

PULNiX

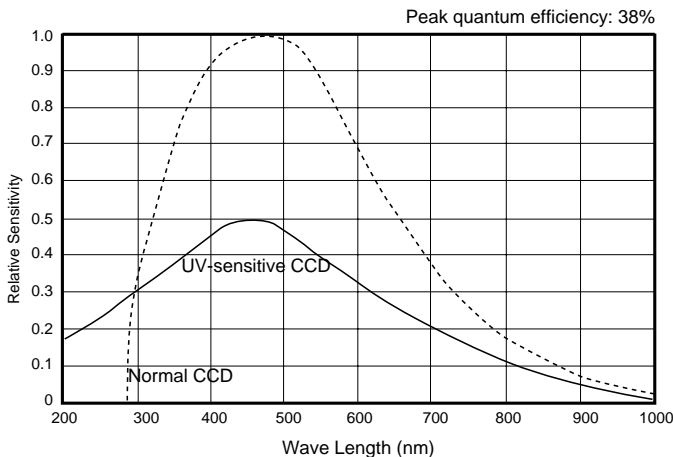
OP2I-UV



General Description

PULNiX's UV-sensitive TM-series cameras are designed to eliminate the need for UV-blocking materials such as glass, or organic or plastic film and coating. These cameras use high-resolution monochrome progressive scan CCDs. The interline-type progressive scan CCD permits full vertical and horizontal resolution of very high-speed shutter images. The electronic shutter, which has speeds to 1/16,000 sec or 1/32,000 sec., can be reset asynchronously by external pulse control. The frame rate is 15 fps (TM-1001, TM-1010, TM-1020-15), 30 fps (TM-9701, TM-1020-30), 60 fps (TM-6703), and 120 fps (TM-6710). A square imager format with uniform square pixels provides superior image definition in any orientation (except TM-9701). The TM-1001, TM-1010, TM-1020-30, and TM-9701 have their own built-in frame stores that capture and output full-frame images in real time. The digital cameras have an 8-bit or 10-bit (TM-1010, TM-1020-30) RS-422/644 digital signal output for interfacing with external image-processing systems. The TM-1020-15CL and TM-1020-30CL have Camera Link output and works with other Camera Link equipment. Applications for UV-sensitive cameras include laser inspection and analysis, UV microscopy, surface inspection, flame analysis, and fluoroscopy.

Spectral Response



*UV spectral response is estimate of silicon characteristics

Integration

The CCD imagers of the UV-sensitive progressive scan cameras can be exposed for longer than the normal scan timing of one frame period (1/15 sec for TM-1001/1010/TM-1020, 1/30 sec for TM-9701/TM-1040, 1/60 sec for TM-6703, 1/120 sec for TM-6710). This integration feature provides extra sensitivity for dark-environment applications. The progressive scan imager permits a full frame of resolution in non-interlace format. Integration is achieved by controlling the

Product Summary

- Very high resolution 1" progressive scanning 1024(H) x 1024(V) interline transfer CCD imager to 1/2" VGA (640 x 480) imager
- Direct silicon spectral response in UV range
- Various frame rate from 15 to 120 frames per second
- Full-frame shutter ranging from 1/16,000 sec. to long integration
- Asynchronous reset with external shutter control
- Frame memory built-in for asynchronous image capturing and full-frame integration with uninterrupted video (TM-1001, TM-1010, TM-9701)
- No Microlens, Lumigen, or other material subject to UV deterioration

#11 pin of the 12-pin connector to low (GND). The internal frame memory (not available in the TM-6700 series or the TM-1020-15) provides continuous video output without a frame grabber.

Asynchronous Reset

The UV-sensitive progressive scan camera's asynchronous reset is flexible and accepts external horizontal drive (HD) for phase locking. When the VINIT pulse is applied, it resets the camera's scanning and purging of the CCD. There are three modes to control the asynchronous reset and shutter speed:

- 1. External VINIT with pulse width.** The duration between pulse edges controls the shutter speed externally.
- 2. Internal shutter speed with Fast mode.** The video signal has no delay from the reset timing (shutter speed range is 1/2,000 to 1/16,000 sec.).
- 3. Internal shutter speed with Slow mode.** The speed control varies from 1/125 to 1/1,000 sec. The video signal starts with internal V reset timing related to shutter speed. The built-in frame memory maintains the asynchronously captured full-frame image until the next VINIT pulse comes in. The output can be either 1/15 sec. or 1/30 sec. of progressive scanning. This camera is available in both analog non-interlace format (1Vp-p, 75) and 8-bit digital format (RS-422).

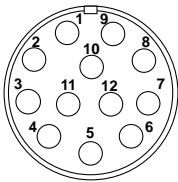
OP2I-UV - UV-Sensitivity

UV-Sensitivity for Progressive Scan CCD Cameras

SPECIFICATIONS

MODEL	PIXELS	IMAGER	FPS	MEMORY	DIGITAL	DIMENSIONS	COMMENTS
TM-6703	640x x484	1/2"	60	no	no	47 x 40 x 141	Partial scan to 200 fps
TM-6710	640 x 484	1/2"	60/120	no	yes	47 x 40 x 141	Partial scan to 350 fps
TM-1400	1392 x 1040	1/2"	15/30	no	no	44 x 44 x 64	Good for microscopy
TM-9701	768 x 494	2/3"	30	yes	yes	44 x 49 x 136	RS-170 converted output & memory
TM-1001	1008 x 1018	1"	15	yes	yes	44 x 48 x 136	1K digital w/Frame Memory
TM-1010	1008 x 1018	1"	15	yes	yes	52 x 68 x 152	10 Bit digital output
TM-1040	1008 x 1018	1"	30	yes	yes	52 x 68 x 174	RS-170 scan conversion
TM-1020-15	1008 x 1018	1"	15	no	no	44 x 44 x 64	1" format for good dynamic range, built-in LUT

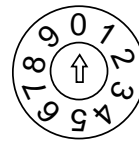
Typical Pin Configurations (Please refer to the individual data sheets for more detailed information and accuracy)



12-Pin Connector

- | | |
|---------|--------------|
| 1 GND | 7 VD in |
| 2 +12V | 8 GND |
| 3 GND | 9 HD in |
| 4 Video | 10 GND |
| 5 GND | 11 Int. cont |
| 6 VINIT | 12 GND |

SHUTTER



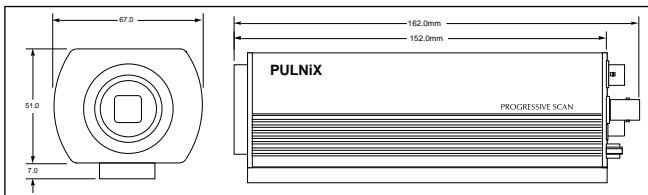
Typical shutter speeds for TM-6703

Shutter Control Switch

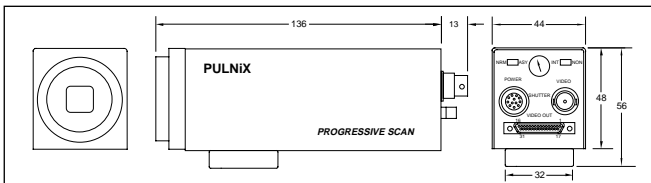
- | | Manual | Async |
|---|------------|------------------|
| 0 | no shutter | no shutter |
| 1 | 1/60 | 1/16,000 |
| 2 | 1/125 | 1/8,000 |
| 3 | 1/250 | 1/4,000 |
| 4 | 1/500 | 1/2,000 |
| 5 | 1/1,000 | 1/1,000 |
| 6 | 1/2,000 | 1/500 |
| 7 | 1/4,000 | 1/250 |
| 8 | 1/8,000 | 1/125 |
| 9 | 1/16,000 | Ext. pulse width |

OP21-UV

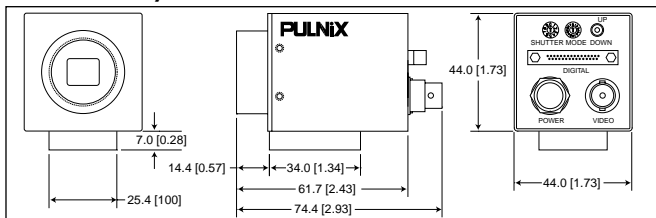
TM-1010/TM-1040



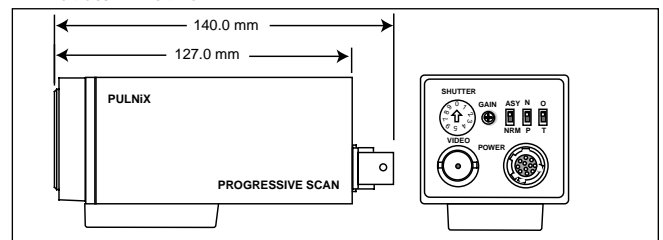
TM-9701



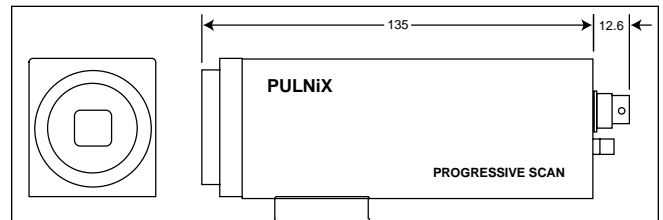
TM-1020 family



TM-6703/TM-6710



TM-1001



PULNiX

Innovation at work!

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