

E-PIN OPTICAL INDUSTRY CO., LTD.

Delivery Specification

Product Type: DUAL BEAM LASER SCANNING UNIT
EPIN Model Number: IO-L615-S01

Delivery To : _____

【 VERSION: T0】

DATE: _____

QA Manager	Production Manager	Sales Manager	R&D Manager	Prepared

Version History

[illegible]

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1. Notifications

1.1 Limitation of use

This product is designed and manufactured for general optical apparatus such Multiple Function Printer (MFP).

An exchange of the delivery specifications (Product Specification for Approval) which suited the use separately requires that there should be a possibility that failure and incorrect operation of this product may do harm to a human life or property etc. the case where it is used for the use of the following as which high reliability and safety are required more.

*Space and aircraft equipment, disaster and crime prevention equipment, medical equipment, transportation equipment (car, train , ship, etc.), information processing equipment with high public responsibility, and equipments equivalent to the above in addition to this.

“When using this product for the equipment by which high safety is demanded to all uses, while securing the safety of equipment by preparing a protection circuit and a redundant circuit, please be sure to carry out a safety test.”

1.2 Production factory

1.2.1 Production country : China

1.2.2 Production factory : NEP



2. Outline

2.1 This specification is applied to Laser Scanning Unit.

2.2 This product shall be used for the standard use of general optical equipment.

Laser Scanning Unit (LSU)	Model Number : IO-L615-S01 Version : T0
This document is applied to inspection of Laser Scanning Unit developed and produced in E-PIN OPTICAL INDUSTRY CO., LTD.. This specification covers LSU IO-L615-S01 used for _____	

3. Application Specification

Items	Specifications	Remarks
(1) Application Used	For mono-laser printer	-
(2) Resolution	600 x 600 DPI	
(3) Construction	(1)Optical System (2)Polygon Motor, Driving Circuit (3)LD driving and PD sensing Circuit (4) Housing, Outer Cover	-

4. Functional Specification (Normal Temperature : 20 +/-5°C Normal Humidity : 55+/-10% RH)

4.1 STATIC Optical Characteristics

Items	Specifications	Remarks
(1) Laser Wavelength	770~800 nm	780nm, typically
(2) Main Scan Beam Size	70 +20/-10 μm (1/e ² entire width)	Measure Position: 0mm Measure Position: $\pm 105\text{mm}$
(3) Sub Scan Beam Size	80 +25/-15 μm (1/e ² entire width)	Measure Position: 0mm Measure Position: $\pm 105\text{mm}$
(4) Laser Power	LD1 : 200 \pm 10% uW LD2 : LD1 \pm 10 uW	On the center of image plane
(5) Power Variation	Above 80%	Entire effective scanning width
(6) Focal Length	104.88 mm	-
(7) Focal Depth	\pm 0.5 mm	-

4.2 DYNAMIC Optical Characteristics

Items	Specifications	Remarks
(1) Effective Scanning Width	216 mm max	-210 mm optical performance guarantee
(2) Scanning direction	CCW	-
(3) Vertical Deviation	+/-1.0 mm	-
(4) Skew	+/-1.0 mm	-
(5) Bow	+/-0.5 mm	-
(6) Horizontal Deviation	+/-1.5 mm	At the center of scanning width
(7) Magnification error	+/-0.5%	
(8) First and Second LD position		
- Main	155.12 +/- 10um	Measure Position: 0mm Measure Position: $\pm 105\text{mm}$
- Sub	42.3 um +/- 10um	Measure Position: 0mm Measure Position: $\pm 105\text{mm}$
(10) Total Process Jitter	24 μm	-
(11) RF Scan Jitter	0.018%p-p	-
(12) LF Scan Jitter	0.030%p-p	-
(11) Acoustic Noise	TBD	- Background noise should be 30[dB(A)] max. measuring 1[m] distance from the motor on the vertical plane.

5. Electrical Specification

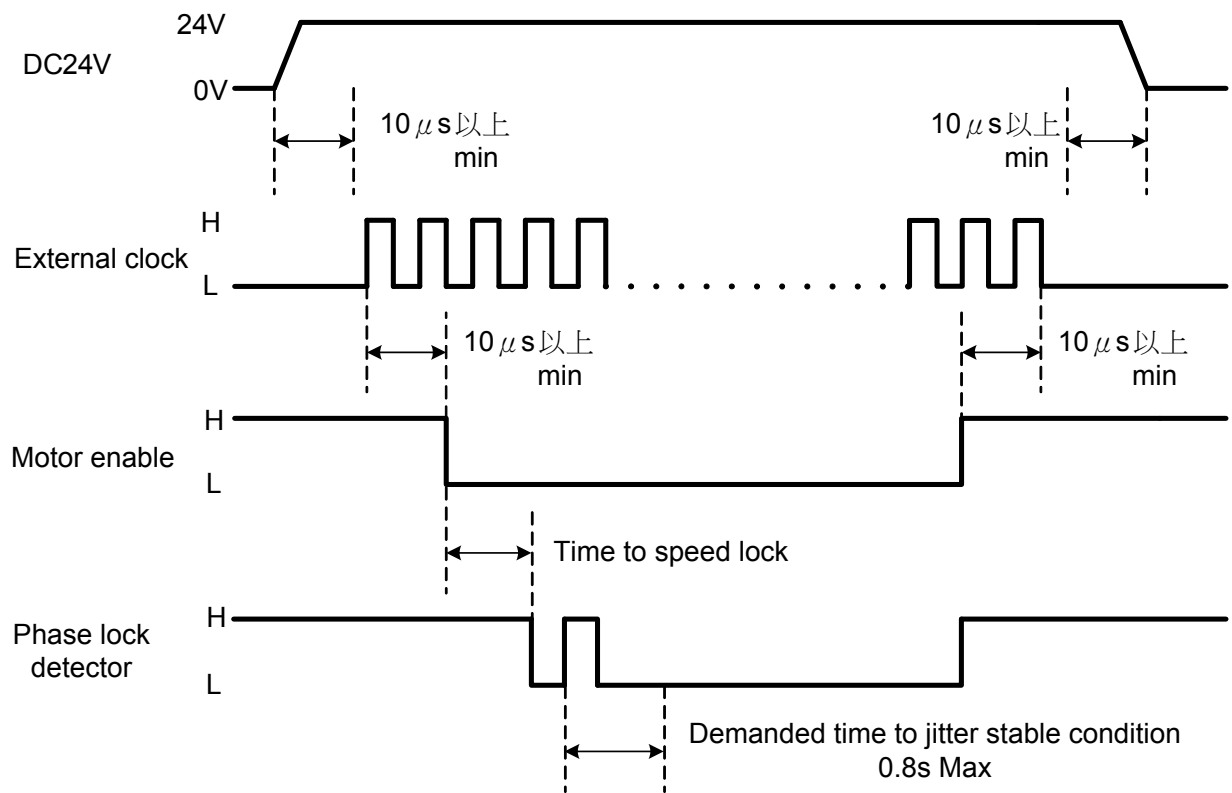
5.1 Polygon Motor Driving Circuit

Items	Specifications	Remarks
(1) Starting Time	Below 5.0 sec.	-Start 5.0 sec. max. -Stable 0.5 sec. max.
(2) Starting Current	Max. 2.2 A	DC 24.0 V, rated speed, 5~50 celsius degree ambience.
(3) Related Current	Max. 0.5 A	DC 24.0 V, rated speed, under 24 celsius degree ambience.
(4) Rated Voltage	24.0 (V) +10%/-10%	Ripple 0.3 V _{P-P} (max)
(5) Connector Type	20039WR-05B (YEONHO)	Or 292173-5 (AMP)
(6) Rated speed	26716.5 RPM / 17811.3 RPM	DUTY : 50±10%

(7) Interface Specification

PIN 1 (CLK)	External Clock $V_i(L) < 0.4 \text{ V}$ $I_o(L) < 2.0 \text{ mA}$	<p>1 : クロック入力 External clock</p>
PIN 2 (nREADY)	Lock Detector $V_i(L) < 0.4 \text{ V}$ $I_o(L) < 2.0 \text{ mA}$ $V_i(H) > 3.5 \text{ V}$	<p>Asynchronous: OPEN Synchronous: LOW</p> <p>2 : 同期信号 (出力) Phase lock detector</p>
PIN 3 (nSTART)	Motor enable $V_i(L) < 0.4 \text{ V}$ $I_o(L) < 2.0 \text{ mA}$	<p>START : LOW STOP : OPEN</p> <p>3 : スタート信号 (入力) Start/Stop signal</p>
PIN 4(GND)	GND (POWER)	GND
PIN 5 (+24V)	DC+24V	Power Supply(+24V)
Control signal input/output: Open collector		

Timing chart

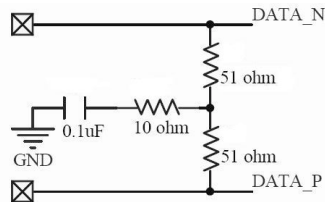
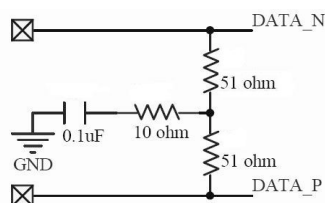
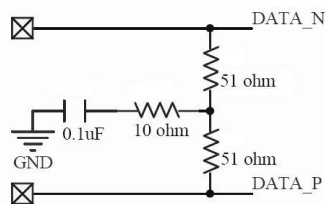


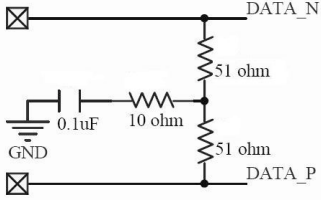
5.2 LD Driving Circuit

Items	Specifications		Remarks
(1) Rated Voltage	VDD+5V±5%		Ripple 50m V _{p-p} (max)
(2) Rated load current	Below 150mA		-
(3) Connector Type	DF11-12DP-2DSA		HRS

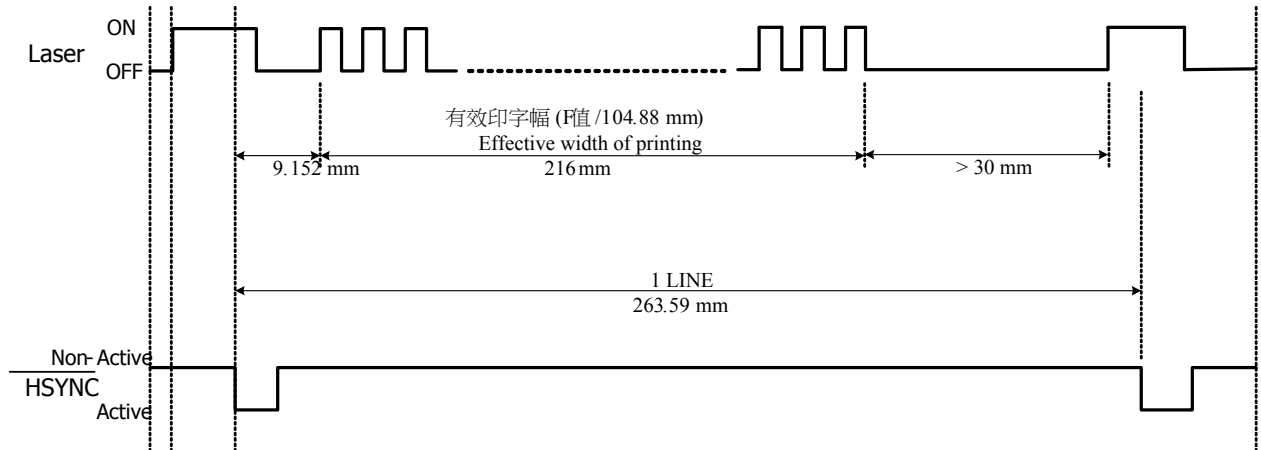
(4) Interface and Timing Chart

#PIN Interface

Pin#	Symbol	I/O	Function	Interface
PIN 1	HSYNC	OUTPUT (Open-Collector)	Horizontal Synchronized signal “H” : Asynchronous “L” : synchronous	VoL : Less than 0.4V(IoL=8mA) Inside of LSU : Pull up(4.7 kΩ)
PIN 2	GND	-	GND	-
PIN 3	S/H_1	INPUT	APC Control “H” : Hold “L” : Sampling	ViH : More than 2.0V ViL : Less than 0.8V IiH : 20μA(Vi=2.7V) IiL : -0.2mA(Vi=0.4V) Inside of LSU : Pull up(4.7kΩ)
PIN 4	Data2_N	INPUT	Laser control signal Data_N > Data_P above 0.4V : Laser OFF Data_N < Data_P above 0.4V : Laser ON	LVDS 
PIN 5	S/H_2	INPUT	APC Control “H” : Hold “L” : Sampling	ViH : More than 2.0V ViL : Less than0.8V IiH : 20μA(Vi=2.7V) IiL : -0.2mA(Vi=0.4V) Inside of LSU : Pull up(4.7kΩ)
PIN 6	Data2_P	INPUT	Laser control signal Data_N > Data_P above 0.4V : Laser OFF Data_N < Data_P above 0.4V : Laser ON	LVDS 
PIN 7	ENB	INPUT	Signal enable Laser driven “H” : disable “L” : enable	ViH : More than 2.0V ViL : Less than0.8V IiH : 20μA(Vi=2.7V) IiL : -0.2mA(Vi=0.4V) Inside of LSU : Pull up(4.7kΩ)
PIN 8	GND	-	GND	-
PIN 9	VCC	-	Power Supply(+5V)	-
PIN 10	Data1_N	INPUT	Laser control signal Data_N > Data_P above 0.4V : Laser OFF Data_N < Data_P above 0.4V : Laser ON	LVDS 

PIN 11	VCC	-	Power Supply(+5V)	-
PIN 12	Data1_P	INPUT	Laser control signal Data_N > Data_P above 0.4V : Laser OFF Data_N < Data_P above 0.4V : Laser ON	LVDS 

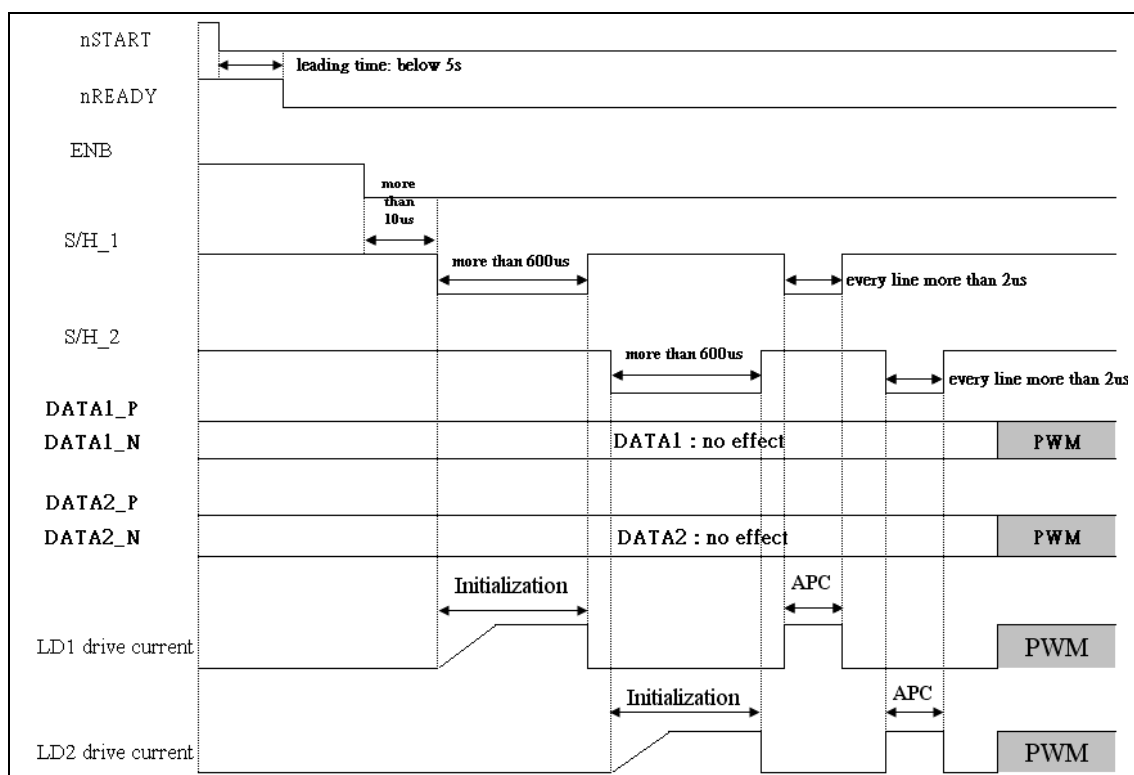
Timing of Scanning



(5)Laser control with Pin priority

	ENB	S/H	Data_N , Data_P
LD on	L	L	X
		H	Data_N < Data_P
LD off	H	H	Data_N > Data_P
		X	X

5.3 LSU Operation Timing



6. Operation Condition

Items	Specifications	Remarks
(1) Posture	±10 degree to stand surface for attachment.	
(2) Range of Temperature and Humidity for operating	+5 ~ +55°C, 10 ~ 85%RH	-
(3) Range of Temperature and Humidity for storage	-20 ~ +60°C, 10 ~ 85%RH	-

7. Reliability Test

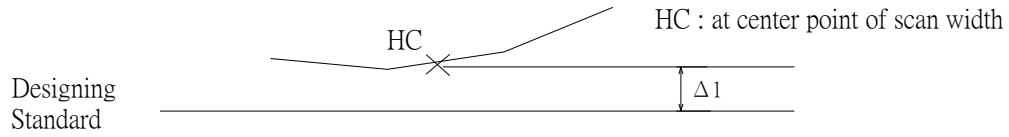
No.	Items	Measuring Condition	Standard	Q'ty	Result
1	High Temperature Storage Test (Heat Resistance)	Keep the least packed unit in 60°C (Humidity of this test can be set as it in the ambient condition) for 120 hours. After that, leave it in room temperature for 7 hours before measurement.	1) To be satisfied with the test items of LSU performance. 2) To be satisfied with the appearance inspection.	3	OK
2	High Temperature Storage Test (Cold Resistance)	Keep the least packed unit in -25°C for 120 hours. After that, leave it in room temperature for 7 hours before measurement.		3	OK
3	High Temperature and High Humidity Storage Test (Wet Resistance)	Keep the unit in +40°C and relative humidity 85% for 120 hours. After that, leave it in room temperature for 7 hours before measurement.		3	OK
4	Thermal Shock	-25°C~+60°C 1hr each, Transfer time : 30sec, Total 100 cycles.		3	OK
5	Vibration Test	For packing least 1) Horizontal : 0.5G(5~50Hz), 27 min 2) Vertical : 1.0G(5~50Hz), 13.5min		3	OK
6	Drop Test	For packing least 1) Drop distance: 60 cm for top and bottom facet, 45 cm for side facet and 1 angle, 3edges. 2) The number of units : 30pcs		30	OK
7	Operation in High Temp and High Humidity	35°C, 85%, for 8 hours		3	OK
8	Operation in High Temp	50°C for 8 hours		3	OK
9	Operation in low temp and high humidity	5°C, 15%, for 8 hours		3	OK
10	Noise test	TBD		3	OK
11	Life Time Test	Perform both tests: ①.100,000 Cycles (10sec On, 30sec Off) ②.1000 hours(Continuous On)		3	OK

Appendix :

1. Definition of Scanning Characteristics

1. Vertical deviation

Deviation of scanning line from designing standard line (at center point of scan width)

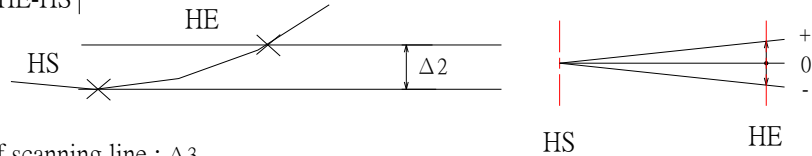


2. Skew

Skew of scanning line : $\Delta 2$

(HS=at start point of scan width , HE=at end point of scan width)

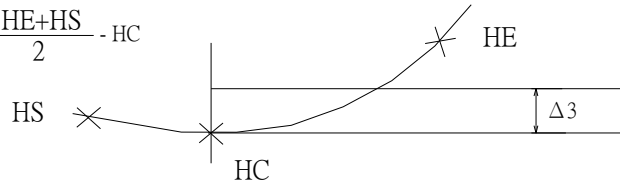
$$\Delta 2 = |HE - HS|$$



3. Bow

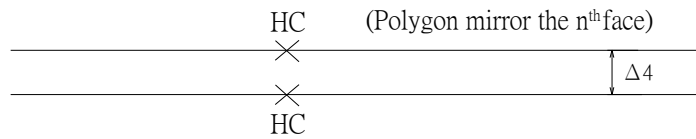
Maximum bow of scanning line : $\Delta 3$

$$\Delta 3 = \frac{HE + HS}{2} - HC$$



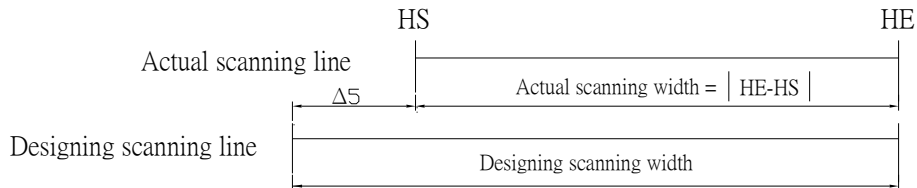
4. Process Jitter

Deviation every scanning line : $\Delta 4$



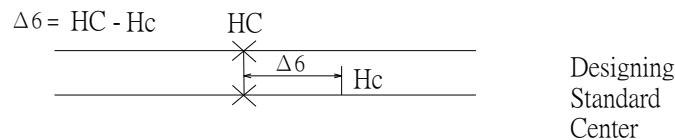
5. Linearity

Deviation of scanning line from designing standard width (Controlled at both start point and end) : $\Delta 5$



6. Horizontal deviation at center point of scan width

Deviation of center point of scan width from designing standard center : $\Delta 6$



7. RF Scan Jitter

Each scanning jitter (5 scan data of one turn) are defined "Rn" (n=1~100)

$$Rn = (Tmax - Tmin) / Tmean \times 100(\%)$$

$$RF \text{ Scan Jitter} = \text{Max}(Rn)(\%)$$

8. LF Scan Jitter

Sampling should be 600 times (600 rotations)

$$LF \text{ Scan Jitter} = (Tmax - Tmin) / Tmean \times 100(\%)$$

2. Mechanical Layout

