control system component, regardless of model number or date of purchase."

Cohu reserves the right to change specifications without notice.

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6612-3000 (3/99) Printed in USA