Datasheet *Preliminary*

Main Features

- **Sensor: 4 x 4096 pixels 10 x 10 µm**
- **Rows Spacing of Two Pixels (Centre to Centre)**
- **Boosted Response with Back Side Illumination**
- **Line Rate Up to 18 KHz**
- **Camera Link® Interface (Base or Medium)**
- **Mechanics: 70 x 76 x 54 mm³**
- **Automated Line Balance and Flat Field Correction**
- **Bidirectional Scanning**

Product Description

The ELiiXA 4S 4096 pixel camera is the ideal candidate for the most demanding applications requiring high responsivity detection. Using e2v's unique technology, the CCD sensor features unmatched performance: line rate up to 18 KHz, row spacing of two pixels center-to-center between the four lines, enhanced response with the back side illumination technology. The camera package is designed to increase efficiency and save cost at vision system level:

- **Easy Calibration (Automatic Tap balance and Flat Field Correction, Line Balance)**
- **Versatile Implementation (Trigger Modes, Output Modes, Bidirectional Scanning, Spatial Correction)**

Typical Applications

- **Web Inspection: Wood, Paper, Metallurgy**
- **Surface Inspection: Wafer, DVD/CDROM, Printed Circuit Board, Flat Panel Display**
- **OCR and Barcode Reading: Document Scanning, Checks Sorting, Data Archiving, Postal Sorting**

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1. Standard Conformity

The ELiiXA cameras have been tested using the following equipment:

- A shielded power supply cable
- A camera Link data transfer cable ref. 14B26-SZLB-500-OLC (3M)

e2v recommends using the same configuration to ensure the compliance with the following standards.

1.1 CE Conformity

The ELiiXA cameras comply with the requirements of the EMC (European) directive 89/336/CEE (EN 50081-2, EN 61000-6-2).

1.2 FCC Conformity

The ELiiXA cameras further comply with Part 15 of the FCC rules, which states that:

Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation

This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

1.3 RoHS Conformity

ELiiXA cameras comply with the requirements of the RoHS directive

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

2. Key Specifications

Table 2-1. Typical Performances

Sensor Characteristics	Value	Unit
Sensor Characteristics at Maximum Pixel Rate		
Resolution	4 x 4096	Pixels
pixel size (square)	10 x 10	µm
Spacing between rows	20 (center to center)	µm
Line length	40.96	mm
Max line rate	18	kHz
Radiometric Performance at Maximum Pixel Rate		
Bit depth	8, 10 or 12	Bits
Responsivity	136	LSB/(nJ/cm²)
Responsivity (four lines summation)	546	LSB/(nJ/cm²)
Response nonlinearity	±1	%
PRNU (not corrected)	< 10	%
Dynamic range	62	dB
Functionality (Programmable via Control Interface)		
Gain	Up to 25.4 dB	
Offset	-4096 to +4096 LSB	
Trigger Mode	Timed (free run) and triggered (Ext Trig, Ext ITC) modes	
Mechanical and Electrical Interface		
Size (w x h x l)	70 x 76 x 54	mm
Weight	470 (without mount)	g
Lens Mount	F, T2, M42 x 1 compliant with AViiVA® SM2 series	
Sensor alignment	±100	µm
Sensor flatness	±35	µm
Power supply	Single 12 to 24	V
Power dissipation	<15	W
Current consumption	Max 2A at the startup	A
General Features		
Operating temperature	0 to 65 (front face)	°C
Storage temperature	-40 to 70	-40 to 70
Regulatory	CE, FCC and RoHS compliant	

3. Camera Performances

3.1 Camera Characterization

Table 3-1. Camera Characterization

	Min Gain			Min Gain +10 dB			Min Gain +20 dB			Unit
	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Dark noise RMS		2.5	3,5		5			25		LSB
Dynamic Range	1170	1640		585	820		135	165		
FPN rms		1	2		2			7		LSB
FPN peak-to-peak		5			11			50		LSB
PRNU rms		0.2			0.3			0.8		%
PRNU peak-to-peak		3			4.5			7		%

Note: These figures in LSB are for a 12-bit format.

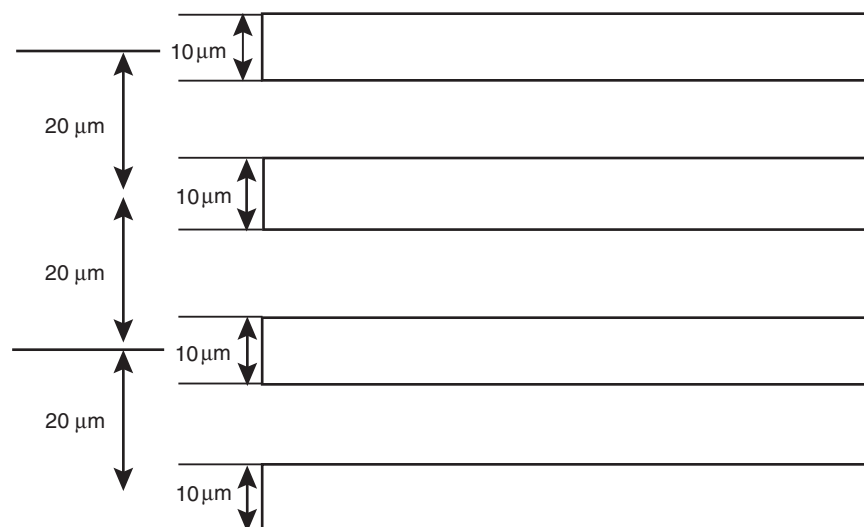### 3.2 Image Sensor

Figure 3-1.   Image Sensor

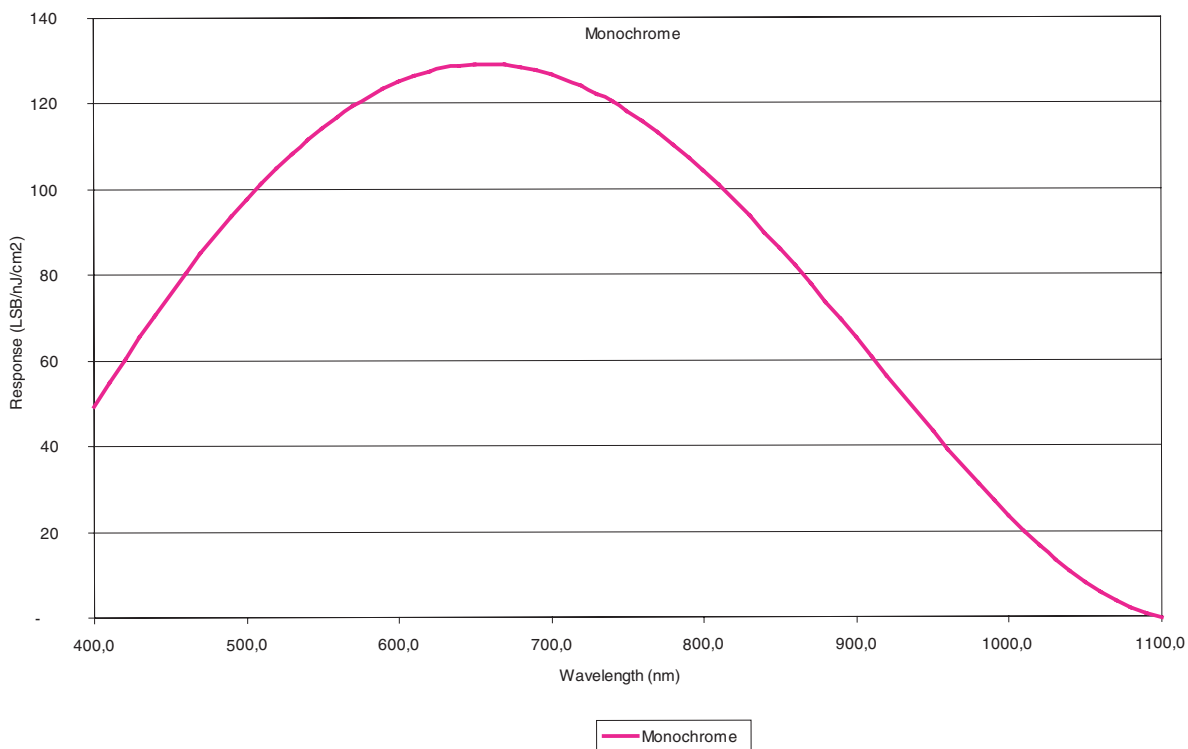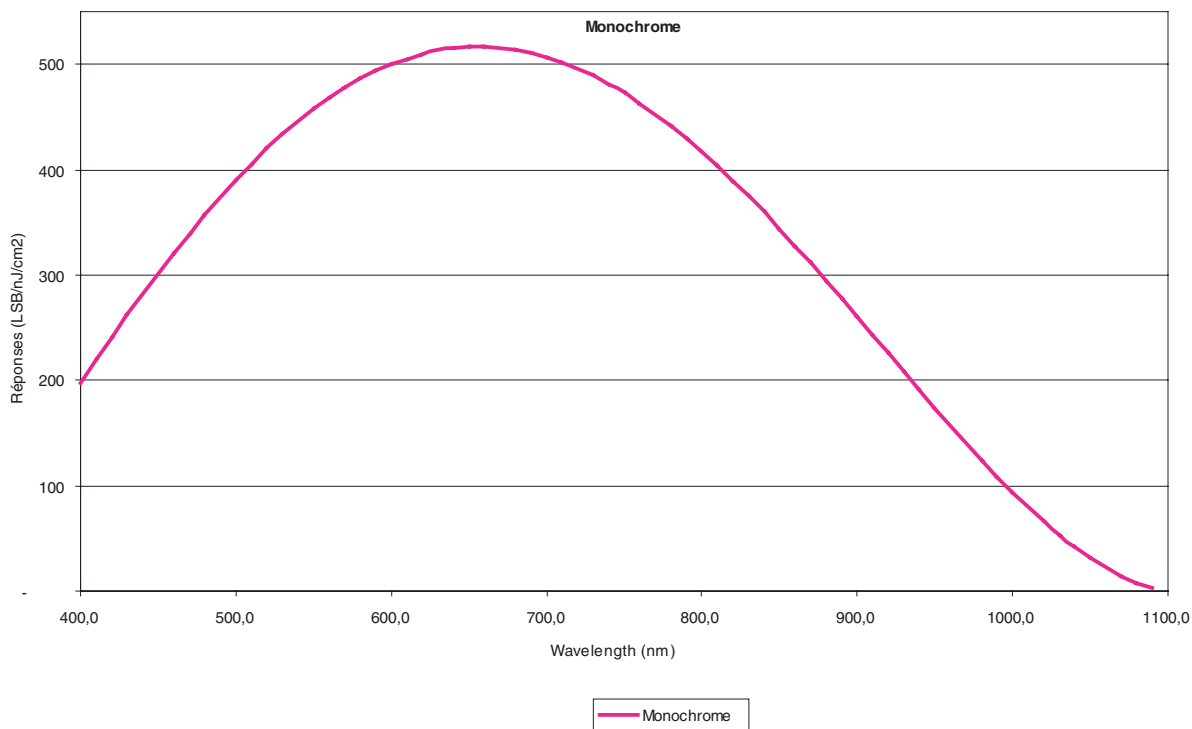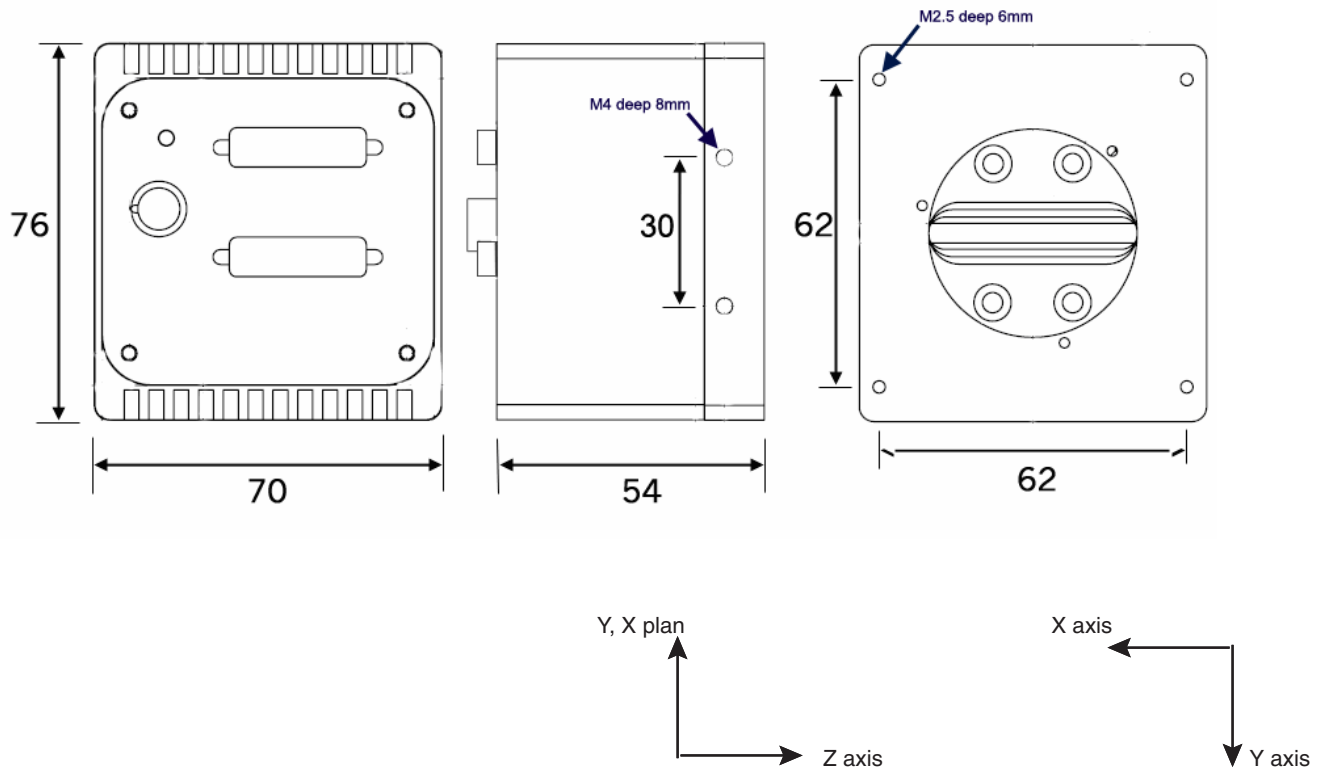**Figure 3-2.** Raw Response of Each Line of the Sensor

Figure 3-3. Response After Four Lines Summation

4. Camera Hardware Interface

4.1 Mechanical Drawings

Figure 4-1. Mechanical Drawings

4.1.1 Sensor Alignment

• Z = 10.9 mm	±150 µm
• X = 14.52 mm	±100 µm
• Y = 38 mm	±100 µm
• Planarity	±35 µm
• Rotation (X,Y plan)	±0.2°
• Tilt (versus lens mounting plane)	±35 µm

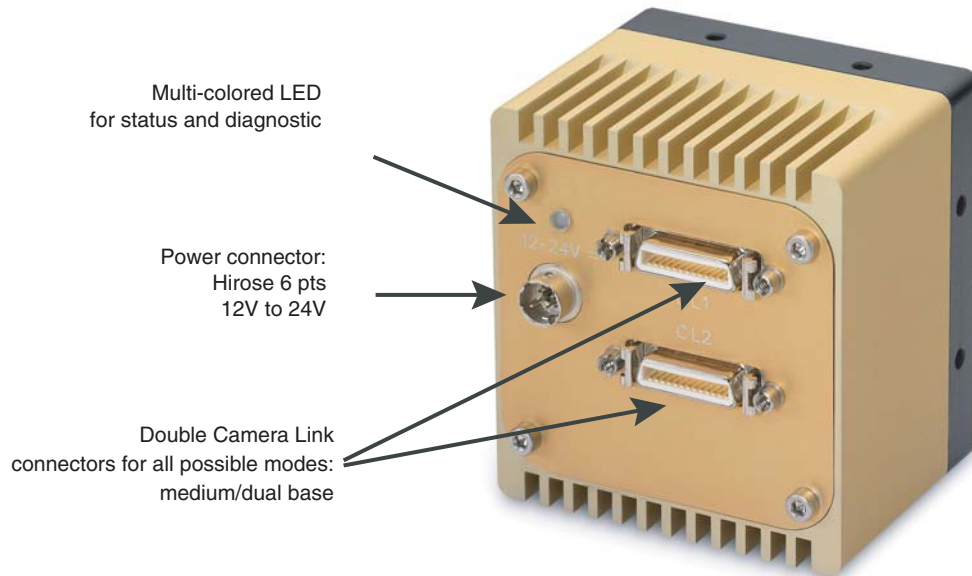**Figure 4-2.** Raw Response
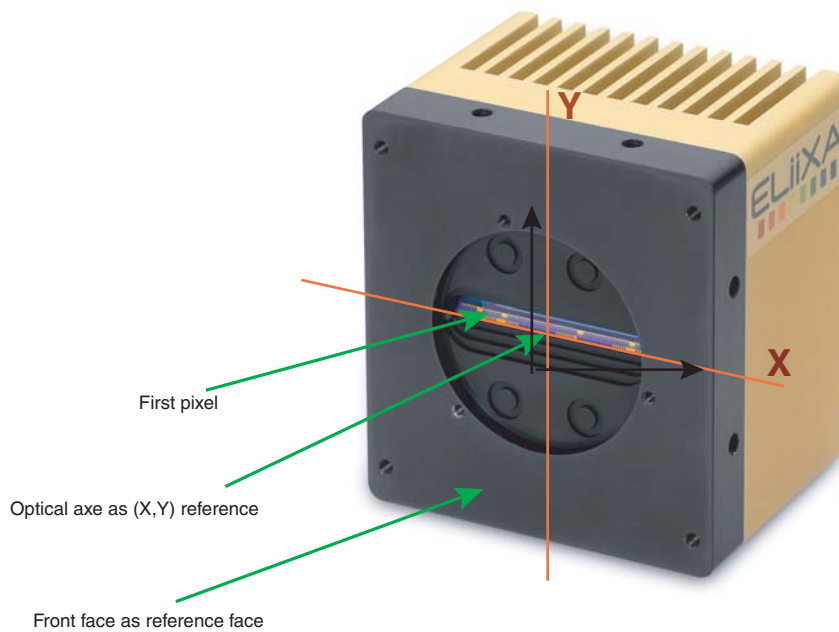
Note: All dimensions are in millimeters

4.2 Input/Output Connectors and LED

Figure 4-3. Rear View

Multi-colored LED
for status and diagnostic

Power connector:
Hirose 6 pts
12V to 24V

Double Camera Link
connectors for all possible modes:
medium/dual base

4.2.1 Status LED Behavior

After less than two seconds of power establishment, the LED first lights up in RED. Then after a maximum of eight seconds, the LED must turn into one of following color described in Table 4-1.

Table 4-1. LED Status
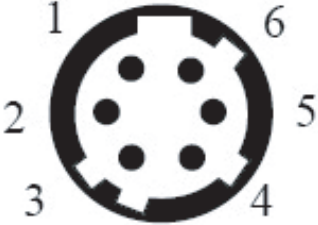
Color and State	Meaning
Green and continuous	Ok
Green and blinking slowly	Waiting for Ext Trig (Trig1 and/or Trig2)
Red and continuous	Camera out of order: Internal firmware error

4.2.2   Power Connector

Camera connector type: Hirose HR10A-7R-6PB (male)

Cable connector type: Hirose HR10A-7P-6S (female)

Table 4-2.   Power Connector

	Signal	Pin	Signal	Pin
Camera side description	PWR	1	GND	4
	PWR	2	GND	5
	PWR	3	GND	6
	Power supply from 12V to 24V Power 15W max with an inrush current of 2A during power up			

4.2.3   Camera Link Output Configuration

Table 4-3.   Camera Link Output Configuration

Modes	Connector CL1	Connector CL2
Base		
1 tap 8 bits	Camera Link standard base mode in 1x80 MHz	
1 tap 10 bits	Camera Link standard base mode in 1x80 MHz	
1 tap 12 bits	Camera Link standard base mode in 1x80 MHz	
Base		
2 tap 8 bits	Camera Link standard base mode in 2x40 MHz	
2 tap 10 bits	Camera Link standard base mode in 2x40 MHz	
2 tap 12 bits	Camera Link standard base mode in 2x40 MHz	
Medium		
4 taps 8 bits	Camera Link standard medium mode in 4x80 MHz	
4 taps 10 bits	Camera Link standard medium mode in 4x80 MHz	
4 taps 12 bits	Camera Link standard medium mode in 4x80 MHz	

4.2.3.1   Connector CL1 Assignment

Table 4-4.   Connector CL1 Assignment

Port/Bit	Base or Medium 8 Bits	Base or Medium 10 Bits	Base or Medium 12 Bits
Port A0	A0	A0	A0
Port A1	A1	A1	A1
Port A2	A2	A2	A2
Port A3	A3	A3	A3
Port A4	A4	A4	A4
Port A5	A5	A5	A5
Port A6	A6	A6	A6
Port A7	A7	A7	A7
Port B0	B0	A8	A8
Port B1	B1	A9	A9
Port B2	B2	nc	A10
Port B3	B3	nc	A11
Port B4	B4	B8	B8
Port B5	B5	B9	B9
Port B6	B6	nc	B10
Port B7	B7	nc	B11
Port C0	C0	B0	B0
Port C1	C1	B1	B1
Port C2	C2	B2	B2
Port C3	C3	B3	B3
Port C4	C4	B4	B4
Port C5	C5	B5	B5
Port C6	C6	B6	B6
Port C7	C7	B7	B7

4.2.3.2   Connector CL2 Assignment

Table 4-5.   Connector CL2 Assignment

Port/Bit	Medium 8 Bits	Medium 10 Bits	Medium 12 Bits
Port D0	D0	D0	D0
Port D1	D1	D1	D1
Port D2	D2	D2	D2
Port D3	D3	D3	D3
Port D4	D4	D4	D4
Port D5	D5	D5	D5
Port D6	D6	D6	D6
Port D7	D7	D7	D7
Port E0	nc	C0	C0
Port E1	nc	C1	C1
Port E2	nc	C2	C2
Port E3	nc	C3	C3
Port E4	nc	C4	C4
Port E5	nc	C5	C5
Port E6	nc	C6	C6
Port E7	nc	C7	C7
Port F0	nc	C8	C8
Port F1	nc	C9	C9
Port F2	nc	nc	C10
Port F3	nc	nc	C11
Port F4	nc	D8	D8
Port F5	nc	D9	D9
Port F6	nc	nc	D10
Port F7	nc	nc	D11

5. Camera Models

Table 5-1.   Ordering Code

Part Number	Additional Filter	Description
Camera		
EV71YM4SCL4010-BA0	Standard N-BK7 glass	
Accessories		
AT71KFPAVIVA-ABA		F-Mount
AT71KFPAVIVA-AKA		M42x0,75
AT71KFPAVIVA-ADA		M42x1 Mount

e2v

How to reach us

Home page: www.e2v.com

Sales offices:

Europe Regional sales office

e2v ltd

106 Waterhouse Lane

Chelmsford

Essex CM1 2QU

England

Tel: +44 (0)1245 493493

Fax:: +44 (0)1245 492492

mailto: enquiries@e2v.com

Europe Regional sales office

e2v sas

16 Burospace

F-91572 Bièvres

Cedex

France

Tel: +33 (0) 16019 5500

Fax: +33 (0) 16019 5529

mailto: enquiries-fr@e2v.com

Europe Regional sales office

e2v gmbh

Industriestraße 29

82194 Gröbenzell

Germany

Tel: +49 (0) 8142 41057-0

Fax:: +49 (0) 8142 284547

mailto: enquiries-de@e2v.com

Americas

e2v inc

4 Westchester Plaza

Elmsford

NY 10523-1482

USA

Tel: +1 (914) 592 6050 or

1-800-342-5338,

Fax:: +1 (914) 592-5148

mailto: enquiries-na@e2v.com

Asia Pacific

e2v ltd

11/F.,

Onfem Tower,

29 Wyndham Street,Central,

Hong Kong

Tel: +852 3679 364 8/9

Fax: +852 3583 1084

mailto: enquiries-ap@e2v.com

Product Contact:

e2v

Avenue de Rochepleine

BP 123 - 38521 Saint-Egrève Cedex

France

Tel: +33 (0)4 76 58 30 00

Hotline:

mailto:hotline-cam@e2v.com

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