



SOFTHARD

MR285

Camera Core Specification

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2 Revision History

Revision	Date	Who	What
0.10	10.11.2006	ML	Initial draft created
0.20	01.12.2006	ML	Binning modes added
0.30	04.01.2007	ML	Updated with CCD vs. housing tolerances, quantum efficiency, power consumption, storage and transportation environments, absolute maximum operation conditions
0.40	05.01.2007	ML	Dark current limit at temperature changed, refresh rate and readout modes updated
0.50	29.01.2007	ML	Readout modes table updated with bits/pix data. Renamed Ambient temperature items.
0.60	29.01.2007	ML	Gain numbers changed to range
0.70	11.06.2007	ML	Sync with CTP
1.00	07.07.2007	ML	Power consumption updated. First release
1.10	27.02.2008	ML	Formatting updated
1.20	28.02.2008	ML	Mode table updated
1.30	03.03.2008	ML	Mode table updated for color model
1.40	08.05.2008	ML	Added DP models Added Back focal distance and tolerances Added filter tilt Added reference to firmware and DLL versions Added exposure time increment Added trigger signal standards description
1.41	07.06.2009	ML	Template updated
1.50	14.08.2009	ML	Mode table updated and synchronized with 2.1.058

3 Disclaimers

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4 Privacy Information

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5 Trademarks

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6 Glossary of Terms, Acronyms and Abbreviations

ADU	Analog to Digital Units
API	Application Program Interface
CCD	Charge Coupled Device
CTP	Compliance Test Procedure
DDRAM	Dual Data rate Random Access Memory
DLL	Dynamic Link Library
FPGA	Field Programmable Gate Array
FWC	Full Well Capacity
GUI	Graphical User Interface
OHCI	Open Host Controller Interface
PC	Personal Computer
PCB	Printed Circuit Board

7 Document Scope and Purpose

The purpose of this document is to specify MR285 camera core parameters and their dependencies.

The generic name of the core is MR285xx_yy, where:

“xx” defines Color/Monochrome and Un-cooled/Cooled models, and can be one of the following:

- CU – Color Un-cooled
- CC – Color Cooled
- MU – Monochrome Un-cooled
- MC – Monochrome Cooled

“yy” defines housing, and can be one of the following:

- BH – Basic rectangular housing
- DP – Wankel shaped housing

8 Referenced Documents

- Sony: Datasheet E01420A27
- Sony: Datasheet E00Y42A27
- SHT: MR285 Validation and Verification plan (MR285VVP)
- SHT: MR285 Compliance Test Procedure (MR285CTP)

9 Parameter tables

9.1 Mechanical

9.1.1 BH housing

Description	Symbol	Value	Units
Height	H	32	mm
Width	W	60	mm
Depth	D	60	mm
Weight	M	100	g
Housing material and technology		Machined Aluminium alloy, no further surface treatments	
Lens adapter, material and technology		C-Mount, machined Aluminium alloy, anodized to black color	

9.1.2 DP housing

Description	Symbol	Value	Units
Height	H	26	mm
Width	W	62	mm
Depth	D	61	mm
Weight	M	85	g
Housing material and technology		Machined Aluminium alloy, no further surface treatments	
Lens adapter, material and technology		Flange to mate with OSIS C-mount ring part number K25-A007-00	

9.2 Sensors

Description	MR285Cx_yy	MR285Mx_yy	Units
Brand	Sony ICX285AQ	Sony ICX285AL	
Sony Datasheet	E01420A27	E00Y42A27	
Type	Interline CCD image sensor		
Pixel resolution	1392 (H) × 1040 (V)		pixels
Chip size	10.0(H) × 8.3(V)		mm
Unit cell size	6.45(H) × 6.45(V)		µm
Color filter	RGB Bayer mosaic	None	
FWC (*), typical	24000		ē
Dark current (**), typical	9		ē/p/s

All parameters in this table, except FWC and Dark current, are reprinted from respective Sony datasheet

(*) – FWC, no limits specified by CCD chip vendor, typical value provided here is for informational purposes only. It cannot be used as a unit qualification parameter.

(**) – Dark current, limit specified by CCD chip vendor is ~200ē/p/s @ 60°C. A typical value provided here is for informational purposes only. It cannot be used as a unit qualification parameter.

9.3 Optical path

9.3.1 BH housing

Description	MR285Cx_BH	MR285Mx_BH	Units
Filter Brand	Hoya E-CM500S	Calflex-C	
Filter Thickness	1.0±0.1	1.0±0.1	mm
Filter Tilt	0.0	0.0	°
Specification	HOYA 8405E	Linos Calflex 04_127-130_e05	
Coating	NA	NA	
CCD Spot blemishes and stain specification	Sony E02928	Sony E02927	
Filter cleanness (spots, scratches)	±3 (*)	±3 (*)	%
Size of the cosmetics defects free aperture on filter	21.5	21.5	mm
Back focal distance in the air	17.52/+0.0/-0.2	17.52/+0.0/-0.2	mm

(*) – Filter cleanness is measured with the method and set of tools described in MR285CTP.

9.3.2 DP housing

Description	MR285Cx_BH	MR285Mx_BH	Units
Filter Brand	Hoya E-CM500S	Calflex-C	
Filter Thickness	1.0±0.1	1.0±0.1	mm
Filter Tilt	5.7 ± 0.3	5.7 ± 0.3	°
Specification	HOYA 8405E	Linos Calflex 04_127-130_e05	
Coating	NA	NA	
CCD Spot blemishes and stain specification	Sony E02928	Sony E02927	
Filter cleanness (spots, scratches)	±3 (*)	±3 (*)	%
Size of the cosmetics defects free aperture on filter	21.5	21.5	mm
Back focal distance in the air (**)	11.02/+0.0/-0.2	11.02/+0.0/-0.2	mm

(*) – Filter cleanness is measured with the method and set of tools described in MR285CTP.

(**) – Tolerances of Back focal distance for DP housing does not account for tolerances of K25-A007-00 part.

9.4 Camera core

Description	Symbol	Value	Units
Digitization		14	Bit
Supported bit resolutions		8, 10, 12 and 14	Bit/pix
Exposure time range	EXP	20µs ... 500sec	
Exposure time increment		1µs	
Variable Analog Gain Range	VGA	36	dB
Refresh rate	MRR	15	Fps
Trigger/sync input		Asynchronous, LVTTTL compatible, TTL tolerant internal pull up resistor of 100kΩ	
Trigger/sync output		LVTTTL compatible via internal serial resistor of 1kΩ	
Dynamic range, Typical	DR	~70	dB
Linearity (*)	Lin	<1	%
Acquisition Gain (14bit)	G	1.5 ±0.3	ē/ADU
External interface		IEEE1394A	

Acquisition noise (**), typical	AN _{typ}	3.0	ē
Acquisition noise (**), max	AN _{max}	5.0	ē
Readout noise (***), typical	RN _{typ}	7.5	ē
Readout noise (***), max	RN _{max}	NA	ē

Parameters in this table are subject to qualification measurements specified in MR285VVP and/or Sony data sheets E01420A27 and E00Y42A27 and/or MR285CTP

(*) – Linearity of 1% guaranteed in the range of exposures 1ms to 16s.

(**) – Acquisition noise means noise generated by the camera with ADC input connected to ground via resistor equivalent to CCD output impedance of 200Ω.

(***) – Readout noise means noise generated by the camera with ADC input connected to CCD chip. Typical value provided here is for informational purposes only. It cannot be used as a unit qualification parameter.

9.5 Power

Description	Symbol	Value	Units
Power supply, via IEEE1394 system connector	V _{nom}	12 ±10%	V
Consumption, typical no cooling	P _{nom}	1.8	W
Consumption, maximum no cooling	P _{max}	2.5	W
Consumption, typical cooling on (MR285xC_yy only)	P _{nom-cool}	3.5	W
Consumption, maximum cooling on (MR285xC_yy only)	P _{max-cool}	5.0	W

All parameters in this table are subject to qualification measurements specified in MR285CTP

9.6 Cooling performance (MR285xC_yy only)

Description	Symbol	Value	Units
Lowest possible temperature on the CCD chip	T _{chip}	10	°C
Housing temperature accuracy	T _{h-acc}	2	°C
CCD chip temperature accuracy	T _{c-acc}	3	°C
Maximum achievable temperature difference between housing and chip	T _{diff}	26	°C

All parameters in this table are subject to qualification measurements specified in MR285VVP

9.7 Environment

Description	Symbol	Value	Units
Optimal ambient temperature operation	T _{opt}	+10 ... +25	°C
Ambient temperature operation (*)	T _{max}	+5 ... +60	°C
Ambient temperature for storage and transportation	T _{storage}	-25 ... +70	°C
Relative Humidity, non condensing	RH	80	%

All parameters in this table are subject to qualification measurements specified in MR285VVP
 (*) – Housing temperature shall not exceed +65°C, also beyond of the optimal range the following parameters are not guaranteed:

Dark current, Dynamical Range, Linearity, Acquisition and readout noise, S/N ratio, cooling performance (MR285xC_yy only), durability.

9.8 Firmware/Host driver/API features

Description	Symbol	Value	Units
MCU firmware version		4.0.1	
FPGA build		20070831	
API DLL version		2.1.37	
Interpolation methods		9331, SHT_advanced	
White balance coefficients ranges		0.0 ... 3.9	x
Sharpness filter		0 ... 100	%
Gamma		0.3 ... 1.0	
Full color correction matrix (3+1)x3 coefficients ranges		-3.9 ... 3.9	x
Partial readout granularity @ (1x binning)		2 (H) x 2 (V)	pixels
Max refresh rate x1 binning		15	Frames/s

All parameters in this table are subject to qualification measurements specified in MR285VVP

9.9 Supported readout modes

Mode	Binning	Mode MR285C	Mode MR285B	Pixels	F/s	Bits /pix
0	2x2 HS	B/W	B/W	688 × 516	50	8
1	1x1	Color	B/W	1376×1038	15	14
2	2x2	B/W	B/W	688 × 516	25	14
3	4x4	B/W	B/W	344 × 258	50	14
4	8x8	B/W	B/W	172 × 129	80	14
5	4x4	B/W	B/W	344 × 258	80	14
6	1x1	B/W	B/W	1392×1040	15	14
7	1x1 HS	B/W	B/W	1392×1040	25	8
8	2x2 BW	B/W	B/W	696 × 520	27	14
9	2x2 BW HS	B/W	B/W	696 × 520	50	8
10	4x4 BW	B/W	B/W	348 × 260	50	14
11	4x4 BW HS	B/W	B/W	348 × 260	80	8
12	8x8 BW	B/W	B/W	174 × 130	80	14
13	2x2 BW	B/W	B/W	640 × 480	60	14
14	2x2 (*)	Color Alt	B/W	696 × 520	27	14
15	2x2 (*)	Color Alt	B/W	696 × 520	27	14

All parameters in this table are subject to qualification measurements specified in MR285VVP

Actual version of software may expose additional modes, not described in the table above, which are special or customized modes for special applications.

(*) – In development