

TM-1001UV, TM-1010UV, TM-9701UV, TM-6710UV, TM-6703UV UV-Sensitive Progressive-Scan CCD Cameras



*Picture shows a normal lens and not UV optics

NEW 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 to 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 UV deterioration material (Microlens or Lumigen)

STANDARD CAMERA FUNCTIONS 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, 1/30 sec for TM-9701, 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 #11 pin of the 12-pin connector to low (GND). The internal frame memory (not available in the TM-6700 series) 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, 75Ω) and 8-bit digital format (RS-422).

OTHER CAMERA MODELS

The same CCD can be used in other camera models such as the TM-1020, TM-6702, TM-1040. Please contact PULNiX for availability.

GENERAL DESCRIPTION

The PULNiX UV-sensitive TM-series cameras use high-resolution monochrome progressive-scan CCDs. These cameras are designed to eliminate the need for UV-blocking materials such as glass, or organic or plastic film and coating.

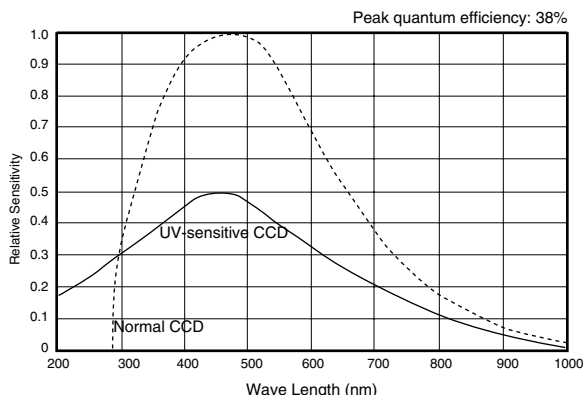
The interline-type progressive-scan CCD permits full vertical and horizontal resolution of very high speed shutter images. The electronic shutter, which has speeds to 1/16,000 sec or 1/32,000 sec., can be reset asynchronously by external pulse control.

The frame rate is 15 fps (TM-1001, TM-1010), 30 fps (TM-9701), 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 and TM-9701 have their own built-in frame stores which capture and output full-frame images in real time.

The digital cameras have an 8-bit or 10-bit (TM-1010) RS-422/644 digital signal output for interfacing with external image-processing systems. Special interface cables are available for connecting the digital output directly to many existing commercial frame grabbers. Applications for the UV-sensitive cameras include laser inspection and analysis, UV microscopy, surface inspection, flame analysis, and fluoroscopy.

SPECTRAL RESPONSE

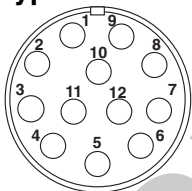


*UV spectral response is estimate of silicon characteristics

PRODUCT SPECIFICATIONS

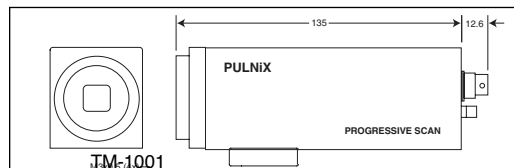
	TM-1001, TM-1010	TM-9701	TM-6703, TM-6710
Imager	1" progressive scan interline transfer CCD	2/3" progressive scan Interline transfer CCD	1/2" progressive scan Interline transfer CCD
Pixel	1024 (H) x 1024 (V)	768 (H) x 484 (V)	648 (H) x 484 (V)
Cell size	9.0 μm x 9.0 μm	11.6 μm x 13.6 μm	9.0 μm x 9.0 μm
Scanning	1050 lines; 15 Hz	525 lines; 30 Hz	525 lines; 60 / 120 Hz
Sync	Internal/external auto switch HD/VD, 4.0 Vp-p impedance 4.7K Ω VD=15 Hz \pm 5%, non-interlace HD=15.75kHz \pm 5%	Internal/external auto switch HD/VD; 4.0 Vp-p, 4.7 K Ω VD = interlace/ non-interlace HD = 15.734 KHz \pm 5%	Internal/external auto switch HD/VD; 4.0 Vp-p, 4.7 K Ω VD = 60 / 120Hz HD = 31.5 KHz / 30.49KHz
Data clock output	20.034 MHz (40.068 MHz for DSP)	14.31818 MHz	25.49 or 50.98 MHz
Resolution	Digital: 1008 (H) x 1018 (V), Analog: over 700 (H) x 800 TV lines (V)	Digital: 768 (H) x 480 (V) Analog:570(H) x 484(V) TV lines	Analog:500(H) x 484(V) TV lines
S/N ratio	50dB min. (AGC = off)	50 dB min. (AGC = off)	50 dB min. (AGC = off)
Min. illumination	3.0 lux, f=1.4 Sensitivity: 3 $\mu\text{V}/\text{e-}$	3.0 lux, f=1.4 Sensitivity: 3 $\mu\text{V}/\text{e-}$	6.0 lux, f=1.4 Sensitivity: 3 $\mu\text{V}/\text{e-}$
Video output	1.0 Vp-p composite video, 75 Ω and 8-bit (10-bit, TM-1010) RS-422 output	1.0 Vp-p composite video 8-bit RS-422 output	1.0 Vp-p composite video 16-bit RS-644 (TM-6710)
AGC	ON*/OFF (OFF std.) *AGC is applicable on analog output only	ON*/OFF (OFF std.) *AGC is applicable on analog output only	ON*/OFF (OFF std.)
Gamma	0.45 or 1.0 (1.0 std.)	0.45 or 1.0 (1.0 std.)	0.45 or 1.0 (1.0 std.)
Lens	C-mount (use 1" format lenses) Adjustable Back Focus	C-mount Adjustable Back Focus	C-mount Adjustable Back Focus
Power req.	12V DC, 500 mA	12V DC, 500 mA	12V DC, 500 mA
Operating temp.	-10°C to 50°C*	-10°C to 50°C*	-10°C to 50°C*
Vibration & shock	Random Vibration: 7G (200 Hz to 2000 Hz) Shock: 70G	Random Vibration: 7G (200 Hz to 2000 Hz) Shock: 70G	Vibration: 7G (200 Hz to 2000 Hz), Shock: 70G
Size (W x H x L)	44mm x 48mm x 136mm (1.73" x 1.91" x 5.35")	44mm x 48mm x 136mm	46mm x 39mm x 140mm
Weight	330 grams (11.6 oz)	323 grams (11.4oz)	240 grams (9.0oz)
Power cable	12P-02	12P-02	12P-02
Power supply	PD-12P (includes power connector)	PD-12P	PD-12P
Auto iris connector	None	None	None
Functional options	See price list for current listings.	See price list for current listings.	See price list for the listings.
I/O	MP-211-031-113-4300 31-pin mating connector; 30DG-02,	MP-211-031-113-4300 31-pin mating connector; 30DG-02,	BNC 50DG-02 (TM-6710)

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

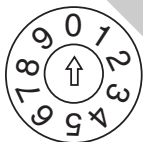


12-Pin Connector

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

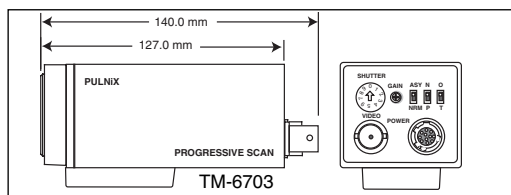


SHUTTER



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



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