AM1280/AM2280 Datasheet

Description

AM1280/AM2280 spectro-module is built in with the linear CCD type sensor and 8 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.

AM1280/AM2280 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 the AM1280/AM2280 in this guide. The optical detector used in AM1280/AM2280 spectro-module is a high-sensitivity Sony ILX563A 3000-element CCD array sensor. The system integrator can control the CCD sensor directly through the 8 pin external cable.

AM2280 with new optical design provides high sensitivity performance than AM1280.

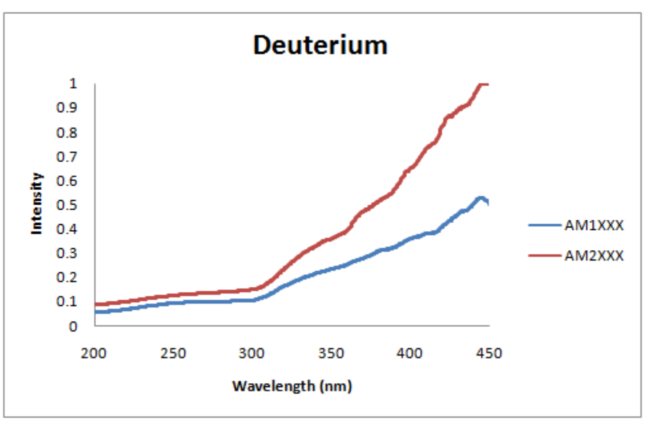
Overview

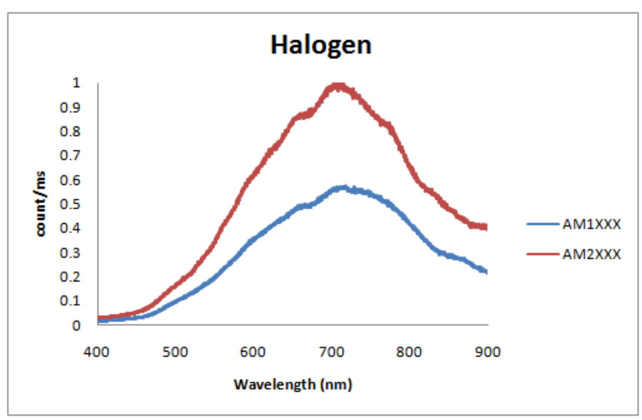
1.1 Lineup of AM1280/AM2280

Model	Type		Spectral response range (nm) (200, 300, 400, 500, 600, 700, 800, 900, 1000)	Slit size (µm)	Resolution (nm)	CCD type	SNR	A/D	Dark noise	Stray light
AM1280-DUV1	AM series	Standard	200nm – 900nm	25	5.5	ILX563A	150	16	52	0.5%
				40	10					
AM2280-DUV1		High Sensitivity		25	6	ILX563A + cylindrical lens				
				40	10					
AM1280-V6		Standard	330nm – 900nm	25	5.5	ILX563A				
				40	10					
AM2280-V6		High Sensitivity		25	6	ILX563A + cylindrical lens				
				40	10					

- AM1280-DUV1, AM1280-V6 are the standard type spectrometer module.
- AM2280-DUV1, AM2280-V6 with new optical design provide high sensitivity performance.

1.2 Output Comparison





Main Features

2.1 Feature

■ SONY ILX563A Detector

- ◻ High sensitivity detector
- ◻ Readout Rate: 2 MHz

■ Optics

- ◻ Optical resolution: 5.5 ~10nm (FWHM)
- ◻ slit width: 25 or 40 μm

■ Electrical Performance

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

2.2 Specification

■ Absolute Maximum Ratings

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

■ Physical Specifications

- Physical dimensions: 39.25 mm (W) x 43.54 mm (D) x 10.1 mm (H)
- Weight: 19 g

■ Power

- Power requirement: 12 mA at +5 V_{DC}
- Supply voltage: 4.5 – 5.5 V

■ Spectro-module

- MEMS Optical Structure
- Input fiber connector: SMA 905
- Entrance slit: 25 or 40 µm
- Detector: Sony ILX563A CCD
- Filters: 2nd & 3rd order rejection

■Spectroscopic

- Wavelength range: 200 ~ 900 nm; 330 ~ 900 nm
- Integration time: 1 ms ~ user defined
- Resolution (FWHM): 5.5~10 nm

■ 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

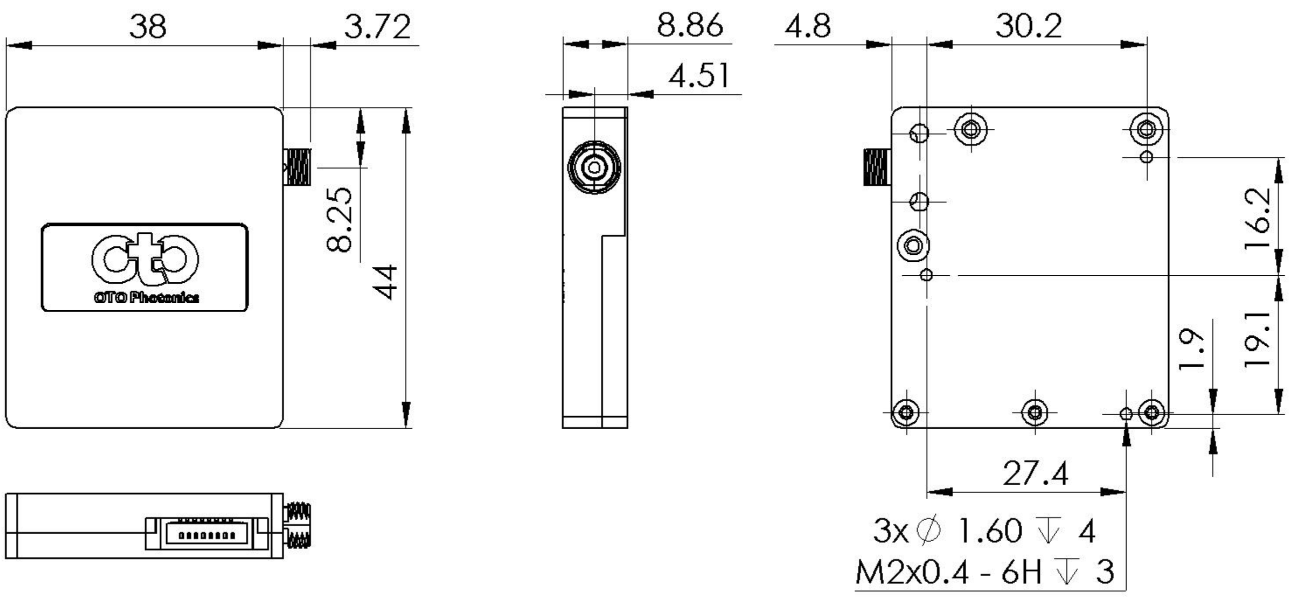
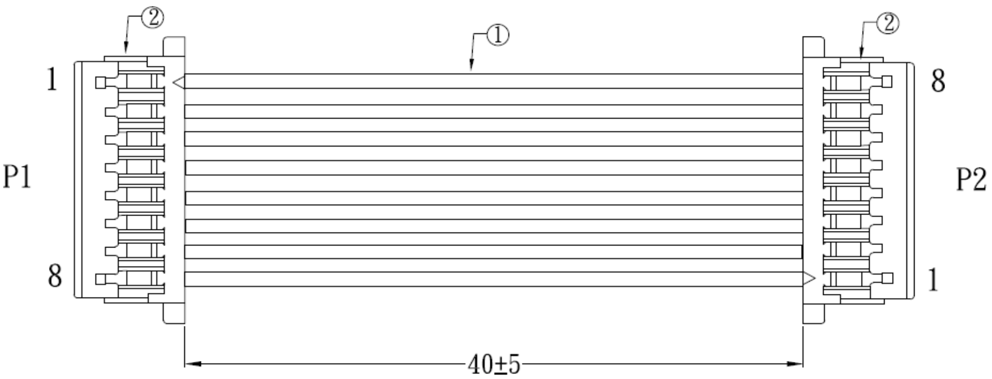


Fig. 1: AM1280/AM2280 outer dimensions

3.2 Electrical Pinout

The following listed is the pin description for the AM1280/AM2280 External Connector. The AM1280/AM2280 module side is 8 pin interface. (pitch 1.0mm) The corresponding connector on board side is HTHR-08WR. Terminal P1 is assembled inside AM1280/AM2280. Terminal P2 is linked to the main board.



P1		P2
1	Black	8
2	Black	7
3	Black	6
4	Black	5
5	Black	4
6	Black	3
7	Black	2
8	Red	1

Fig. 2: 8 pin Cable Drawing

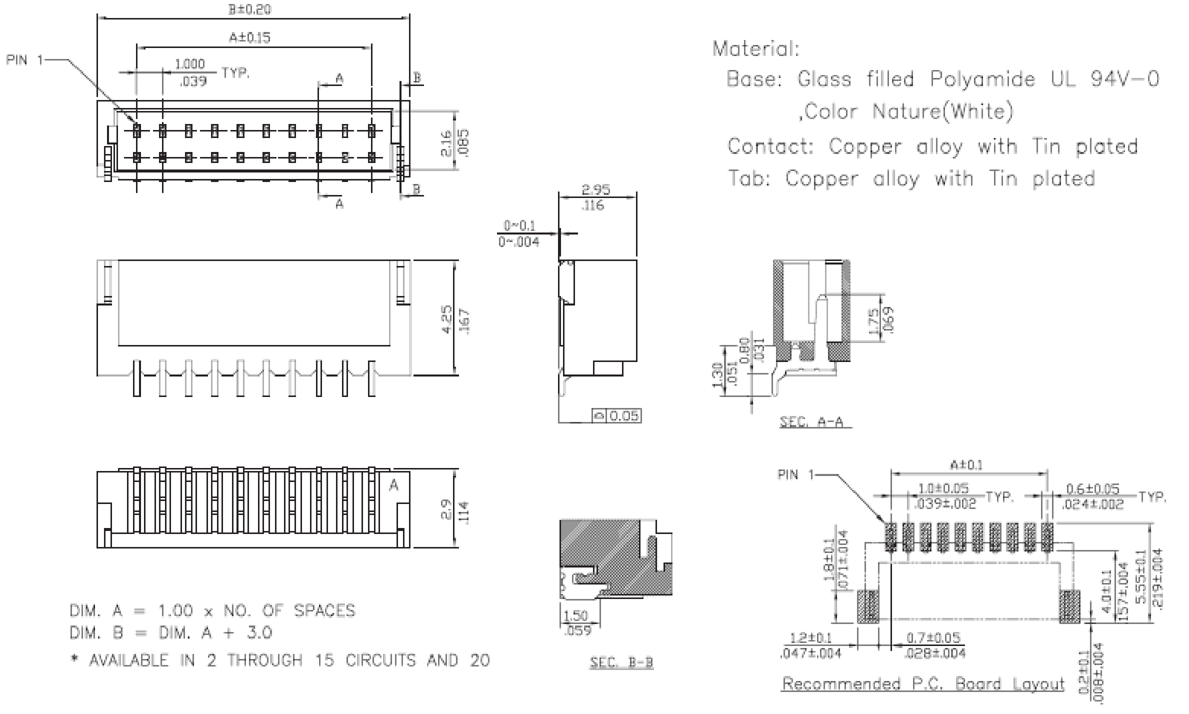


Fig. 3: HTHR-08WR drawing

■ Pin# Description

Pin No.	Direction	Pin Name	Function
1	Input	SH	CCD SH Control
2	Input	Gain	CCD Gain Control, the default is low gain (gain=1)
3	Analog Output	VOUT	CCD Video Output
4	GND	GND	GND
5	Input	ROG	CCD ROG Control
6	Input	CLK	CCD CLK Control
7	Power	+5V	CCD Power +5V
8	GND	GND	GND

■ Pin orientation

Looking at AM1280/AM2280 8 pin cable, red line is the pin 1 of 8 pin connector. (for main board)

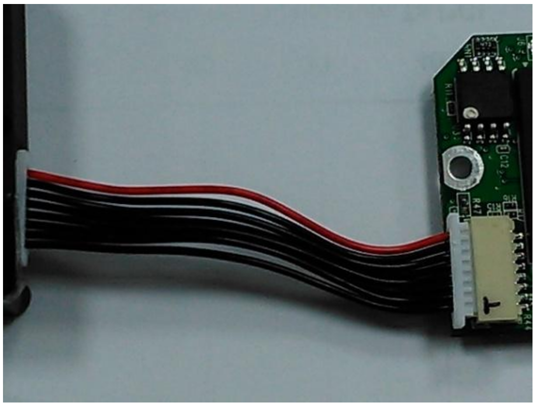


Fig. 4: CCD Board and Cable picture

3.3 CCD Overview

■ CCD DETECTOR

The ILX563A 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 use.

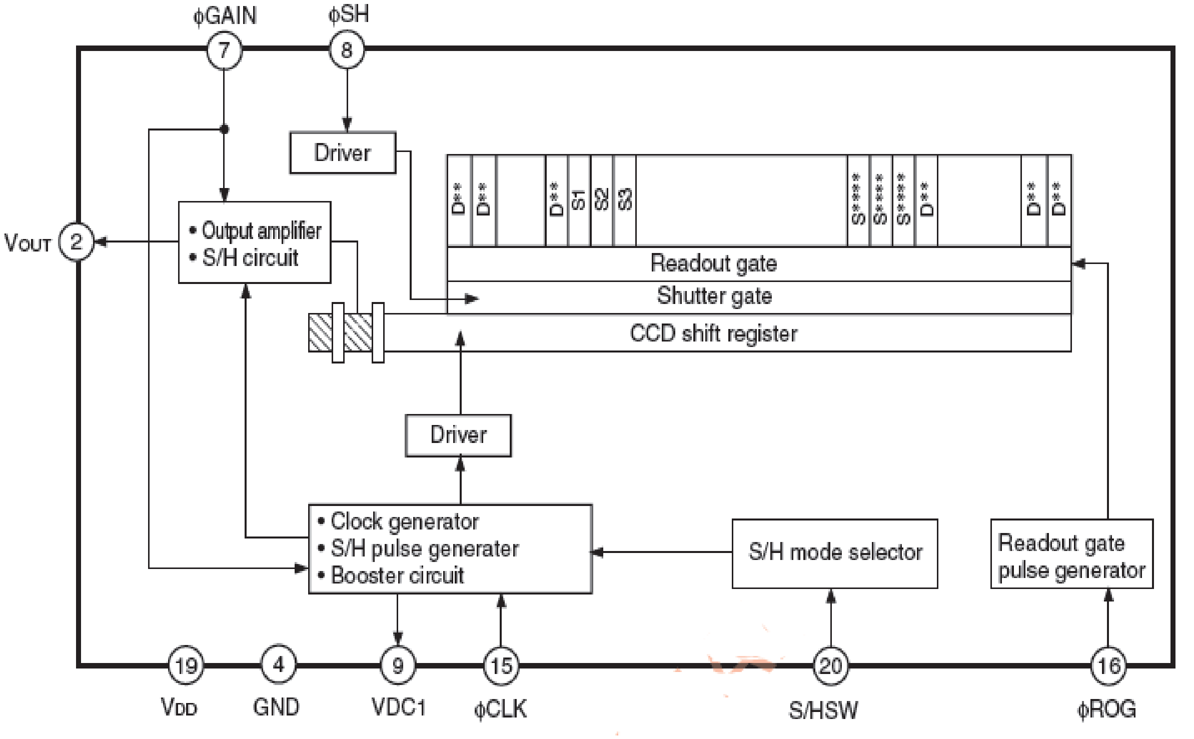


Fig. 5: CCD Block Diagram

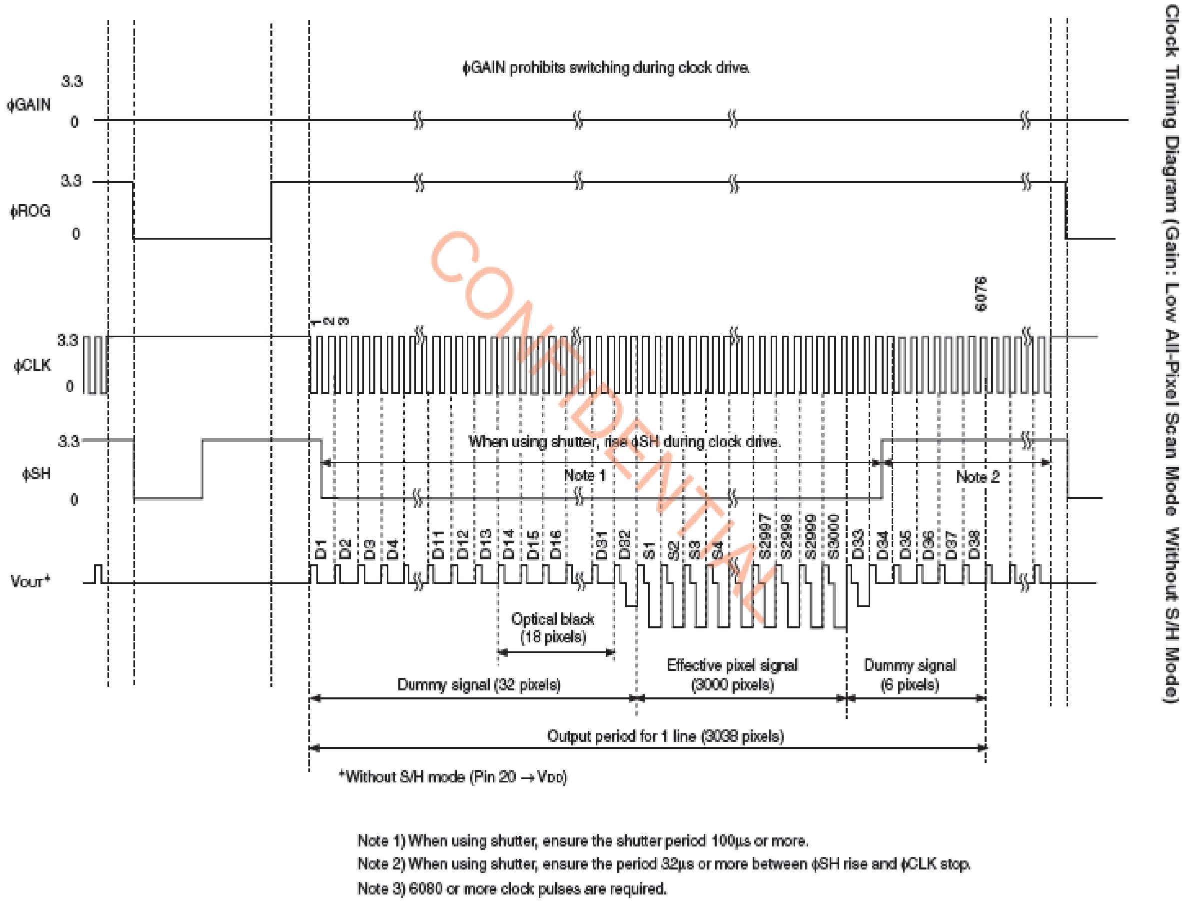


Fig.6: CCD operation timing waveform

There are two operation modes in this Sony CCD. One is sample & 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 two clock cycles. AM1280/AM2280 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.

■ 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 operations. The first one is the signal averaging. By the averaging method, we can reduce the noise impact on each pixel. Sure, 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 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 this.

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 is a description of all of the pixels

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