

specification



hyperion
colorimeter





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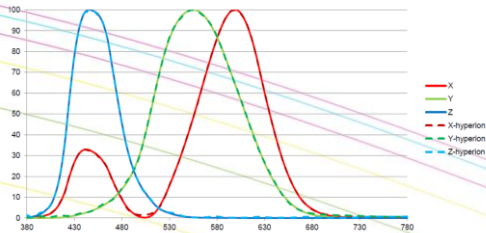
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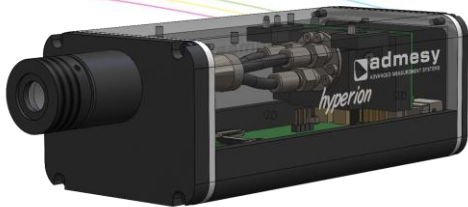
1 Hyperion

The Hyperion colorimeter offers a unique combination of high speed and accurate colour measurement capabilities packed in a robust jacket.

The improvement compared to the previous colorimeters is that the Hyperion has a significant improvement on filter characteristics and an incredible speed upgrade. It is actually 4x times faster than our previous models making accurate colour measurements possible in 50ms at 0.3Cd/m².



The Hyperion colorimeter is available with a 10mm spot size. A fiber version is also available with several optics, custom optics can be applied on request. Added to the filter characteristics the high sensitivity, ultra-low noise electronics and a huge dynamic range make it the ideal device for display measurements even at low levels.



2 Highlights

- Highly accurate colour measurement according to human eye (CIE1931)
- Fast colour measurement even at low luminance level
- Flicker luminance (Y) function: 2,000 samples/second.
- Auto-range function
- Powerful MCU enables internal JEITA flicker calculation
- Mechanical shutter
- USBMTC standard compliant
- Windows, Linux and MAC OSX compatible
- Directly supported in Labview, Labwindows, Visual Studio via VISA library



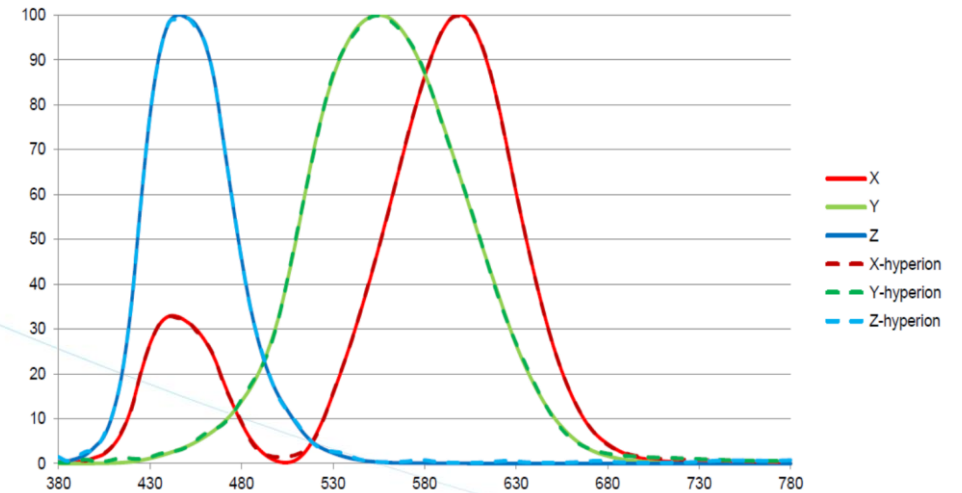
3 General specifications

Interfaces	
USB 2.0	USBMTC compliant, SCPI command set, high speed device
RS 232	For PC and embedded purposes, using same command set as USB
Trigger in & out	5V compliant

Power ratings				
	Min voltage	Typical voltage	Max voltage	Max current
USB power	4.75V	5.00V	5.25V	300mA
9V power	8.75V	9.00V	9.25V	300mA

Measurement system	
Photo detector	3 silicon photo diode using XYZ interference filter
Spectral response	Approximates CIE 1931 colour matching functions
Measurement parameters	XYZ, Yxy, Yuv, correlated color temperature (CCT), dominant wavelength DWL, Flicker, Response time
Size (HxWxD)	53x70x147 mm (without lens system)
Mounting	12 M3 threat holes spread over four sides

4 Typical spectral sensitivity





5 10mm measurement specifications

Measurement system			
Optical system	Acceptance angle 5° (+/- 2.5)		
Measurement spot size	13.5 mm at 50 mm distance 18 mm at 100 mm distance		
Flicker measurement speed (sample mode)	Luminance 2000 samples / second, XYZ 2000 samples / second Correct detected frequency of at least 1 Hz		
Colour measurement speed	Colour 22 ms or higher, depending on luminance level (including communication) 150 cd/m ² with DC level light at 16 ms. PWM requires longer integration (multiple frames)		
Sample mode signal frequency response			
Parameter	F _{3db} ^a		
Gain 1	DC – 500 Hz		
Gain 2	DC – 500 Hz		
Gain 3	DC – 500 Hz		
Colorimeter specification			
Parameter	Range	Accuracy	Repeatability
Resolution	16 bit for X, Y and Z		>80 dB without averaging
Luminance (Y)	0.005 cd/m ² - 20,000 cd/m ² integration time between 0.5ms – 1s	+/-4% of measured value, measured at white image of LCD display, Luminance of app. 150 cd/m ² , x=0.300 y= 0.325	Y +/- 0.5% at 0.1 cd/m ² ¹ Y +/- 0.2% at 1 cd/m ² ¹ Y +/- 0.15% at 5 cd/m ² ¹ Y +/- 0.1% at 150 cd/m ² ¹
Chromaticity (x,y)		+/- 0.001 after calibration, measured at white image of LCD display, Luminance of app. 150 cd/m ² , x=0.300 y= 0.325	x,y +/- 0.001 for Y at 0.1 cd/m ² ¹ x,y +/- 0.0005 for Y at 1 cd/m ² ¹ x,y +/- 0.0005 for Y at 5 cd/m ² ¹ x,y +/- 0.0002 for Y at 150 cd/m ² ¹
Measurement speed			4-10 samples / s for Y at 0.1 cd/m ² ¹ 10-20 samples / s for Y at 1 cd/m ² ¹ 40 samples / s for Y at 5 cd/m ² ¹ 40 samples / s for Y at 150 cd/m ² ¹
Flicker (contrast method)	5 cd/m ² or higher	+/- 0.3% flicker frequency 30Hz AC/DC 10% sine wave. Sine wave at 10 cd/m ²	+/- 0.2%
Flicker (JEITA method)	5 cd/m ² or higher	+/- 0.3dB flicker frequency 30Hz AC/DC 10% sine wave. Sine wave at 10 cd/m ²	+/- 0.2dB
Operating temperature	10-35°C ²		
Shutter lifetime	>1000000		
Shutter speed	250-300 ms depending on temperature and lifetime		

¹ All measurements are performed 20 times on a LED display with sufficient signal noise ratio, value is based on 2 sigma. Sample speed depends on the measured sample.

If the sample uses PWM, it will take longer. Use of lower rated values is strongly recommended to ensure repeatability.

² Operating temperature reaches from 0 to 40 degrees. Dark level compensation is optimized for operating in temperatures between 10 and 35 degrees.

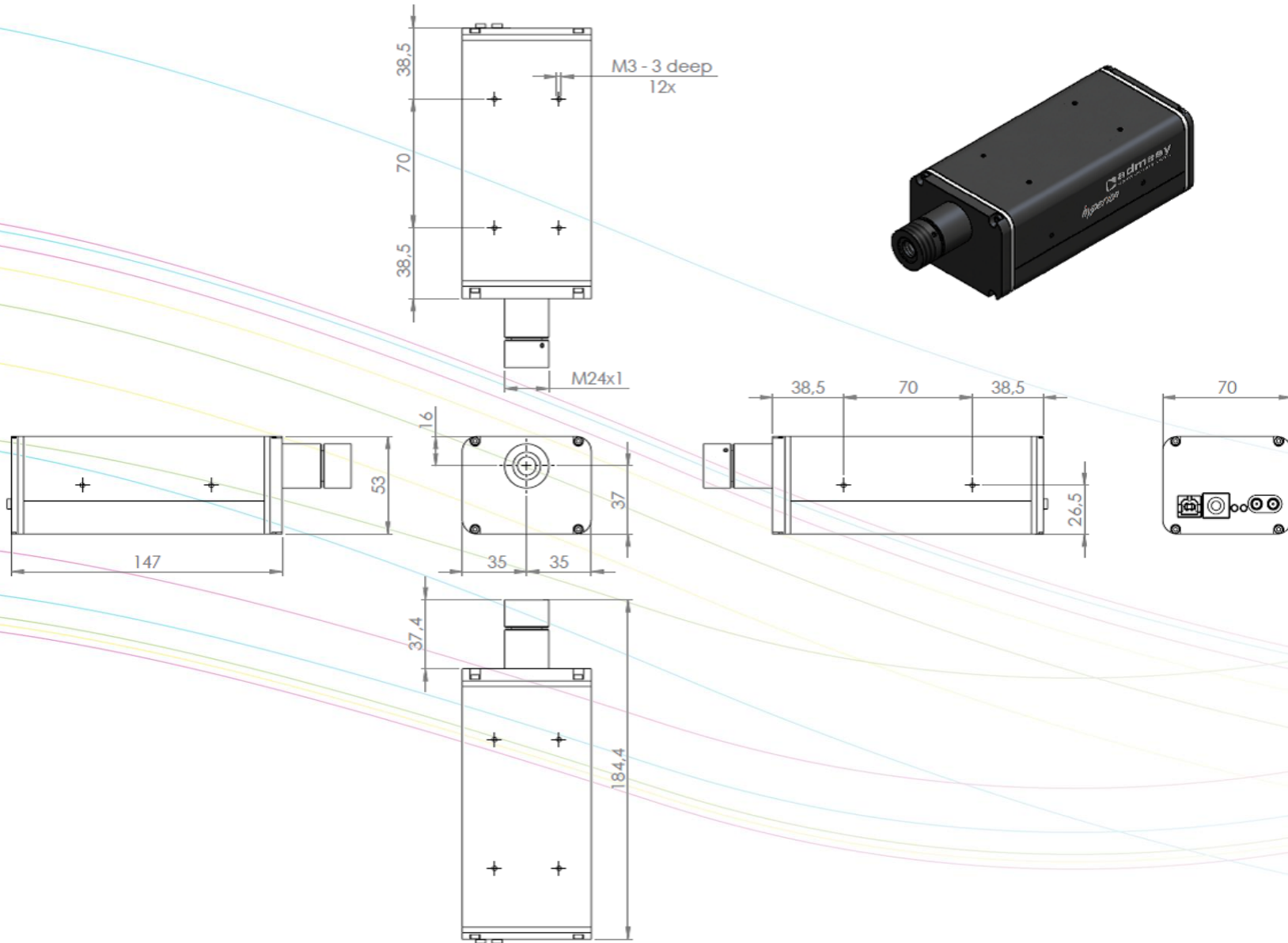


6 Real measurement data

		Setting 1- max integration time 100ms				Setting 3- max integration time 240ms				Setting 2- max integration time 1000ms				
		from (cd/m ²)	to (cd/m ²)	level (%)	level (cd/m ²)	from (cd/m ²)	to (cd/m ²)	level (%)	level (cd/m ²)	from (cd/m ²)	to (cd/m ²)	level (%)	level (cd/m ²)	
2	Luminance	Measurement range	0.005	20000	-	-	0.005	20000	-	-	0.005	20000	-	-
		Accuracy (for white)	0.01	-	+/-5%	-	0.01	-	+/-5%	-	0.01	-	+/-5%	-
		0.1	-	+/-5%	-	0.1	-	+/-5%	-	0.1	-	+/-5%	-	
		0.3	-	+/-4%	-	0.3	-	+/-4%	-	0.3	-	+/-4%	-	
		1	-	+/-3%	-	1	-	+/-3%	-	1	-	+/-3%	-	
		5	-	+/-3%	-	5	-	+/-3%	-	5	-	+/-3%	-	
		15	-	+/-2%	-	15	-	+/-2%	-	15	-	+/-2%	-	
		50	-	+/-2%	-	50	-	+/-2%	-	50	-	+/-2%	-	
		100	20000	+/-2%	-	100	20000	+/-2%	-	100	20000	+/-2%	-	
		Repeatability (2 sigma)	0.01	-	+/-5%	0.0009	0.01	-	+/-3%	0.0006	0.01	-	+/-1%	0.0001
			0.1	-	+/-1%	0.002	0.1	-	+/-0.6%	0.0012	0.1	-	+/-0.5%	0.0009
			0.3	-	+/-1.2%	0.0036	0.3	-	+/-0.5%	0.003	0.3	-	+/-0.2%	0.0024
			1	-	+/-0.6%	0.011	1	-	+/-0.5%	0.016	1	-	+/-0.2%	0.014
			5	-	+/-0.3%	0.04	5	-	+/-0.3%	0.042	5	-	+/-0.15%	0.031
		15	-	+/-0.3%	0.06	15	-	+/-0.3%	0.068	15	-	+/-0.13%	0.062	
		50	-	+/-0.2%	0.14	50	-	+/-0.12%	0.14	50	-	+/-0.07%	0.16	
		100	20000	+/-0.3%	0.34	100	20000	+/-0.08%	0.23	100	20000	+/-0.07%	0.25	
		Setting 1- max integration time 100ms				Setting 3- max integration time 240ms				Setting 2- max integration time 1000ms				
		from (cd/m ²)	to (cd/m ²)	level		from (cd/m ²)	to (cd/m ²)	level		from (cd/m ²)	to (cd/m ²)	level		
3	Chromaticity	Measurement range	0.1	20000	-	-	0.1	20000	-	-	0.1	20000	-	-
		Accuracy (for white)	0.1	-	+/-0.005	-	0.1	-	+/-0.005	-	0.1	-	+/-0.003	-
		0.3	-	+/-0.0025	-	0.3	-	+/-0.0025	-	0.3	-	+/-0.002	-	
		1	-	+/-0.002	-	1	-	+/-0.0015	-	1	-	+/-0.0015	-	
		5	-	+/-0.0015	-	5	-	+/-0.0015	-	5	-	+/-0.0015	-	
		15	-	+/-0.0015	-	15	-	+/-0.0015	-	15	-	+/-0.0015	-	
		50	-	+/-0.0015	-	50	-	+/-0.0015	-	50	-	+/-0.0015	-	
		100	20000	+/-0.0015	-	100	20000	+/-0.0015	-	100	20000	+/-0.0015	-	
		Repeatability (2 sigma)	0.1	-	0.006		0.1	-	0.0037		0.1	-	0.001	
			0.3	-	0.0026		0.3	-	0.0014		0.3	-	0.00022	
			1	-	0.00056		1	-	0.00061		1	-	0.00033	
			5	-	0.00066		5	-	0.00067		5	-	0.00066	
			15	-	0.00035		15	-	0.00028		15	-	0.00033	
			50	-	0.00017		50	-	0.00012		50	-	0.00022	
		100	20000	0.00014		100	20000	0.00012		100	20000	0.0001		
		Setting 1- max integration time 100ms				Setting 3- max integration time 240ms				Setting 2- max integration time 1000ms				
		from (cd/m ²)	to (cd/m ²)	times/sec.		from (cd/m ²)	to (cd/m ²)	times/sec.		from (cd/m ²)	to (cd/m ²)	times/sec.		
4	Speed	xyLv	0.1	-	8		0.1	-	3.7		0.1	-	0.6-0.9	
			0.3	-	8		0.3	-	3.7		0.3	-	0.6-0.9	
			1	-	10		1	-	10		1	-	10	
			5	-	40		5	-	40		5	-	40	
			15	-	40		15	-	40		15	-	40	
			50	-	40		50	-	40		50	-	40	
			100	3000	40		100	3000	40		100	3000	40	



7 Hyperion 10mm dimensions





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