

A 4 Megapixel 500 Frames/s Shuttered CMOS Digital Image Sensor

SHORT SPECIFICATION

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REVISION HISTORY

Date	Revision	Comments
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INTRODUCTION

XF-2336 is a high speed area scan sensor providing 500 full frames per second over bit parallel digital output. The high sensitivity global shutter pixel provides outstanding image quality, free of shutter leakage and artifacts in the most demanding high speed imaging applications

The block diagram of the XF-2336 sensor is drawn in Fig.1.

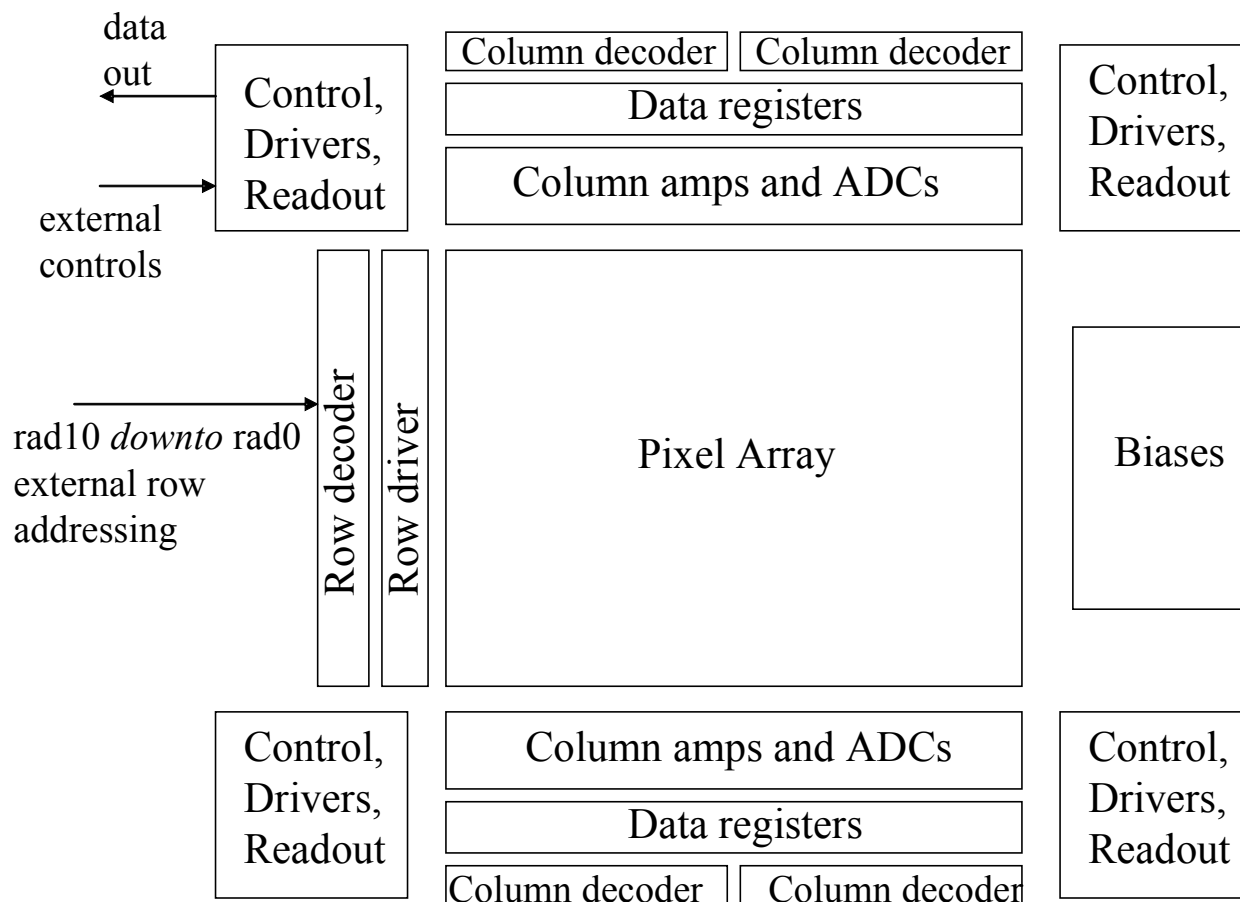


Fig 1: XF-2336 Sensor block diagram

Electrical Specification

Absolute Maximum Ratings:

Symbol	Description	Min	Max	Unit
VDDIO	Power supply voltage (digital)	-0.3	2.4	V
VDDK	Power supply core	-0.3	2.4	V
VAA	Power supply Analogue core	-0.3	3.6	V
VRST_PIX	Power supply Matrix	-0.3	3.6	V
Vxx	Voltage on any analogue voltage reference	-0.3	3.6	V
V I/O	Voltage on any digital Input or output pin	-0.3	2.4	V
IIO	DC forward BIAS current, input or output on any pin.		-12 (source) +12 (sink)	mA
Ta	Ambient temperature	-40	125	°C

Electrical overstress immunity

Electrostatic discharges on component level:

The device withstands 1kVolts ESD pulses when tested according to:

- HBM CDF-AEC-Q100-002/JESD22-A114/MIL STD 883 method 3015.7 or 100V when tested according to:
- MM CDF-AEC-Q100-003/JESD-A115

Latchup Immunity

Static latch-up protection level is 20mA when tested according to EIA/JESD78 class 2.

Functional operation is guaranteed under these conditions.

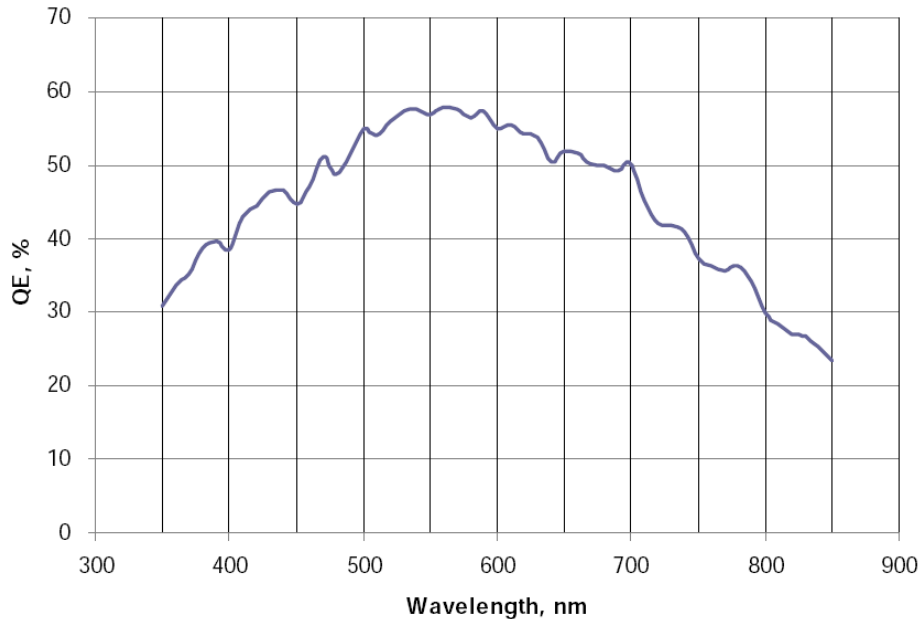
Symbol	Description	min	typical	max	unit
VDDIO	Digital I/O power supply	1.7	1.8	1.9	V
VDDK	Digital core supply	1.7	1.8	1.9	V
VAA	Analogue Power supply	3.2	3.3	3.4	V
Vn AA	Rms noise on VAA			5	mV
VRST_PIX	Matrix supply voltage	2	2.5	3.3	V
Vn RST_PIX	Rms noise on VRST_PIX			1	mV
VADH	ADC high reference voltage	0.2	0.9	1.0	V
VADL	ADC low reference voltage	0	0	VADH	V
Vn ADx	Rms noise on ADC reference voltage			1	mV
VRSTH	Row address driver voltage	2.5	3.3	3.4	V
Vn RSTH	Rms noise on VRSTH			1	mV
VTXL	Pixel transfergate low voltage	-0.3	0	0.7	V
VREF	Column amplifier reference voltage	1	1.5	2	V
Vn REF	Rms noise on VREF			1	mV
VOFF	Adc offset voltage	0	1.2	1.5	V
VCAS	Ncascode bias voltage	1	1.7	2	V
Fclk	Input Clock Frequency	1	133	144	MHz
Duty_clk	Input Clock Duty cycle	45	50	55	%
Jitter_clk	Input Clock Jitter			100	ps
Cload	Loadcapacitance on digital I/O's			15	pF
Ta	Ambient temperature*	-0	30	+85	°C
Vil	Low level input voltage	-0.3	0	0.4	V
Vih	High level input voltage	0.7*VD-DIO	VDDIO	VDDIO +0.3	V

Symbol	Description	Min	Max	Unit
V _{ol}	Low level digital output voltage	-0.3	0.5	V
V _{oh}	High level digital output voltage	V _{DDIO} -0.5	V _{DDIO}	V
I _{il}	Low level input current (V _i =0)	-1	1	mA
I _{ih}	High level input current (V _i =V _{DDD})	-1	1	mA
tslew, rising	Output slew rate of rising edge		2.5	ns
tslew, falling	Output slew rate of falling edge		2.5	ns
I(V _{DDIO})	Average Current consumption on V _{DDIO}		800	mA
I(V _{DDK})	Average Current consumption on V _{DDK}		200	mA
I(V _A)	Average Current consumption on V _A		500	mA
I(V _{RST_PI} X)	Average Current consumption on V _{RST_PIX}		50	mA
I(V _{RSTH})	Average Current consumption on V _{RSTH}		50	mA
P _{tot}	Power Consumption		5.5	W

Optical Specifications

Parameter	Min	Typ	Max	unit
Pixel Size y		7		um
Pixel Pitch y		7		um
Number of pixels in x direction		2336		pixels
Number of pixels in y direction		1728		pixels
Number of dark pixels x		32		pixels
Number of dark pixels y		0		pixels
Total number of pixels		2368x1728		Pixels ²
Optical Format		4/3"		
DSNU rms			2.5	DN ⁽¹⁾
PRNU rms			1.2	%
Full well capacity		16 ³ 000		e-
Dark noise			22	e-
Total quantum efficiency		45		%
Global shutter efficiency	99.7			%
Frame rate full resolution			500	Fps
Output signal bit resolution		10		bit

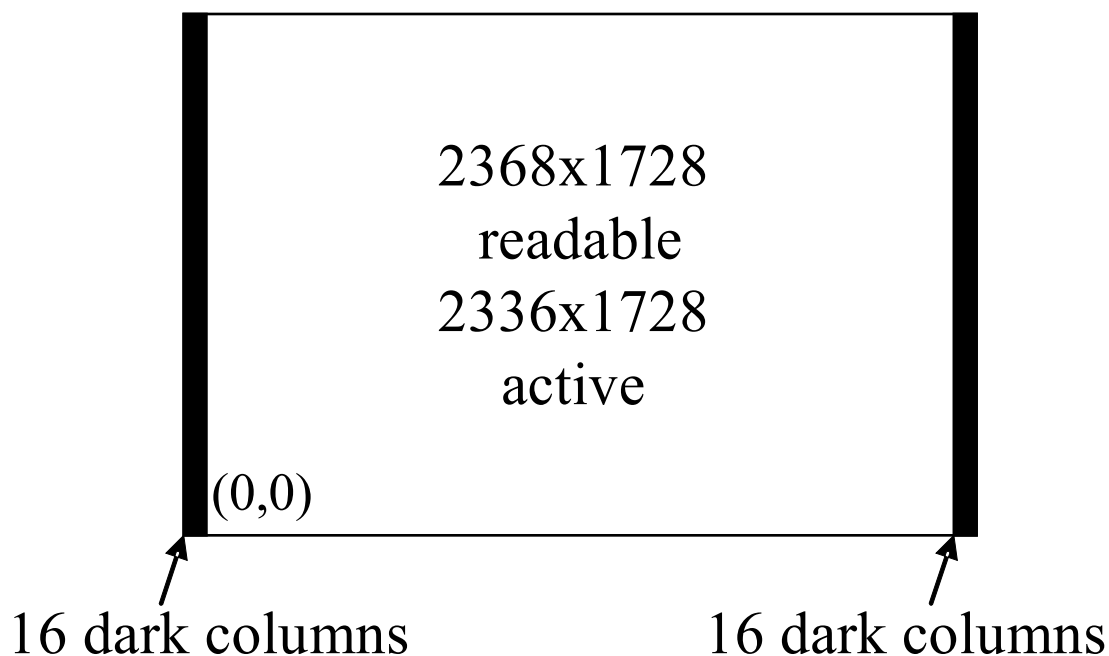
Spectral response of total QE



Interface description

2.0 PIXEL ARRAY

There are total of 2368x1728 pixels.



3.0 OUTPUT PORTS

XF-2336 has 16 ports 10 bit each. Although the ADCs are implemented as a uniform column-parallel block (one at the bottom of the sensor, one on the top), the data registers which store the ADC data are split into the left and the right ones, so that the left data registers serve only the left half of the pixel array columns, and the right – only the right ones. This was done as the measure to speed up the data readout from the registers, avoiding very long bit lines.

4.0 DIGITAL I/O PADS ABSOLUTE RATINGS

XF-2336 are operated from 1.8V digital power supply.

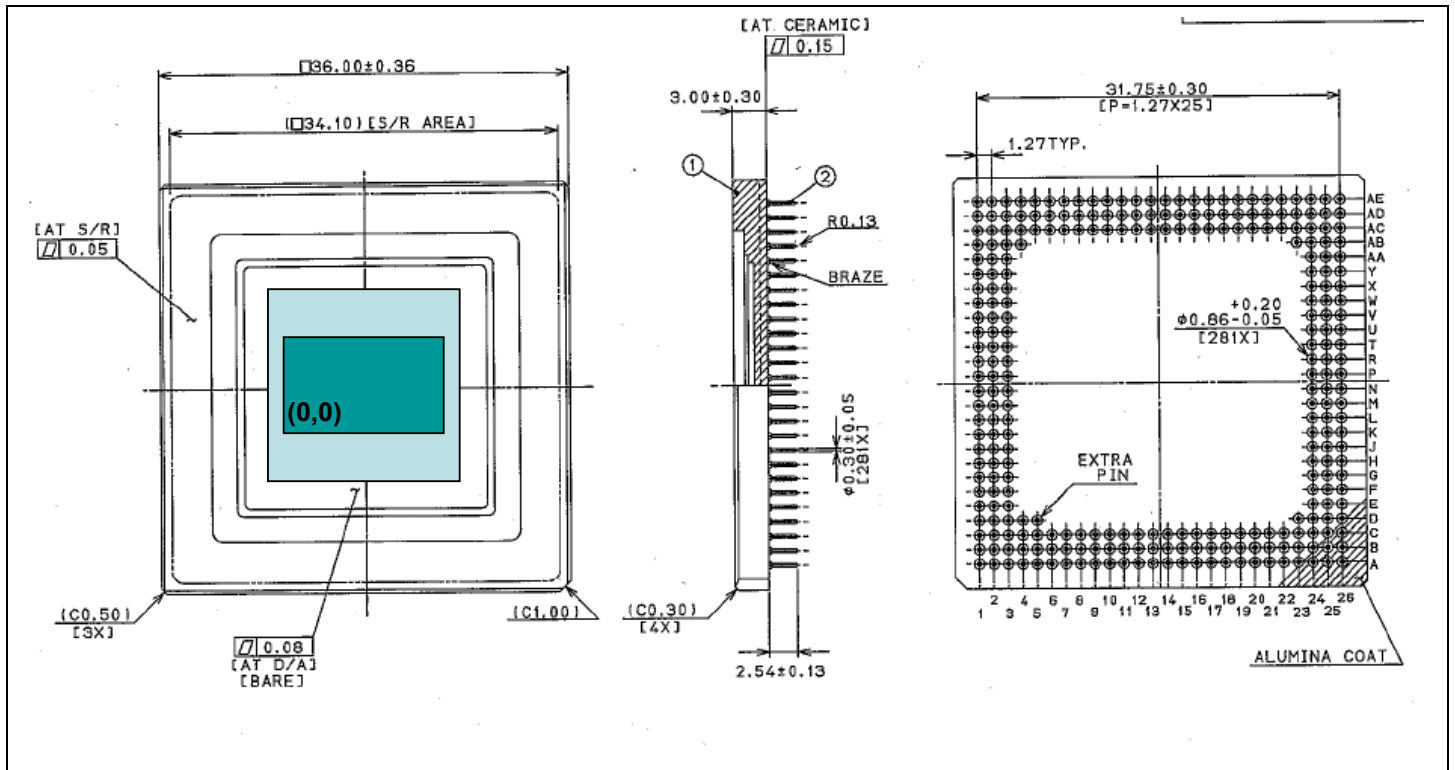
Analog power supply voltage remains higher. We recommend 3V for VAA.

The pads have the following ratings:

	Operating condition	Min	Typ	Max
VDDIO	I/O Power, operating ratings	1.7V	1.8V	2.5V
VDDIO	I/O Power, absolute maximum ratings	-0.3V		2.5V
	Input digital I/O pads, logic LOW level	-0.3V	0V	+0.5V
	Input digital I/O pads, logic HIGH level	1.6V	1.8V	+2.5V
	Input digital I/O pads, absolute maximum ratings	-0.3V		+3.3V
	Output digital I/O pads, logic LOW level	-0.3V	0V	+0.5V
	Output digital I/O pads, logic HIGH level	1.6V	1.8V	+2.5V

5.0. PACKAGE

- a 1.27mm pitch 280 micro-PGA of ~36mm size.



XF-2336 in 280 micro-PGA package. Chip position and pixel array position in the package is symmetrical top-bottom and left-right.

Not shown on this picture:

Glass thickness 0.8mm

Sensor thickness 0.725mm

Thickness of the package under the cavity: 1.2mm

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