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Find the *Sony XC-77CE* at our website: ***Click HERE***

XC-77 (EIA), XC-77CE (CCIR)

Monochrome machine vision video camera modules.

1. Outline

The XC-77/77CE is a monochrome video camera module designed for the industrial market. The camera is equipped with 2/3-inch IT CCD and provides a high resolution video signal according to EIA (60 field)/CCIR (50 field) standard. Camera XC-77 works in accordance with EIA, the XC-77CE with CCIR video norm.

- Square pixels, 11×11 µm (XC-77CE only)
- High resolution: 768×493 (EIA), 756×581 (CCIR)
- High sensitivity: 400 lux F4 (min 3 lux F1.4)
- High S/N ratio (>50 dB)
- Frame and field integration
- Restart Reset function
- Compact, lightweight: 44×29×107 mm, 190 g

2. Main features

Internal/External synchronization

Except the internal sync (provided by internal electronics), the camera can accept external sync information as well. Three types of sync signals are possible:

HD/VD (horizontal drive/vertical drive) signals
: The camera determines whether to operate in interlaced or noninterlaced modes from the phase relation between HD and VD (see Scanning system).

VBS (composite video signal)
: The camera is synchronized by supplying a composite video signal (for example from another image sensor).

SYNC (composite sync signal)
: Synchronization is performed by means of composite sync input signal.

The unit switches automatically between all sync types mentioned above. If no sync signal is input, it operates with internal sync and 2:1 interlace mode.

Restart Reset function

The Restart Reset function enables to start new image integration at any time (specified by external trigger pulse). While HD signal must be supplied all the time, V reset pulses are generated from the trigger signal. Meaningful video signal (being stored after the trigger) is output since the second (in the field integration mode) or the third (in the frame integration mode) field.

The other kind of the restart reset function (which requires further internal setting in the camera) assures the slow speed shutter operation. The image data, integrated

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since the first reset input signal, is taken out as video signal after the second reset. This is used for capturing dark objects.

Scanning system (interlaced/noninterlaced)

The camera can operate either in interlaced or noninterlaced mode (depending on phase relation between HD and VD pulses).

Interlace mode
: Full frame image is split into two fields: odd (lines 1-3-5...) and even (2-4-6...). It enables higher image resolution, but two steps (2 · 1/60 = 1/30 sec for EIA or 2 · 1/50 = 1/25 sec for CCIR) are necessary to read out full frame data. Period of VD signal is V = (A + 1/2)H in this mode, A is an integer.

Noninterlace mode
: The camera reads just the odd lines (1-3-5...). That's why full frame data is output every 1/60 or 1/50 sec, however the resolution is half when compared to the interlace mode. Period of VD signal is V = (A)H, A is an integer.

Integration modes

The charge accumulated in the CCD can be presented as output on two different ways.

Field integration mode
: The data of any line in the output is a result of mixture of two adjacent lines - in the odd field charge from lines 1 and 2 is mixed and output as line 1, data from lines 3 and 4 becomes line number 3 in output and so on (in the even field lines 2 and 3 are mixed and read out as line 2). This method minimizes motion blur when shooting a moving target. The disadvantage lies in lower vertical resolution.

Frame integration mode
: The data for every output line is read out from a single line in the CCD chip. This results in a higher vertical resolution, however when shooting fast moving objects the two fields (odd and even) of an image are shifted each other and the image quality is degraded.

Note: The differences between field and frame integration were explained for the case of an interlaced image scanning. The situation is similar for noninterlaced images.

Square pixels

The XC-77CE (not XC-77) employs a square pixel CCD (cell size 11×11 µm). The square pixels are needed in image processing systems and accurate measuring tasks, because the aspect ratio (the ratio width/height of an image) doesn't require adjustment. Picture elements are equally arrayed in both directions, and allow easy addressing. In case of rectangular pixels one have to maintain the aspect ratio when measuring objects, because the dimensions of stored frame aren't equal to true dimensions; resolutions along *x* and *y* axis aren't the same.

Output

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Video signal (1.0 Vp-p/75 ohm), generated by the camera electronics, can be output to one of two available connectors - either to a BNC connector or to a special 12-pin multiconnector. Using this 12-pin connector, internal sync signals of the camera (pixel clock, HD and field index/VD) can be output as well.

The third connector of the camera allows to connect and automatically adjust an auto iris lens.

3. Comprehensive specifications

Note: The following table tries to describe all known features and parameters of the camera. When a times mark (×) is filled in a cell, it means that the camera doesn't employ accordant feature or specifying such parameter doesn't make any sense for this camera type.

	SONY XC-77	SONY XC-77CE
Signal system		
Video norm	EIA (60 field)	CCIR (50 field)
Color coding	×	×
Scanning frequency (field)	59.94 Hz	50 Hz
Scanning frequency (vertical)	15.734 kHz	15.625 kHz
Scanning frequency (horizontal)	14.31818 MHz	14.1875 MHz
Sensor		
Pickup device	2/3-inch IT CCD	2/3-inch IT CCD
Total picture elements		
Effective picture elements	768×493	756×581
Elements in video out	756×485	739×575
Cell size	11.0×13.0 µm	11.0×11.0 µm
Sensing area	8.8×6.6 mm	8.8×6.6 mm
Chip dimensions	10.0×8.2 mm	10.0×9.3 mm
Optical black (H)	50 pixels	60 pixels
Optical black (V)		
Dummy bits (H)	22 pixels	22 pixels
Dummy bits (V)		
Operating modes		
Output modes	2:1 interlaced, noninterlaced	2:1 interlaced, noninterlaced
Scan. system 2:1 interlaced	525 lines, 2 fields	625 lines, 2 fields

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Scan. system noninterlaced	244 to 1023 lines, 1 frame	289 to 1023 lines, 1 frame
Charge accumulation	field - frame	field - frame
Serial control interface	×	×
Timing		
Shutter types	none	none
Normal shutter	×	×
Special shutter	×	×
Donpisha	×	×
Low speed shutter	×	×
High speed shutter	×	×
Trigger shutter	×	×
Synchronization	internal - external	internal - external
External sync system	HD/VD, VBS, SYNC	HD/VD, VBS, SYNC
Restart/Reset	2 modes	2 modes
Optical parameters		
Sensitivity	400 lux F4 (3200 K, with IR filter)	400 lux F4 (3200 K, with IR filter)
Minimum illumination	3 lux F1.4 (AGC = ON, with IR filter) 0.5 lux (without IR filter)	3 lux F1.4 (AGC = ON, with IR filter) 0.5 lux (without IR filter)
Signal/noise	better than 50 dB	better than 50 dB
Technical specifications		
General		
Video output	1.0 Vp-p sync negative, 75 ohm, unbalanced	1.0 Vp-p sync negative, 75 ohm, unbalanced
Dimensions	44×29×107 mm	44×29×107 mm
Weight	190 g	190 g
Power consumption	2.2 W	2.2 W
Lens mount	C-mount	C-mount
Flange back length	17.526 mm	17.526 mm
Connectors	BNC for video out, 12-pin for video out, sync i/o, power in, 4-pin lens connector	BNC for video out, 12-pin for video out, sync i/o, power in, 4-pin lens connector
In/Out requirements		
Power	DC12 V ±10 %	DC12 V ±10 %

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Power voltage tolerance	10.5 to 15.0 V	10.5 to 15.0 V
External sync allowable frequency	±1 %	±1 %
External sync in	HD/VD (4.0 Vp-p), VBS or SYNC (0.3 Vp-p), 75 ohm	HD/VD (4.0 Vp-p), VBS or SYNC (0.3 Vp-p), 75 ohm
Internal sync out		
Trigger in	×	×
Trigger in duration	×	×
Environment		
Vibrations resistance	7 g (11 to 200 Hz)	7 g (11 to 200 Hz)
Shock resistance	70 g	70 g
Temperature of guaranteed performance	0 to 40 °C	0 to 40 °C
Operating temperature	-5 to 50 °C	-5 to 50 °C
Operating humidity	30 to 70 %	30 to 70 %
Storage temperature	-30 to 60 °C	-30 to 60 °C
Storage humidity	25 to 90 %	25 to 90 %
Controls and functions		
Gamma correction	ON - OFF	ON - OFF
Gain mode	auto - fix	auto - fix
Manual gain	×	×
Field invert	normal - inverse	normal - inverse

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