

Type No. E1L5E-AR2A*-00

Drawn

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1. Product name TG RED LED

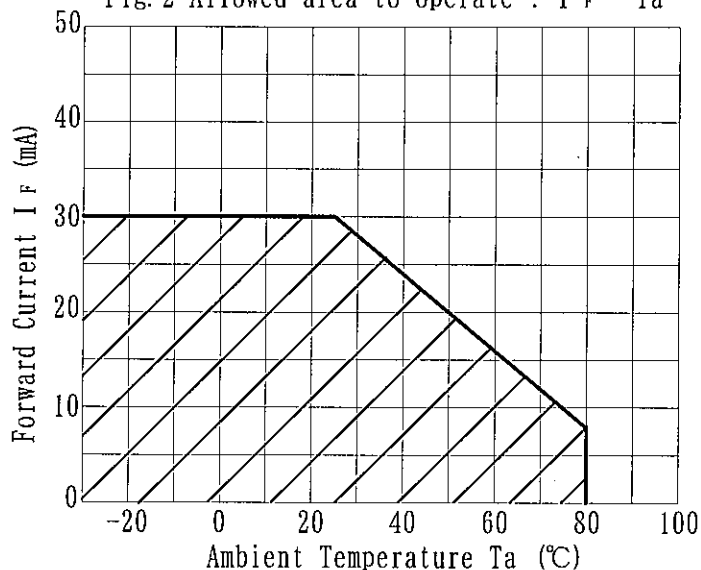
2. Absolute Maximum Ratings ($T_a=25^\circ\text{C}$)

Fig.1

Item	Symbol	Value	Unit
Power Dissipation	P_D	120	mW
DC Forward Current	I_F	30	mA
DC Forward Current reduction (*1)	ΔI_F	-0.40	mA/ $^\circ\text{C}$
Pulsed Forward Current (*2)	I_{FP}	100	mA
Reverse Voltage (*3)	V_R	5	V
Operating Temperature	T_{opr}	-30 ~ +80	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 ~ +100	$^\circ\text{C}$

(*1) I_F shows the reduction rate between 25-80 $^\circ\text{C}$, which is graphically shown by the chart below.
Please avoid applying current which may exceed the tolerated range indicated.

Fig.2 Allowed area to operate : $I_F - T_a$



(*2) I_{FP} is measured by Duty 1/10 Pulse and Width 0.1 msec.

(*3) V_R is for momentary direct current.

Please avoid steady or/and usages with pulse current.

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3. Electrical/Optical Characteristics ($T_a=25\pm 3^\circ\text{C}$)

Fig.3

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	$I_F=20\text{mA}$	—	(2.25)	2.7	V
Reverse Current	I_R	$V_R=5\text{V}$	—	—	100	μA
Luminous Intensity (Axial Direction)	I_V	$I_F=20\text{mA}$	700	—	1640	mcd
Dominant Wavelength	λ_D	$I_F=20\text{mA}$	612	—	625	nm
Spectral Bandwidth at 50%	$\Delta\lambda$	$I_F=20\text{mA}$	—	(23)	—	nm

Fig.4 Color and Intensity Ranks ($I_F=20\text{mA}$)

Rank		Luminous Intensity (mcd) (*3)
Dominant wavelength (nm) (*4)		
612 ~ 618	618 ~ 625	
2 -- 1	2 -- 2	700 ~ 790
3 -- 1	3 -- 2	790 ~ 950
4 -- 1	4 -- 2	950 ~ 1140
5 -- 1	5 -- 2	1140 ~ 1370
6 -- 1	6 -- 2	1370 ~ 1640

(*4) Note that guaranteed intensity range includes 20% tolerance.

Ex. The possible intensity range of rank 3--1 is 632~1140mcd.

(*5) Note that guaranteed wavelength range includes 2nm tolerance.

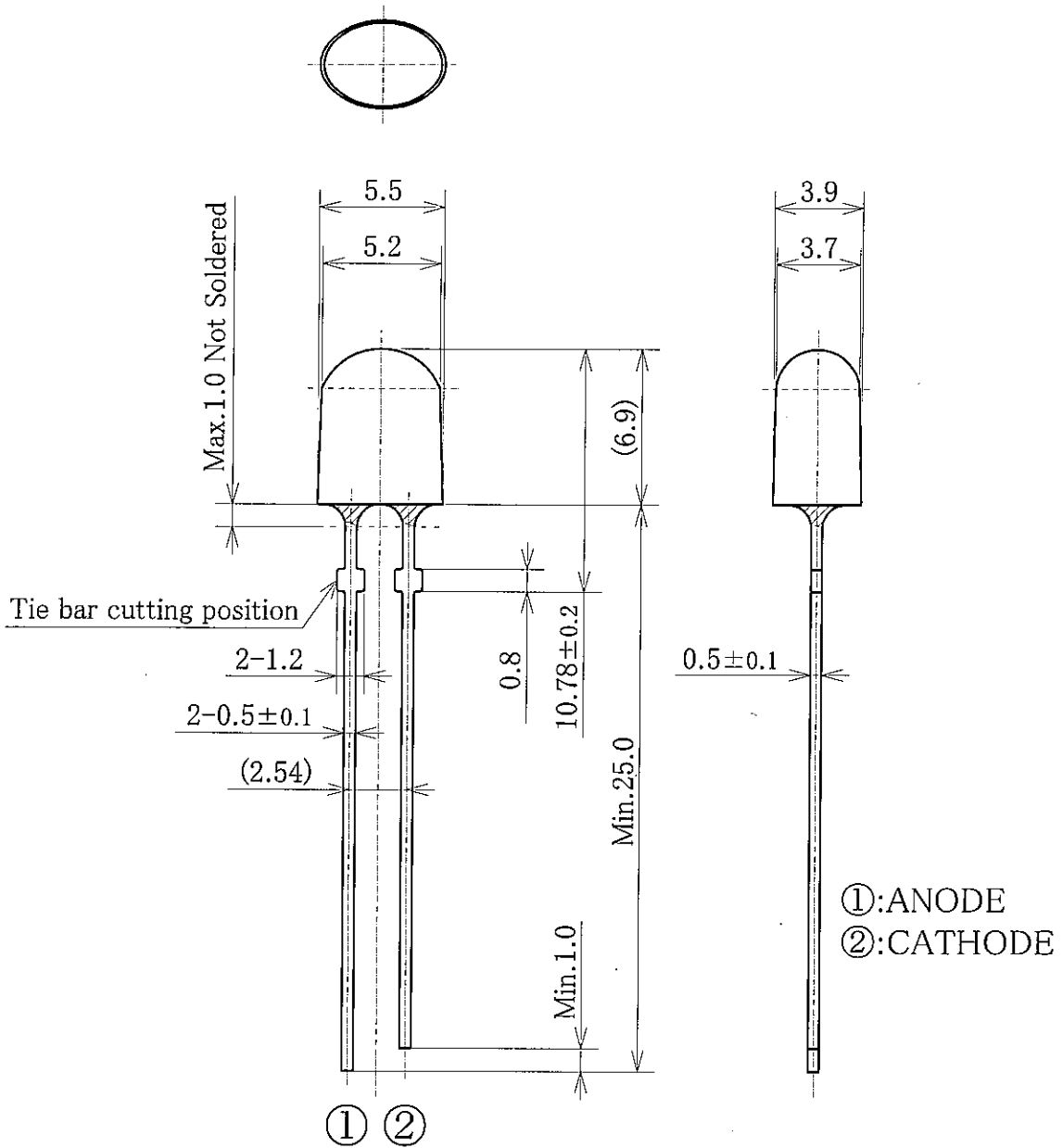
Ex. The possible wavelength range of rank 3--1 is 610~620nm.

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4. Outline Dimensions

Fig.5

Unit : mm



- General tolerance : ± 0.3
- Lead Frame : Alloy Steel
- Lead surface : dip-soldered
- Lens : Red diffused

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5. Reliability Tests

Fig.6

Item	Standard Test Method (*6)	Test Conditions	Failure Rate (*7,8)
Operating Test	ED-4701 D-511	$T_a = 25\text{ }^\circ\text{C}$, $I_F = 30\text{ mA DC}$, $t = 1000\text{ hrs.}$	0/20
High Temp. Operating Test	-	$T_a = 80\text{ }^\circ\text{C}$, $I_F = 8\text{ mA DC}$, $t = 1000\text{ hrs.}$	0/20
High Humidity Operating Test	ED-4701-3 B-122A	$T_a = 60^\circ\text{C}$, $\text{RH}=90\%$, $I_F = 16\text{ mA DC}$ $t = 1000\text{ hrs.}$	0/20
High Temp. Storage Test	ED-4701-3 B-111A	$T_a = 100\text{ }^\circ\text{C}$, $t = 1000\text{ hrs.}$	0/20
Low Temp. Storage Test	ED-4701-3 B-112A	$T_a = -40\text{ }^\circ\text{C}$, $t = 1000\text{ hrs.}$	0/20
High Humidity Storage Test	ED-4701-3 B-121A	$T_a = 85^\circ\text{C}$, $\text{RH}=85\%$, $t = 1000\text{ hrs.}$	0/20
Temperature Cycle Test	ED-4701-3 B-131A	$T_a = (-40\text{ }^\circ\text{C}, 30\text{ min.} \sim 25\text{ }^\circ\text{C}, 5\text{ min.}$ $\sim 100\text{ }^\circ\text{C}, 30\text{ min.} \sim 25\text{ }^\circ\text{C}, 5\text{ min.}) \times 100\text{ cy.}$	0/20
Thermal shock Test	ED-4701-3 B-141A	$T_a = (100\text{ }^\circ\text{C}, 5\text{ min.} \sim 0^\circ\text{C}, 5\text{ min.}) \times 50\text{ cy.}$	0/20
Soldering Heat Test	ED-4701 A-132	$T_a = 260\text{ }^\circ\text{C}$, $t = 5\text{ sec.}$, 2 times	0/20
Fall Test	-	$h=1\text{m}$, maple tree board, 10times No broken	0/20
Terminal Strength Test	ED-4701-3 A-111A	(Tensile) $W=4.9\text{N}$, $t=30\text{sec.}$ No broken & No looseness	0/20
Terminal Strength Test	ED-4701-3 A-111A	(Bending) $W=2.5\text{N}$, 2times No broken & No looseness	0/20

(*6) The code formation explains EIAJ ("Electronic Industries Association of Japan") standard methods number.

(*7) Failure rate above supposes that there is no static electricity damage.

(*8) Failure rate is conducted by following "Damage Criteria"

Fig7.

Damage Criteria

Item	Symbol	Test Condition	Limit	
			Min.	Max.
Forward Voltage	V_F	$I_F=20\text{ mA}$	-	U.S.L. $\times 1.2$
Reverse Current	I_R	$V_R=5\text{ V}$	-	U.S.L. $\times 2.0$
Luminous Intensity	I_V	$I_F=20\text{ mA}$	L.S.L. $\times 0.5$	-

(*9) U.S.L. : Upper Standard Level Max. of Value of Fig.3 (See P.2)

(*10) L.S.L. : Lower Standard Level Min. of Value of Fig.3 (See P.2)

6. Typical Characteristics

Fig. 8 Forward Voltage VS Forward Current

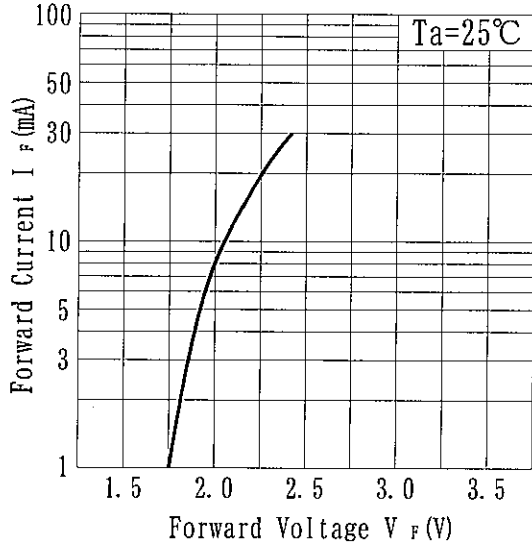


Fig. 9 Forward Current VS Relative Luminous Intensity

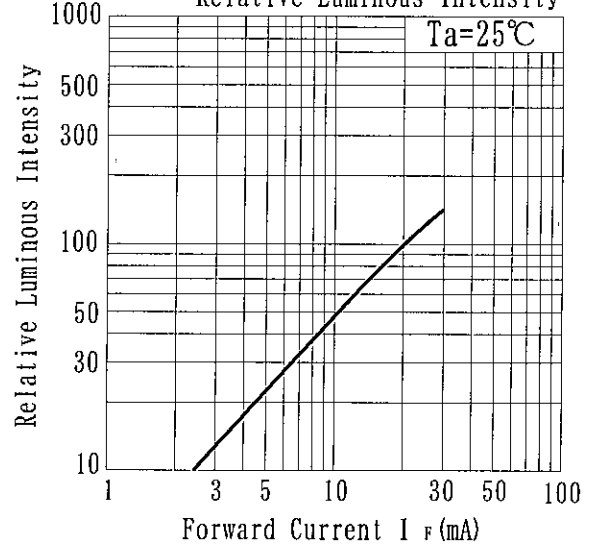


Fig. 10 Ambient Temperature VS Relative Luminous Intensity

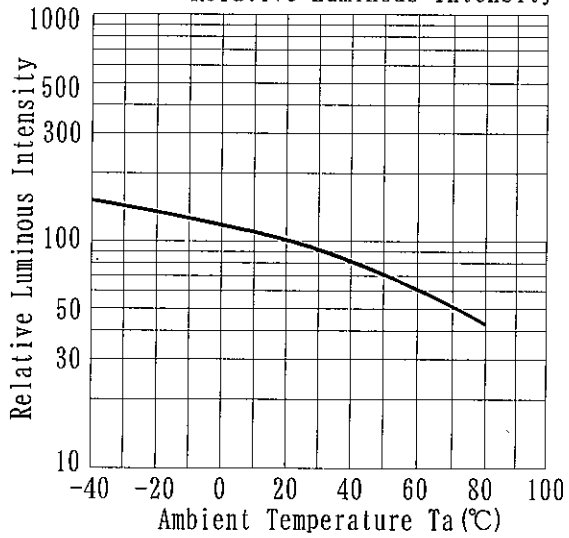


Fig. 11 Spectrum

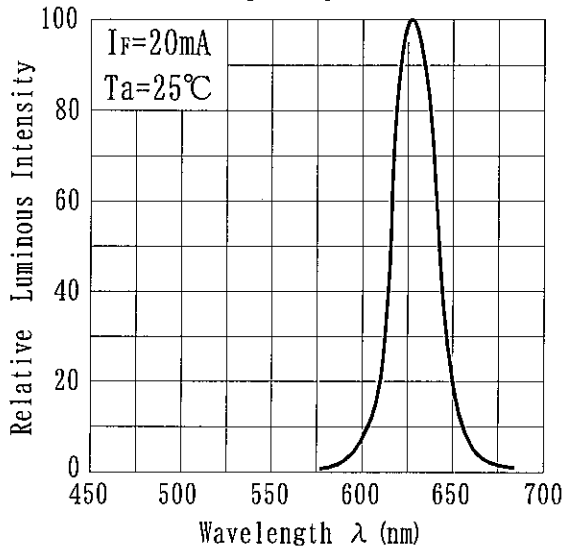


Fig. 12 Forward Current VS Dominant Wavelength

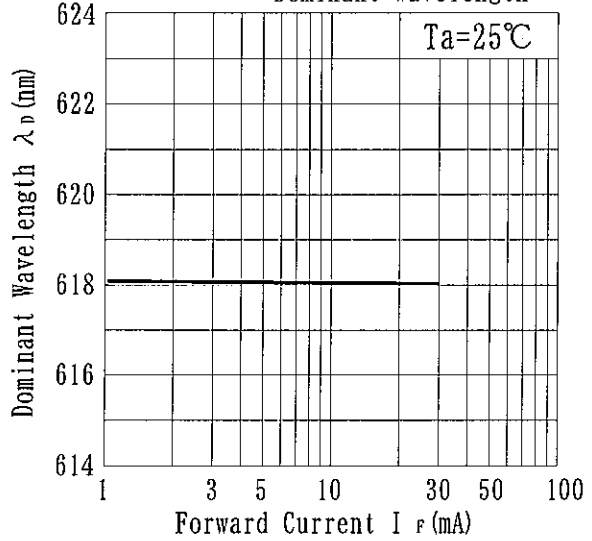


Fig. 13 Forward Current VS Chromaticity Diagram

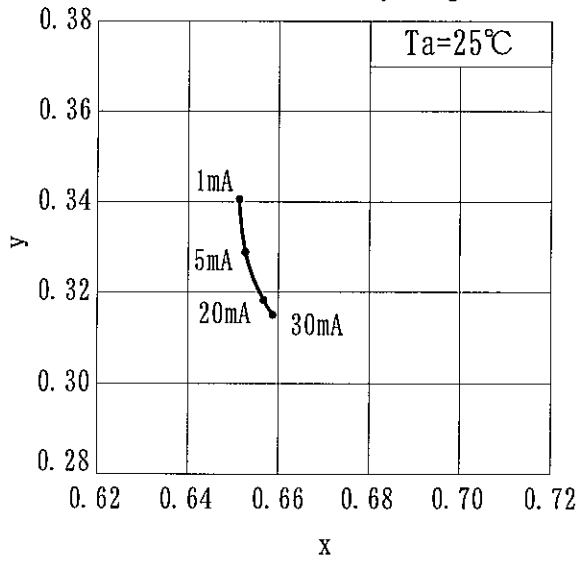
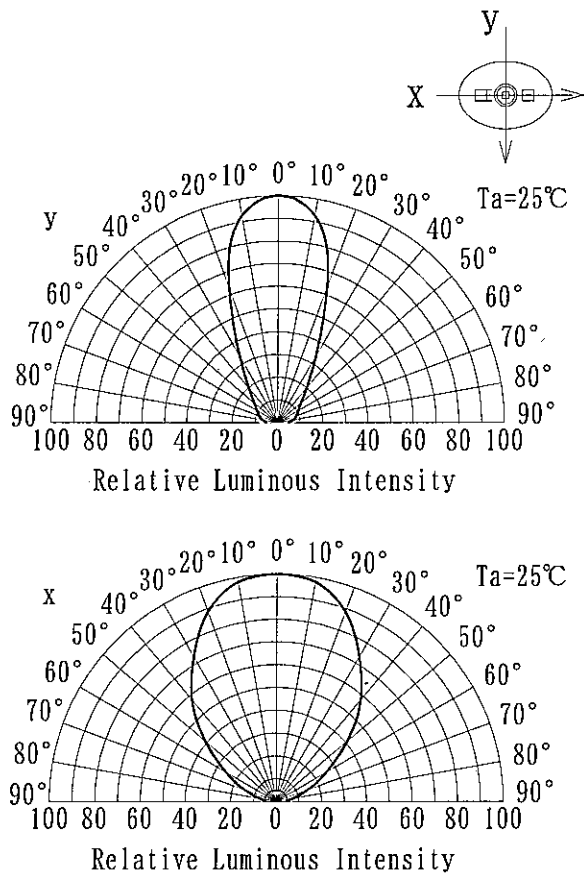


Fig. 14 Directive Characteristics



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7. Code Formation

E 1 L 5 E - A R 2 A 2 - 0 0 3 - - 1

Rank Code

Package of Products

2	200 pieces (Bulk)
6	2000 pieces (Taped)

Color

R	Red
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Type

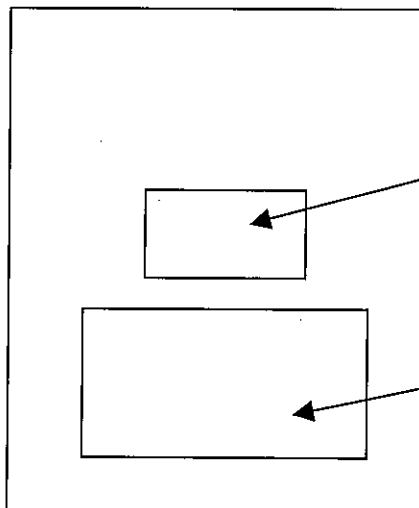
L	LED LAMP
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8. Shipping Package Style

(1) Bulk

200pcs are packed in ESD protected bag.

Bag Size : 150 mm × 205 mm



Label (Product Name, Product Number,
Lot No. and Quantity are described)

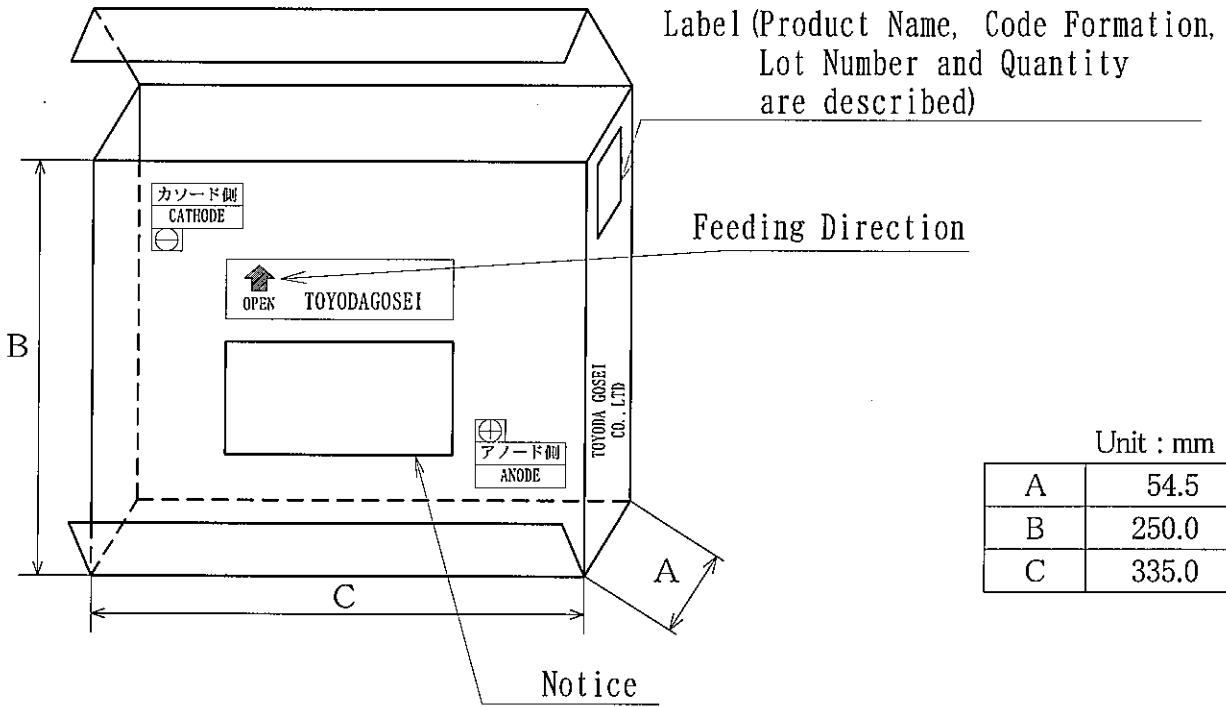
Notice

Type No. E1L5E-AR2A*-00

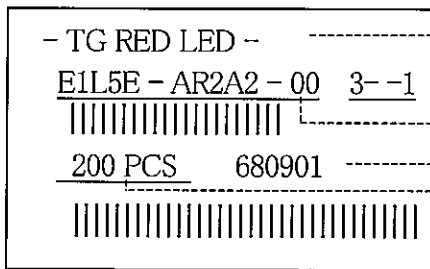
(2) Taped

2000pcs are packed in ESD Protected box.

Package :



Label Formation



Product Name

Rank

Product Number

Lot Number 6 8 09 01

Quantity Year Month Date

Jan. ~ Sep. : 1~9 32~39 means mixed Lot.

Oct. : O

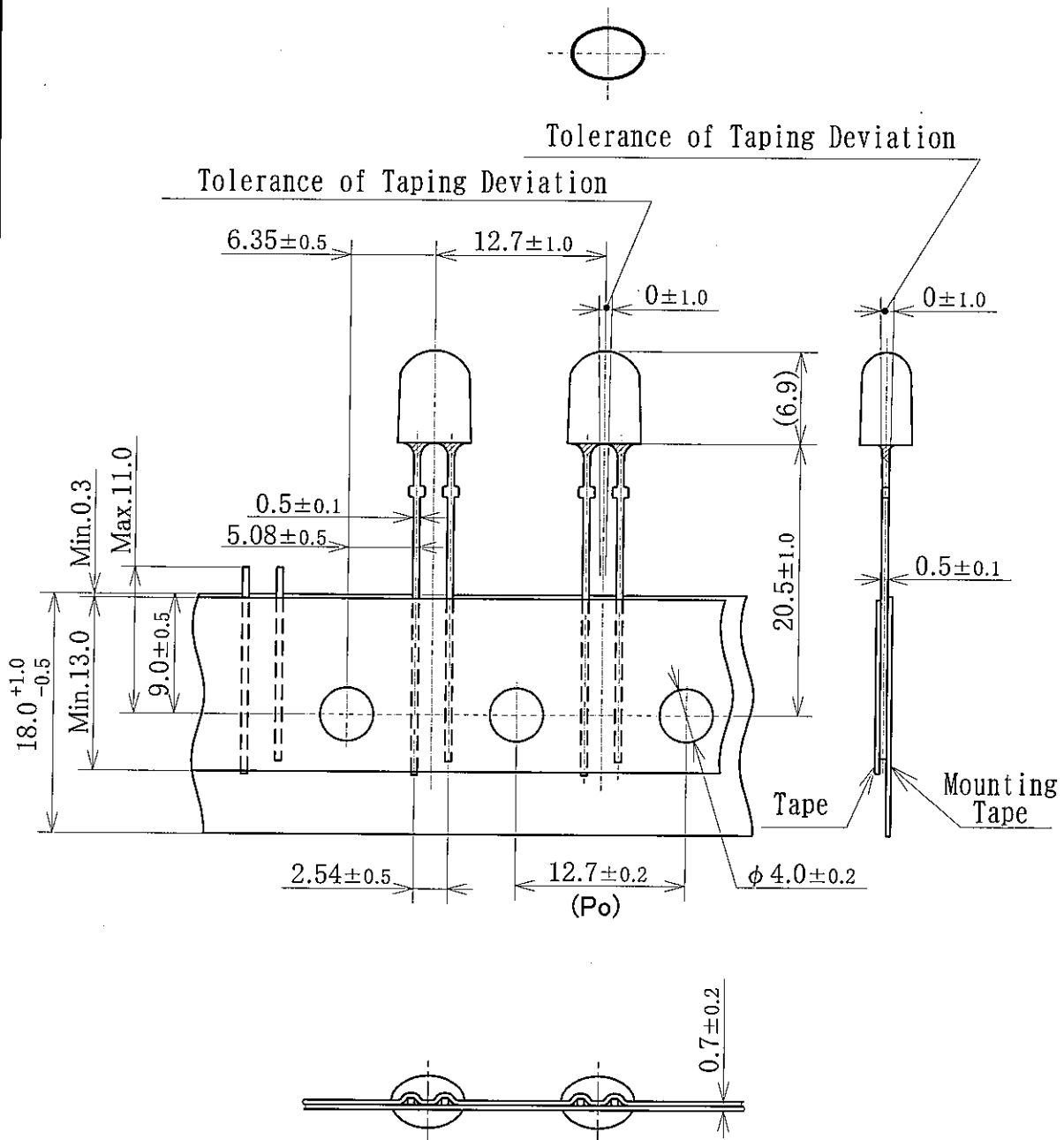
Nov. : N

Dec. : D

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Taping Dimensions

Unit:mm



- 25 LEDs between folds.
- More than 3 pilot holes without LED on both ends of tape.
- Succession of insertion failure is less than 3.
- Cathode side of the first LED is marked with red line.
- Pitch tolerance level (Po) : $\pm 1\text{mm}/20\text{pitch}$
- General tolerance : ± 0.3

9. PRECAUTIONS IN HANDLING

(1) Safety Precautions

- Do not look directly at the LED with unshielded eyes, or damage to the retina may result.

(2) Static Electricity

- These products are sensitive, a high standard of care must be used. Particularly if an over-current and over-voltage, which exceeds the Absolute Maximum Rating of Products, is applied, the overflow in energy may cause damage to, or possibly result in destruction of, the Products. Customer shall take absolutely secure countermeasures against static electricity and surge when handling Products.
- A protection device should be installed in the LED driving circuit, which does not exceed the max. rating for surge current during on/off switching.
- Proper grounding of Products (via 1 M Ω), use of conductive mat, semiconductive working uniform and shoes, and semiconductive containers are considered to be effective as countermeasures against static electricity and surge.
- A soldering iron with a grounded tip is recommended. An ionizer should also be installed where risk of static generation is high.
- If the countermeasures mentioned above are implemented, LED can work well.
Users are required to confirm those countermeasures when problems are caused by static electricity.

(3) Soldering Condition

- When soldering, leave minimum clearance between the resin and the soldering point.
- Maximum allowable soldering conditions are:
 - Solder dipping : 260 degrees C max., 5seconds max., once.
 - Soldering iron : 350 degrees C max., 5seconds max., once, power 40 W max.
- Contact between molten solder and the resin must be avoided.
- Correcting the soldered position after soldering must be avoided.
- In soldering, do not apply any stress to the lead frame, particularly when heated.
- When other SMD parts in the same circuit board and adhesive is to be cured, maximum allowable conditions are:
 - 120 degrees C max., 60 seconds max.

(4) Lead Forming and Cut

- Lead forming must be done below the tie bar cutting portion.
- When forming a lead, do not stress the resin case.
- Lead forming must be done before soldering.
- Cutting the lead frame at high temperature may result in personal injury. Cut the lead frame at room temperature.

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(5) Assembly

- Do not apply any stress to the lead frame while assembling.
- When mounting Products onto boards such as printed wired board, the pitch between the two holes of such boards must match the pitch of the Products.

(6) Cleaning

- Do not use organic solvents such as acetone which may damage the surface of chips.
- Recommended conditions are as below.
Chemicals: Alcohol (such as AK-225)
Temperature & Cleaning Time: 1. 50°C and below, note over 30 seconds
2. 30°C and below, not over 3 minutes
Ultrasonic Cleaning: @300W or below
- * When applying ultrasonic cleaning, please see if it is good for the actual operating conditions of your application as well.

(7) Precaution against heat

- Temperature of LED chips depends on operation environment and could be influenced by thermal resistance of circuit board or/and other heat source around LED. Please avoid exceeding the maximum rating of ambient temperature defined on our data sheet by applying abnormal conditions. If it is expected that your operation will exceed it, LED may not work correctly.

(8) Precaution in driving

- This product is basically designed for forward current driving. Please avoid driving with reverse voltage, which may bring about migration which damages LED chips.

10.WARRANTY

- (1) Manufacturer only warrants that the Products will conform with the items and conditions described in paragraphs 2,3 ,4, 7 and 8 in these Specifications.
- (2) Manufacturer's warranty as set forth in 10(1) above applies only when each Product stands alone. In no event shall Manufacturer assume responsibility for failure of injury arising out of Customer's installation or assembly of Products into Customer's equipment.
- (3) Customer shall conduct its receiving inspection promptly upon delivery, and in the event any Product units in the respective delivery are found not to conform with any of Manufacturer's warranties, Customer may reject and shall return such non-conforming units to Manufacturer for replacement. Customer shall provide the reason and the number for such rejection with the return of each non-conforming unit.

- (4) MANUFACTURER MAKES NO OTHER REPRESENTATION OR WARRANTIES, EITHER EXPRESS OR IMPLIED, CONCERNING THE PRODUCTS INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
- (5) Manufacturer's liability for nonconforming Products shall be in any case limited to replacement of nonconforming Products, provided that such nonconformity is attributable to Manufacturer. In no event shall Manufacturer be liable for any costs of expenses incurred for replacement of such nonconforming Products, consequential damages or lost profits.
- (6) The warranty for the Products shall be twelve (12) months from the date the Products are delivered to the Customer. Notwithstanding the foregoing, the warranty shall not apply to any of the following, even during such warranty period:
 - (a) failure of, or injury caused by the Products due to mishandling or misuse of the Products by Customer;
 - (b) failure of, or injury caused by the Products due to inappropriate repair or modification by Customer;
 - (c) failure of, or injury caused by Products due to force majeure including, without limitation, fire, earthquake, flood, lightning or other natural disasters, or pollution, damage from briny air or outbreak of a state of emergency; or
 - (d) Any failure and damage caused by not following the handling precautions listed in Section 9 of these Specifications.

- (7) The warranty provide for in these Specifications constitutes the entire and only agreement between Customer and Manufacturer with respect to the quality of the Products and supersedes, cancels and annuls all prior or contemporaneous negotiations or communications whether written or oral.
- (8) The warranty provided for in these Specifications can only be modified by a written agreement signed by the representatives of both Customer and Manufacturer.
- (9) IN NO EVENT SHALL MANUFACTURER BE LIABLE TO BUYER FOR (I) ANY LOSS OR DAMAGE (WHETHER SPECIAL, CONSEQUENTIAL, COMPENSATORY, PUNITIVE, EXEMPLARY, DIRECT, INDIRECT OR OTHERWISE) TO CUSTOMER'S PROPERTY RESULTING FROM THE USE, HANDLING, TRANSPORTATION, SALE, STORAGE, REPAIR, MODIFICATION OR MAINTENANCE OF THE PRODUCTS, WHETHER IN THE MANUFACTURING OR INSTALLATION PROCESS, ALONE, IN COMBINATION WITH OTHER GOODS, MATERIALS, EQUIPMENT OR SUBSTANCES OR OTHERWISE, (II) ANY LOSS OF USE, REVENUE OR PROFIT OR DIMINUTION OF GOODWILL, EVEN IF MANUFACTURER KNEW OR SHOULD HAVE KNOWN OF THE POSSIBILITY OF SUCH LOSS, DAMAGE OR DIMINUTION, (III) ANY INJURY TO OR DEATH OF PERSONS AND (IV) ANY CLAIM, DEMAND, ACTION, LAWSUIT OR OTHER PROCEEDING AGAINST CUSTOMER BY ANY THIRD PARTY, WITH RESPECT TO (A) ANY LOSS OR DAMAGE (WHETHER SPECIAL, CONSEQUENTIAL, COMPENSATORY, PUNITIVE, EXEMPLARY, DIRECT, INDIRECT OR OTHERWISE) INCURRED, SUFFERED OR OTHERWISE CLAIMED BY SUCH THIRD PARTY OR (B) ANY INJURY TO OR DEATH OF PERSONS.

11. MISCELLANEOUS

- (1) The Products described in these Specifications are intended only for standard applications or general electronic equipment such as office equipment, communications, electronic instrumentation and household electrical appliances.

When they are used for transport equipment, disaster prevention and crime prevention equipment as well as other safety devices calling for high reliability and safety, Customers are requested to pay particular heed to the safety design of the equipment as a whole in terms of fail-safe design and redundant design to maintain the reliability safety of such equipment.

Do not use them for special applications (and such as aviation, space craft and life-sustaining equipment) requiring exceptionally high reliability and safety, and if their failure or malfunction may threaten human lives or may detrimental to human bodies.

It is to be understood that the manufacturer shall not be held responsible for any damage incurred as a result of using the product for purpose which is not the standard the manufacturer has intended to be used for, unless the manufacturer articulate agrees to the no-standard use in writing.

- (2) Customers must comply with the laws and public regulations concerning safety.

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The content of these Specifications shall be deemed fully accepted by Customer either (1) upon execution hereof by the Customer or (2) if Customer does not advise Manufacture of any objections within two (2) weeks of the date of receipt of these Specifications, whichever is the earlier. If Customer does advise Manufacturer of any objections within two (2) weeks of the date of receipt of these Specifications, the parties shall negotiate an alternative acceptable to both parties, which alternative shall be deemed fully acceptable by Customer upon Customer's execution of the revised Specifications.

("Customer")

Date _____

("Manufacture")

Date _____

Date _____