

SPEC.No. L15306  
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**DRAFT**

## SPECIFICATION

DEVICE SPECIFICATION FOR

Laser Diode

MODEL No.

**JLD4035Z**

Spec No. L15306

1. Scope

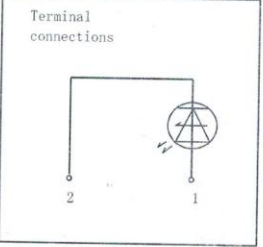
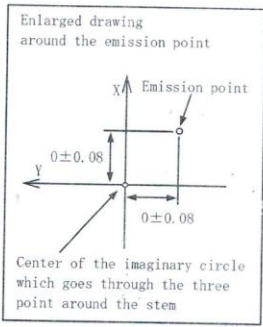
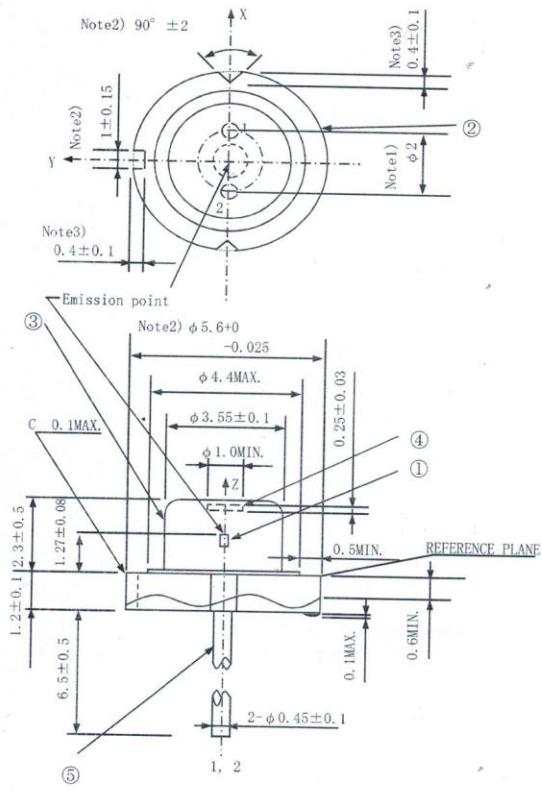
This specification covers the appearance and characteristics of blue violet Laser Diode,  
Model No.

**[Outline of this product]**

This product is equipped with an InGaN multiple quantum well blue violet laser diode.  
Oscillating transverse mode of this model is TE.  
Oscillating transverse mode of this model is multi-mode.

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2. Outline dimensions and Terminal connections



Mass of the product :  
0.32g (reference value)

- Note 1) Dimension of the bottom of leads.
- Note 2) These dimensions are valid only in the range of 0 ~ 0.6mm below from the reference plane.
- Note 3) These dimensions are defined from the imaginary circle which goes through the three points around the stem to the bottom of cut off parts.

GENERAL TOLERANCES ± 0. 2  
UNIT:mm

No.	Component	Material	Finish
①	Laser Diode Chip	InAlGaN	-
②	Stem	Fe, Cu	Gold-plated
③	Cap	Kovar	Nickel-plated
④	Window glass	Borosilicated glass	-
⑤	Lead pins	Kovar	Gold-plated

3. Ratings and Characteristics

3-1 Absolute Maximum Ratings

(Tc=25°C (Note 1))

Parameter	Symbol	Value	Unit
Optical power output	CW (Note 2) Po	350	mW
	Pulse (Note 3) Pp	1,100	mW
Reverse voltage	Laser diode Vrl	2	V
Operating temperature (Case temperature)	CW (Note 2) Topc(c)	0 ~ +50	°C
	Pulse (Note 3) Topp(c)	0 ~ +50	°C
Storage temperature	Tstg	-40 ~ +85	°C
Soldering temperature (Note 4)	Tsld	350	°C

(Note 1) Tc : Case temperature

(Note 2) CW : Continuous Wave Operation

(Note 3) Pulse : Pulse Operation(Pulse Width 0.2μs Duty:50%)

(Note 4) Soldering temperature means soldering iron tip temperature while soldering.

Soldering position is 1.6mm apart from bottom edge of the case. (Immersion time: ≤3s)

3-2 Electro-optical Characteristics (Note 1)

(Tc=25°C (Note 2))

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Threshold current	Ith	-	-	140	200	mA	
Operating current	Iop	Po=300mW	250	325	400	mA	
Operating voltage	Vop		-	4.5	5.5	V	
Wavelength	λp		400	406	414	nm	
1/e <sup>2</sup> Intensity Angle(Parallel) (Note 3,5)	θ // (1/e <sup>2</sup> )		8	14	20	°	
1/e <sup>2</sup> Intensity Angle(Perpendicular) (Note 3,5)	θ ⊥ (1/e <sup>2</sup> )		36	41	46	°	
Misalignment angle (Parallel) (Note 4,5)	Δθ // (1/e <sup>2</sup> )		-3	-	3	°	
Misalignment angle (Perpendicular) (Note 4,5)	Δθ ⊥ (1/e <sup>2</sup> )		-4	-	4	°	
Slope efficiency	ηd		120mW I(300mW) - I(180mW)	1.4	1.8	2.2	mW/mA
Polarization Angle (Note 6)	-		Po=50mW NA=0.13	-5	-	5	°
Polarization Ratio (Note 6)	PI			100	-	-	-
Pulse operating current (Note 7)	PIop	Pp=1,000mW	-	-	1,000	mA	
Difference rate of ηp (Note 8)	Δηp	Pp=50~1,000mW	-	-	100	%	

(Note 1) Initial value, Continuous Wave Operation

(Note 2) Tc:Case temperature

(Note 3) Full angle of 13.5%(≈1/e<sup>2</sup>) peak intensity

(Note 4) Misalignment angle of 13.5%(≈1/e<sup>2</sup>) peak intensity

(Note 5) Parallel to the junction plane(X-Z plane)

Perpendicular to the junction plane(Y-Z plane)

(Note 6) Reference Standards : JIS-C-5943

(Note 7) Pulse Operation(Pulse Width 0.2μs Duty:50%)

(Note 8) Difference rate of ηp

Pulse Operation(Pulse Width 0.2μs Duty:50%)

$$\Delta \eta p = \frac{\eta p_{Max} - \eta p_{Min}}{\eta p} \times 100 \quad (\%)$$

$$\eta p = \frac{950mW}{Iop(1,000mW) - Iop(50mW)}$$

ηpMax, ηpMin : maximum value and minimum value of the ηp data measured between Pp=50mW to Pp=1,000mW(Iop increment of 5mA).

4. Reliability

4-1 The reliability of products satisfy all the items listed below.

Confidence level : 90%

No.	Test	Test Conditions	Samples:n	Defective:C	LTPD(%)	Failure criteria No. [4-2]
1	Solderability (Note 1)	Soldering temperature: 230±5°C (Flux used) Immersion time: 5±0.5s Solder and Flux : Senju Metal Industry M705 and ESR-250	11	0	20	4
2	Resistance to soldering (Note 1)	Soldering iron tip temperature: 350±5°C 20W Immersion time: 3+0/-1s	11	0	20	1, 2, 3
3	Terminal strength (Tensile test)	Load: 5N Duration: 5±1s Once for each terminal	11	0	20	5
4	Terminal strength (Bending test)	Load: 2.5N 0° ~ 90° ~ 0° ~ -90° ~ 0° Once for each terminal	11	0	20	5
5	Mechanical shock	Acceleration: 1000m/s <sup>2</sup> Pulse width: 6ms Direction: ±X, ±Y and ±Z Three times for each direction	11	0	20	1, 2, 3
6	Variable frequency vibration	Acceleration: 100m/s <sup>2</sup> or Amplitude: 1.5mm Frequency: 10~500~10Hz 15min reciprocation Direction: X, Y and Z 2 h for each direction	11	0	20	1, 2, 3
7	Temperature cycling	Lower temperature: -40°C Higher temperature: +85°C Duration: 30min each, 30 times	11	0	20	1, 2, 3
8	airtightness	He leak test 5×10 <sup>-3</sup> Pa·cm <sup>3</sup> /s	11	0	20	6
9	High temperature storage	Storage temperature: 85°C t=500 h	11	0	20	1, 2, 3
10	Low temperature storage	Storage temperature: -40°C t=500 h	11	0	20	1, 2, 3
11	High temperature humid atmosphere storage	Storage temperature: 60°C (Note 2) humidity: 90%RH t=500h	11	0	20	1, 2, 3

Reference Standards : JIS

(Note 1) Soldering position is 1.6mm apart from bottom edge of the case.  
(Note 2) To be measured after 72 hours exposure to the room atmosphere.

4-2 Parameters to be measured and Failure criteria

No.	Parameters	Failure judgment criteria
1	Threshold current	I <sub>th</sub> > initial value × 1.3
2	Operating current	I <sub>op</sub> > initial value × 1.3
3	Operating voltage	V <sub>op</sub> > initial value × 1.2
4	Solderability	95% or more is covered with solder.
5	Terminal strength	It is defective if there are breaking and loosening.
6	airtightness	Amount of leak > 5×10 <sup>-3</sup> Pa·cm <sup>3</sup> /s

4-3 Target Lifetime

The target mean time to failure (MTTF) of this product is more than 2,000 h.  
MTTF is confirmed by performing the operating test under the following conditions in time of development or change process related to the reliability of this product.

Samples tested should have a laser diode chip with the same structure of this model.

Conditions	Failure judgment criteria
T <sub>c</sub> =50°C, P <sub>p</sub> =1,000mW, 500 hours (Note 2)	Failure is defined as the time under the operating power under the conditions in the left changes 30% of the initial (12 h) value. (Note 1) As for the samples which do not fail within 500 hours, their life time is calculated by extrapolating operating power data of between 400 and 500 hours. MTTF is estimated by plotting each life time in Weibull function worksheet. (Note 1)

(Note 1) Defective samples caused by surge current is rejected.  
(Note 2) ACC pulse Operation (Pulse Width 0.2 μs Duty: 50%)