MS1200/MS2200 Datasheet

Description

MS1200/MS2200 spectro-module is built in with the linear CCD type sensor and 16 pin external interface. The optical engine is very simple and optimized for the spectrometer. The optical bench is very rigid and stable for measurement system. The compact size is very flexible for system integration.

MS1200/MS2200 spectro-module is constructed by a new invented technology and can provide high optical resolution and fast spectral response.

We provide the related information and the detailed instructions of how to operate with MS1200/MS2200 in this guide. The optical detector used in MS1200/MS2200 spectro-module is a high-sensitivity Sony ILX554B 2048-element CCD array sensor. The system integrator can control the CCD sensor directly through the 16 pin external cable.

MS2200 with new optical design provides high sensitivity performance than MS1200.

Overview

1.1 Lineup of MS1200/MS2200

Model	Type	Spectral response range (nm)	Slit size (μm)	Resolution (nm)	CCD type	SNR	A/D	Dark noise	Stray light
MS1200-DUV	Standard	230nm – 800nm	25	3	ILX554B	130	16	65	0.8%
			50	4					
			100	5.5					
MS2200-DUV	High Sensitivity		25	3.2	ILX554B + cylindrical lens				
			50	4					
			100	5.8					
MS1200-V	Standard	380nm – 780nm	25	2.8	ILX554B				
			50	4					
			100	5.5					
MS2200-V	High Sensitivity		25	3	ILX554B + cylindrical lens				
			50	4					
			100	5.8					
MS1200-UVN	Standard	300nm – 1000nm	25	3.5	ILX554B				
			50	4.2					
			100	5.5					
MS2200-UVN	High Sensitivity		25	4	ILX554B + cylindrical lens				
			50	4					
			100	6					

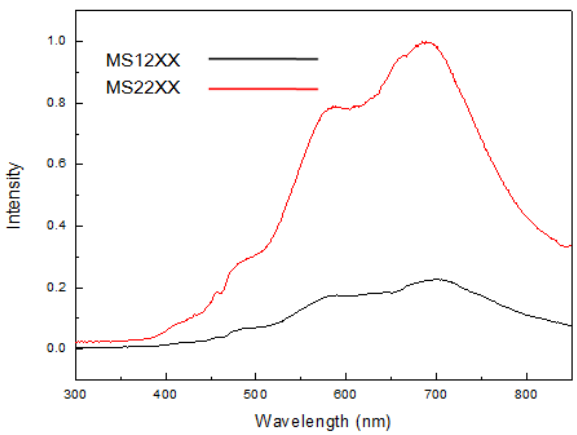
MS series

200 300 400 500 600 700 800 900 1000

➢MS1200-DUV,MS1200-V,MS1200-UVN are the standard type spectrometer module.

➢MS2200-DUV,MS2200-V,MS2200-UVN with new optical design provide high sensitivity performance.

1.2 Output Comparison



◆ New optical design spectrometer of MS2200 shows 5.0 times efficiency toward standard type spectrometer.

Main Features

2.1 Feature

■ Sony ILX554B Detector

- High sensitivity detector
- Readout Rate: 2MHz

■ Optics

- Optical resolution: 2.8 ~ 6.0 nm (FWHM)
- 3 slit widths (25, 50 or 100 μm wide slits)

■ Electrical Performance

- Integration times: from 1 ms to the time user defined

2.2 Specification

■ Absolute Maximum Ratings

- CCD input power V_{CC}: $+5.25V_{DC}$

■ Physical Specifications

- Physical dimensions: 74mm (W) x 86mm (D) x 17mm (H)

■ Power

- Power requirement: 12mA at +5VDC
- Supply voltage: 4.75 – 5.25V

■ Spectro-module

- MEMS Optical Structure
- Input fiber connector: SMA 905
- Entrance slit: 25, 50 or 100 um
- Detector: Sony ILX554B CCD
- Filters: 2nd & 3rd order rejection

■ Spectroscopic

- Wavelength range: 380 ~ 780 nm ; 300 ~ 1000 nm ; 230 ~ 800 nm
- Integration time: 1ms ~ user defined
- Dynamic range: 1000:1 for a single acquisition
- Signal-to-Noise: 130:1 (at full signal)
- Readout noise (single dark spectrum): 65 counts RMS
- Resolution (FWHM): 2.8 ~ 6 nm (varies by configuration)

■ Environmental Conditions

- Temperature: -30℃ to +70℃ Storage & -10℃ to +50℃ Operation
- Humidity: 0% - 90% non-condensing

■ Interfaces

- CCD direct control

Structure

3.1 Mechanical Diagram

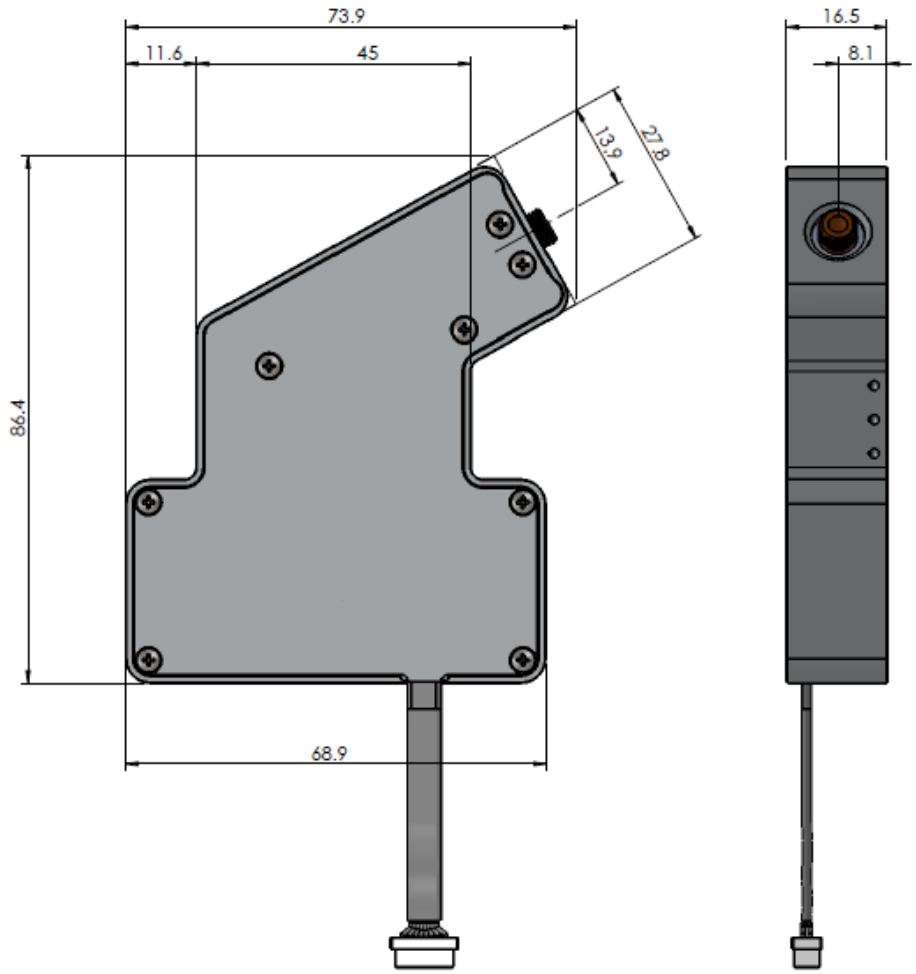


Fig. 1: MS1200/MS2200 outer dimensions

3.2 Electrical Pinout

The following listed is the pin description for the MS1200/MS2200 external connector. The connector is a Takewing 8x2 pin housing. The wafer side to this is a part of Takewing TDR-16WR. **Please pay attention to the pin order, it is reverse on the cable.**

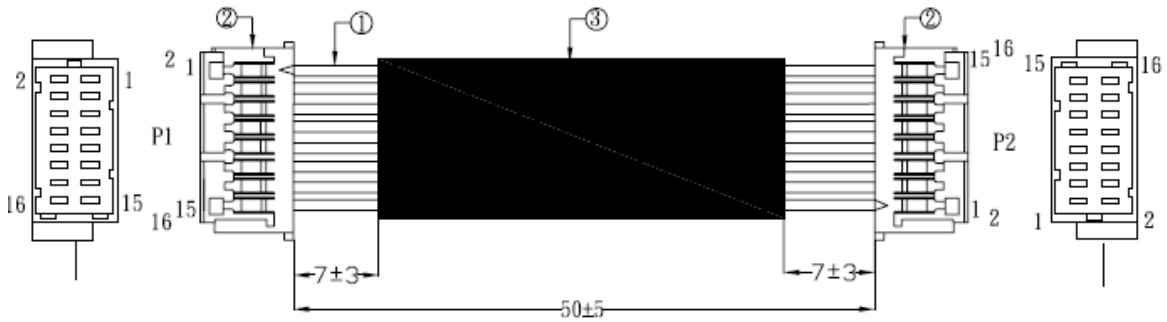


Fig. 2 :16 pin Cable Drawing

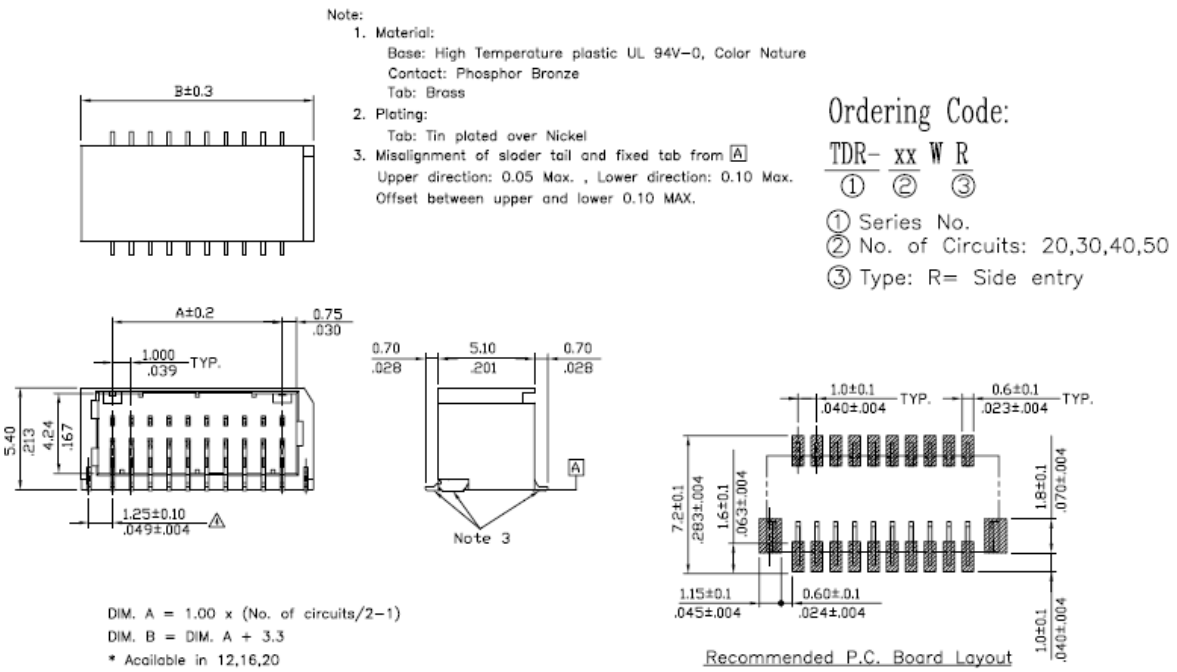


Fig. 3: TDR-16WR drawing

■ Pin# Description

Pin No.	Direction	Pin Name	Function Description
1	Power	+5V	CCD Sensor Power
2	Input	ROG	CCD control signal, Readout Gate Pulse
3	GND	AGND	Analog GND
4	NC	NC	No Connection
5	GND	AGND	Analog GND
6	Output	VOUT	CCD Output Signal
7	GND	AGND	Analog GND
8	Input	MCLK	CCD control signal, Master Clock
9	GND	AGND	Analog GND
10	NC	NC	No Connection
11	NC	NC	No Connection
12	NC	NC	No Connection
13	NC	NC	No Connection
14	NC	NC	No Connection
15	NC	NC	No Connection
16	NC	NC	No Connection

■ Pin orientation

Looking at the 16 pin cable of MS1200/MS2200, yellow line is the pin 1 of CCD board.

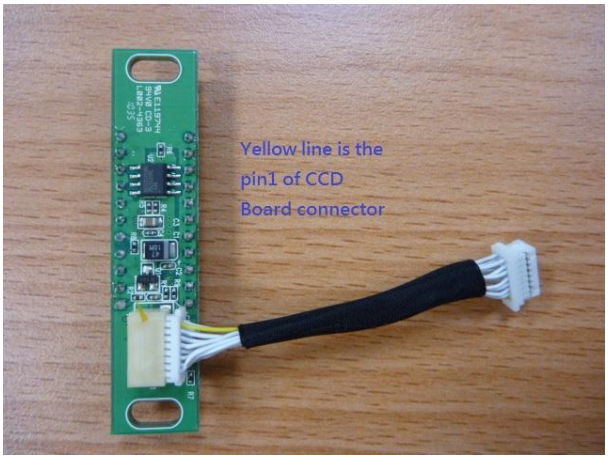


Fig. 4: CCD Board and Cable picture

3.3 CCD Overview

■ CCD DETECTOR

The ILX554B is a rectangular reduction type CCD linear image sensor designed for optical measuring equipment use. A built-in timing generator and clock-drivers ensure single 5V power supply for easy to use.

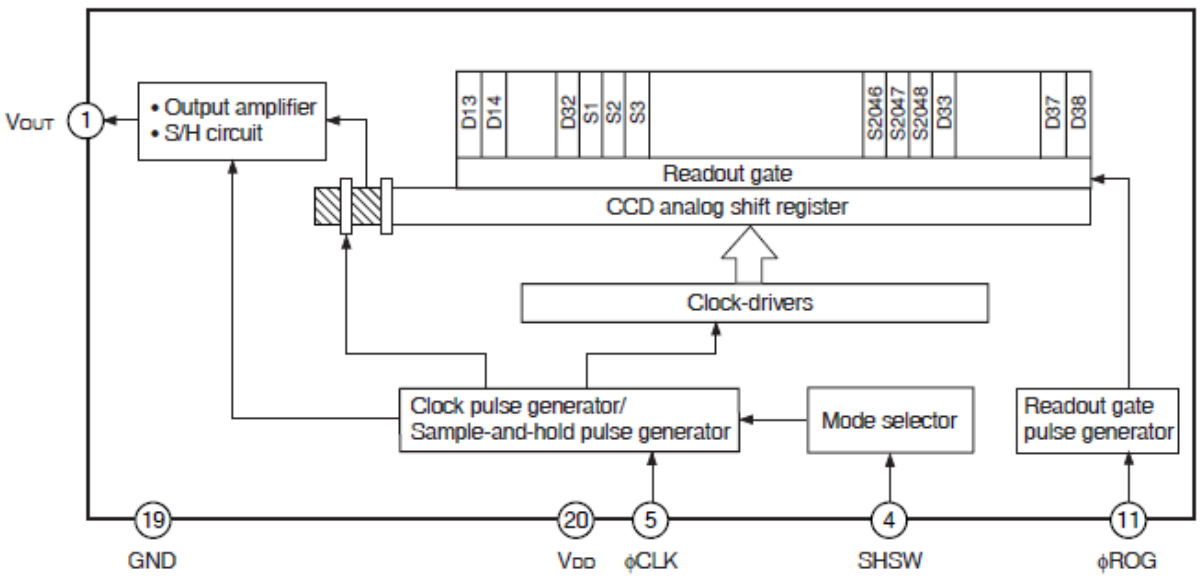


Fig. 5: CCD Block Diagram

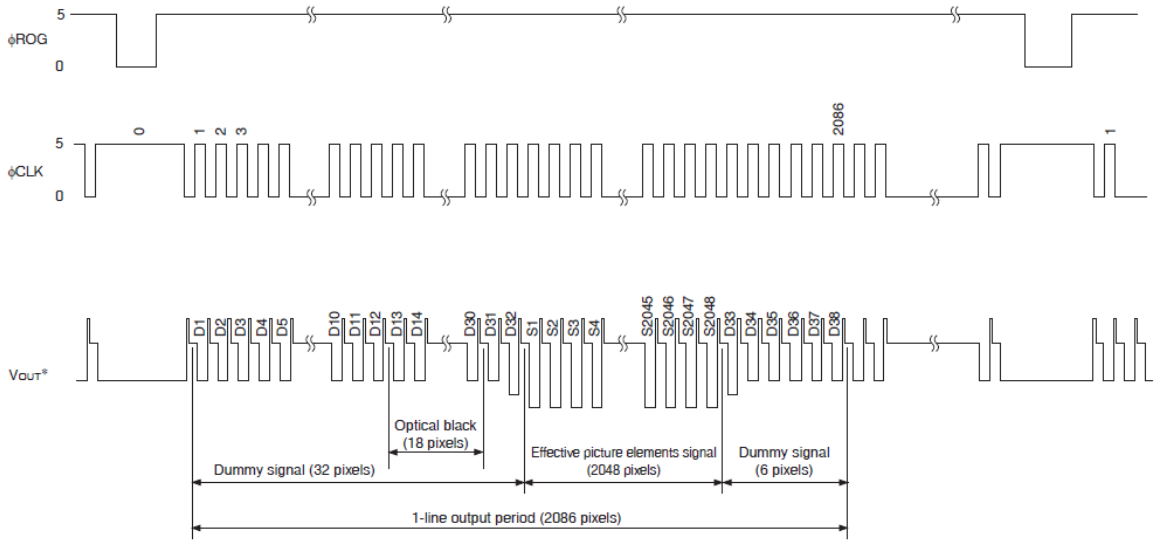


Fig.6: CCD operation timing waveform

There are two operation modes in this Sony CCD. One is the sample and hold mode, the other is without the sample/hold mode. The above timing chart is running without the sample/hold mode. There is one reset level during each clock cycle. MS1200/MS2200 is operated under this mode. The corresponding AFE (Analog Front End) device needs to be run at CDS mode. (Correlated Double Sample)

The CCD operation sequence is exposed-transferred-readout. We need to perform the integration time first, then, read the Vout in the next cycle. The operation is like pipeline. The Vout signal shows in the top waveform actually is the exposed result in the previous cycle. The output signal is almost proportion to the integration time. When the light energy or integration time is long enough to fully charge the pixel, the CCD output will be saturated. Per the characteristic of this CCD sensor, the over-saturated condition will cause the signal to be reversed.

■ CCD/SYSTEM NOISE

There are three major sources impact the Vout signal reading. One is the light source stability, the second is the electronics noise, and the other is CCD detector noise. If we don't consider the light source impact, we can check the dark noise performance of this system. The dark noise we define here is the RMS of Vout signal under 1ms integration time in dark condition. So the dark noise will be only contributed by electronics readout noise and the CCD sensor.

The other major parameter to define the noise performance is the SNR. The SNR we define here is the ratio of the full signal (65535 counts) to the RMS value under the full signal condition. The higher SNR performance indicates the readout signal is more stable. It will be helpful for the low signal differentiation.

■ SIGNAL AVERAGING

Generally, there are two options for the signal curve optimized. First is the signal averaging method. By the averaging method, we can reduce the noise impact on each pixel. Surely, more sampling points will bring the better averaging performance, but it will need more time to get one spectra. When we use the time-base type of signal averaging, the S:N increases by the square root of the number of samples. Thus, a S:N is readily 10x achieved by averaging 100 spectra.

The other curve smoothing method is boxcar filter. It can average the adjacent points to show the smoother curve, but if the target signal is peak type, the boxcar may not be suitable for it. These two methods can be enabled at the same time if the measurement target is suitable for this operation.

Internal Operation

■ Pixel Definition

If the system integrator uses the AFE device, you can use the command to manually adjust the baseline. (adjust the AFE OFFSET) The other baseline adjustment method is to enable the background removal. It depends on the user how to use the baseline.

The following table is a overall description of pixels :

Pixel	Description
1–13	Dummy pixels
14–31	Optical black pixels
32	Dummy pixels
33–3032	Optical active pixels
3033-3038	Dummy pixels