FINAL INSPECTION SHEET

2025, July, 10

HAMAMATSU PHOTONICS K.K.
Mfg, Laser Division

Type No.	X15213-02R
Quantity	1 pc.
Note	

Approved by *N.Nozawa* Naoko Nozawa
Inspected by *T.Takahashi* T. Takahashi

LCOS-SLM Serial No.: LSH0805598

LCOS-SLM Head Serial No.: LSH0805598
LCOS-SLM Controller Serial No.: BP4K105A
Readout light: 785 nm
LCOS chip flatness calibration bitmap file name: CAL_LSH0805598_xxxxnm.bmp

1. The following characteristics were tested.

(1) Transfer characteristic

(2) Flatness

2. Measurement conditions

Temperature: 25.2 degree

3. Test results

Items	test results
Phase modulation	2.469 π radians (λ=785 nm)
flatness (without calibration)	
PV value	1.942 λ (λ=785 nm)
RMS value	0.435 λ (λ=785 nm)
flatness (with calibration)	
PV value	0.031 λ (λ=785 nm)
RMS value	0.004 λ (λ=785 nm)

FINAL INSPECTION SHEET	Type No.	X15213-02R	Page 2 / 6
	Note		

(1) Transfer characteristic

Transfer characteristic for the LCOS-SLM is shown in Figure 1. The horizontal axis shows the input signal level to the LCOS-SLM, and the vertical axis shows the amount of the phase modulation. Input signal for 2 PI modulation is shown in Table 1.

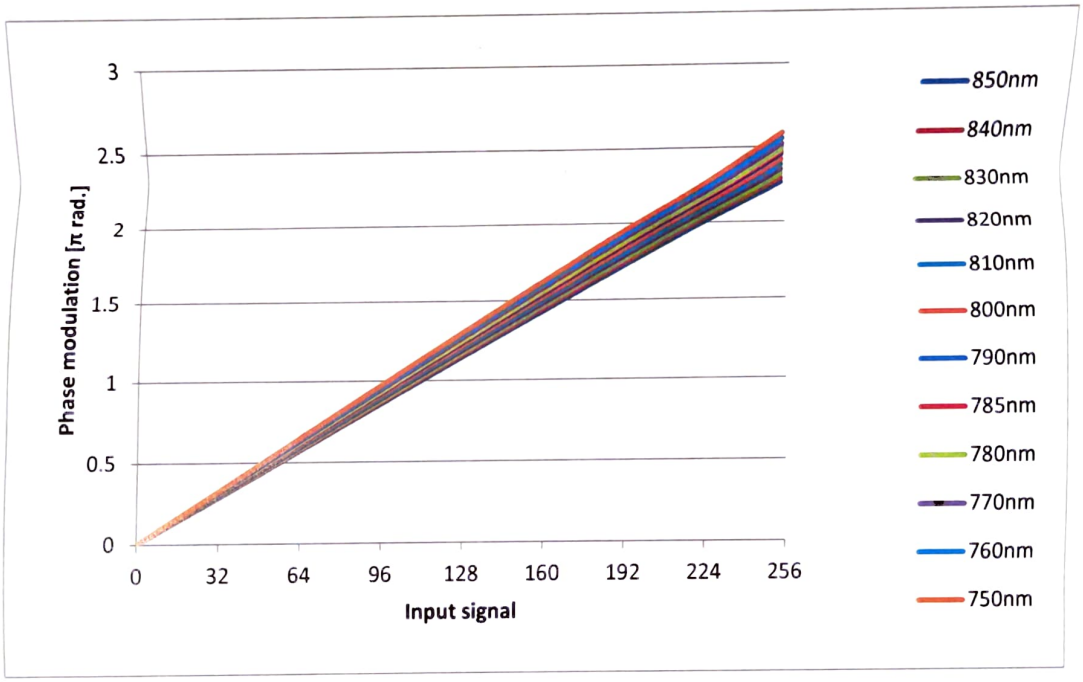

Fig.1 Transfer characteristic for the LCOS-SLM

FINAL INSPECTION SHEET	Type No.	X15213-02R	Page 3 / 6
	Note		

Wavelength (nm)	Input signal level for 2 π modulation
850	224
840	221
830	219
820	216
810	214
800	211
790	208
785	207
780	206
770	203
760	200
750	198

Table1.Input signal for 2 PI modulation.

(2) Flatness

Flatness of the LCOS-SLM was measured. Michelson interferometer was used for the measurement. LD was used in the interferometer.

Figure 2 is a picture of the interference pattern, when no calibration was done. Figure 3 is a picture of the interference pattern, when calibration was done. Table 2 shows analyzed results for the both interference patterns. Here, PV is a value of a difference between peak and valley and RMS is a root mean square value within the LCOS chip whole effective area (1272 pixels by 1024 pixels).

Caution: Flatness may be varied temperature or way of treatment.

Fig.2 Interference pattern (without calibration)

Fig. 3 Interference pattern (with calibration)

Table 2 Analyzed results of the interference pattern

Items	analyzed results
Flatness (without calibration)	
PV value	1.942 λ (λ=785 nm)
RMS value	0.435 λ (λ=785 nm)
flatness (with calibration)	
PV value	0.031 λ (λ=785 nm)
RMS value	0.004 λ (λ=785 nm)

FINAL INSPECTION SHEET	Type No.	X15213-02R	Page 5 / 6
	Note		

Notes:

The flatness distortion is represented with a value from 0 to 255 (8bits) in the correction pattern (CAL_LSHxxxxxx.bmp) and it corresponds to a phase from 0 to 2π [rad.]. In the control software enclosed in the attached CD, the following processing is performed.

(Corrected Pattern) = (CGH Pattern) + (Correction Pattern) Equation (1)
(Wrapped Pattern) = mod(Corrected Pattern, 256) Equation (2)
(Displayed Pattern) = (Wrapped Pattern) x (Value for 2π) / 255 Equation (3)

(Value for 2π) means the value to obtain 2π phase modulation at specified wavelength and is shown in page 3 of this document.

These processing will be necessary in your application software. This test report and the attached CD suggest the values for the processing.

Caution:
The operating parameters, such as the correction pattern and value for 2π, are different for operating wavelengths. It is necessary to select the proper parameters for specific wavelengths if those are provided for specified wavelengths requested. If you want to use at the other wavelengths at which the operating parameters are not provided in this test report and the attached CD, please contact Hamamatsu Photonics.

FINAL INSPECTION SHEET	Type No.	X15213-02R	Page 6 / 6
	Note		

Additionally, a sample code for MATLAB is shown below.

```
X000 = double(imread('CGH.bmp'));                    % reading CGH pattern
Y000 = double(imread('CAL_LSHxxxxxx.bmp'));          % reading correction pattern

alpha = 234;                                         % value for 2π in test report

Z000 = X000 + Y000;                                  % Equation (1)
Z001 = mod(Z000,256);                                % Equation (2)
Z002 = Z001 * alpha / 255;                           % Equation (3)

Z003 = uint8(Z002);

imwrite(Z003,'desired_pattern.bmp');                 % saving the pattern
```

MATLAB is the registered trademark of The MathWorks in the United States and/or other countries.