



Pb-free
HEAT

STANLEY

DNK1101M

Surface Mount Type/
High-output IRED for Automotive

Features

Package	10.2 x 6.0 mm (h=5.5 mm) type, Water clear epoxy
Product features	• Outer Dimension 10.2 x 6.0 x 5.5mm (L x W x H) • Big Lenz Type • Wide operation temperature range. Storage Temperature : -40°C~120°C Operating Temperature : -30°C~ 95°C • High Total Output Power : 22mW TYP. (I_F=50mA) • Operation at 50mA is possible at 85°C. • Lead-free soldering compatible • RoHS compliant
Peak Wavelength	870nm
Half Intensity Angle	$\theta_x = 38 \text{ deg.}, \theta_y = 38 \text{ deg.}$
Die materials	GaAlAs
Rank grouping parameter	Sorted by radiant intensity per rank taping
Assembly method	Auto pick & place machine (Auto Mounter)
Soldering methods	Reflow soldering ※Please refer to Soldering Conditions about soldering.
Taping and reel	900pcs per reel in a 24mm width tape. (Standard) Reel diameter: $\phi 330\text{mm}$
ESD	2kV (HBM)

Recommended Applications

Automotive (Camera of Door Mirror, Camera of Crew Detection, Camera of Driver Watch, Rear Head Phone, Back Monitor, Various Sensors)

Absolute Maximum Ratings

(Ta=25°C)

Item		Symbol	Absolute Maximum Ratings	Unit
Power Dissipation		Pd	170	mW
Forward Current	Ta=60°C	I _F	120	mA
	Ta=95°C		40	
Pulse Forward Current ※1		I _{FRM}	1,200	mA
Derating (Ta=60°C or higher)		Δ I _F	2.29	mA/°C
		Δ I _{FRM}	22.90	mA/°C
Reverse Voltage		V _R	5	V
Operating Temperature		T _{opr}	-30~+95	°C
Storage Temperature		T _{stg}	-40~+120	°C

※1 I_{FRM} Measurement condition : Pulse Width ≤ 100 μs, Duty ≤ 1/100

Electro-Optical Characteristics

(Ta=25°C)

Item	Conditions	Symbol	Characteristics		Unit
Forward Voltage	I _F =50mA	V _F	MIN.	1.3	V
			TYP.	1.5	
			MAX.	1.7	
Pulse Forward Voltage	I _{FRM} =500mA	V _{FM}	MAX.	3.4	V
Reverse Current	V _R =5V	I _R	MAX.	100	μA
Radiant Intensity	I _F =50mA	I _E	MIN.	20	mW/sr
			TYP.	35	
			MAX.	(60)	
Total Output Power	I _F =50mA	P _o	TYP.	22	mW
Peak Wavelength	I _F =50mA	λ _p	TYP.	870	nm
Spectral Half-width	I _F =50mA	Δ λ	TYP.	45	nm
Half Intensity Angle	I _F =50mA	2θ 1/2	TYP.	38(θ x)	deg.
				38(θ y)	
Cut-off Frequency	I _F =50mA _{DC} ±5mA, -3db from 1MHz	fc	MIN.	(40)	MHz
			TYP.	55	
Response Time	I _F =50mA	tr/tf	TYP.	7/7	ns



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Radiant Intensity Rank

(Ta=25°C)

Rank	I _E (mW/sr)		Condition
	MIN.	MAX.	
A	20	35	I _F = 50mA
B	30	45	
C	40	(60)	

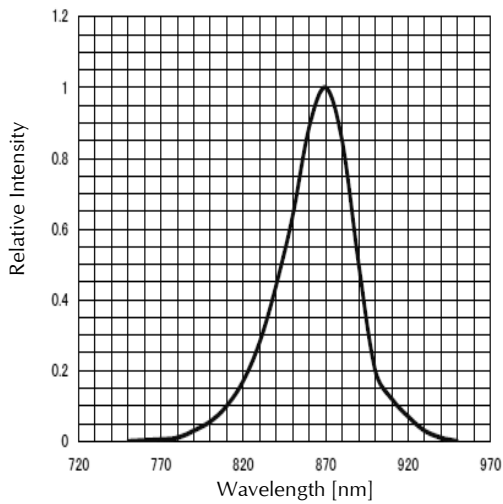
※Please contact our sales staff concerning rank designation.

Technical Data

Spectral Distribution

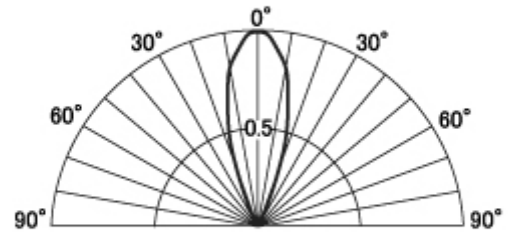
Relative Intensity vs. Wavelength

Condition : $T_a = 25^\circ\text{C}$, $I_F = 50\text{mA}$



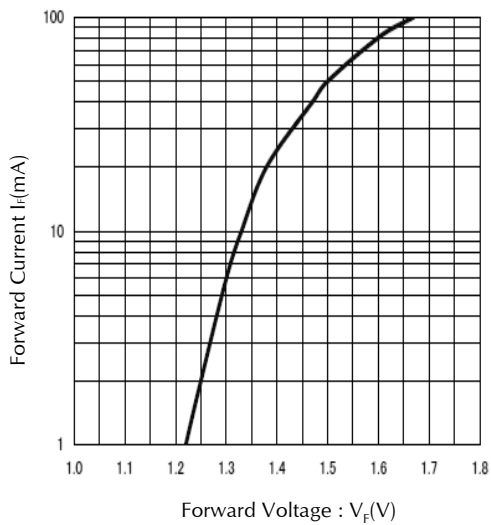
Spatial Distribution Example

Condition : $T_a = 25^\circ\text{C}$



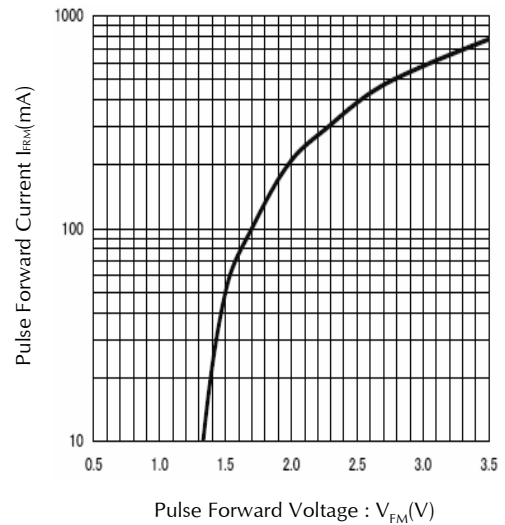
Forward Voltage vs. Forward Current

Condition : $T_a = 25^\circ\text{C}$



Pulse Forward Voltage vs. Pulse Forward Current

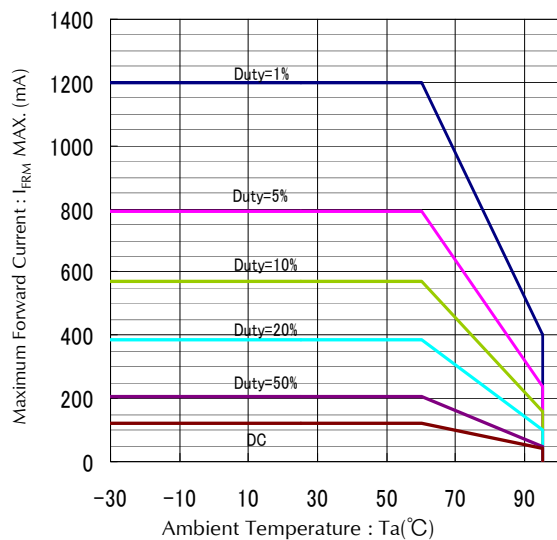
Condition : $T_a = 25^\circ\text{C}$, $t_w \leq 100 \mu\text{s}$, Duty $\leq 1/100$



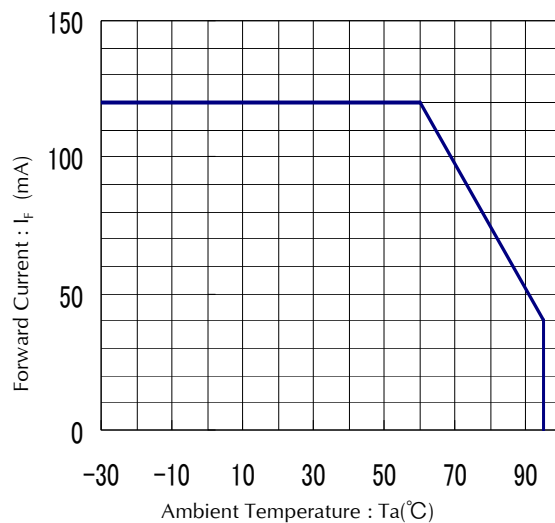
Technical Data

Derating

Ambient Temperature vs. Maximum Forward Current
Condition : $t_w \leq 100 \mu s$

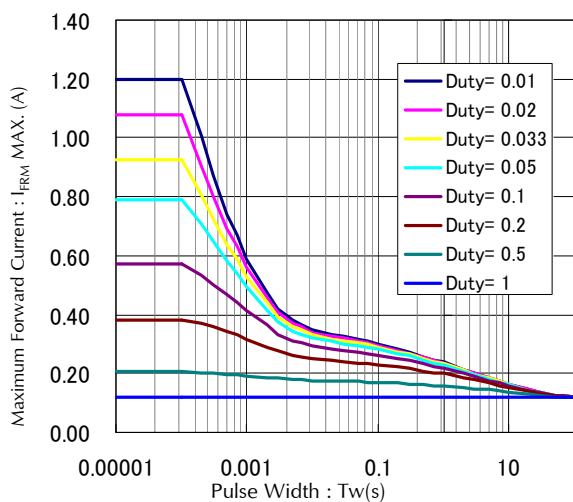


Ambient Temperature vs. Forward Current



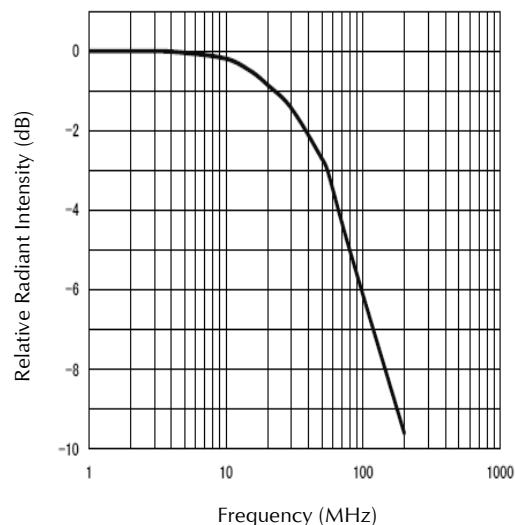
Pulse Width vs. Maximum Forward Current

Condition : $T_a \leq 60^\circ C$



Frequency

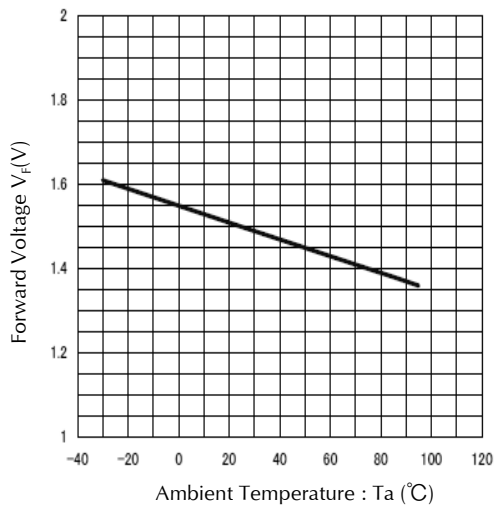
Condition : $T_a = 25^\circ C$, $I_F = 50mA_{DC} \pm 5mA$



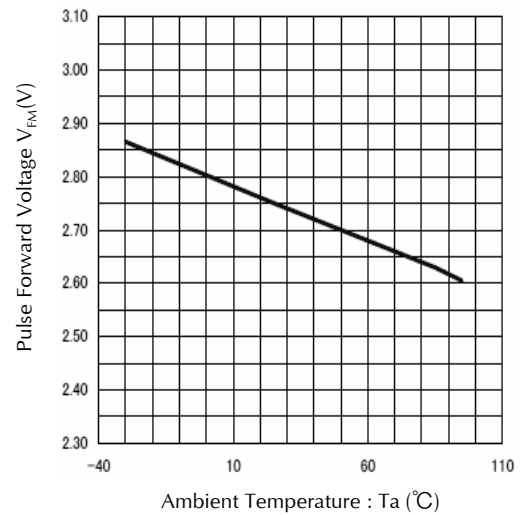
$$Duty = \frac{T_w}{T}$$

Technical Data

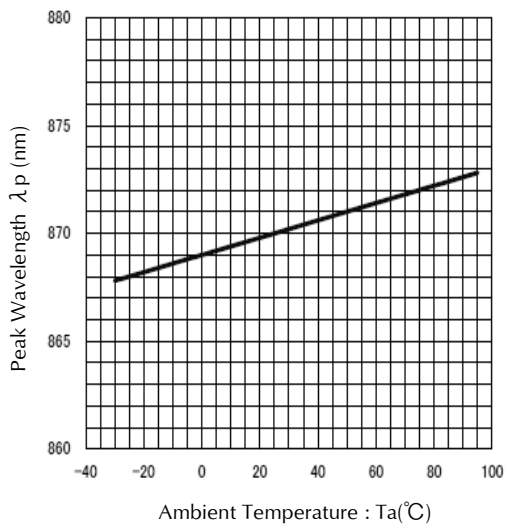
Ambient Temperature vs. Forward Voltage
Condition : $I_F = 50\text{mA}$



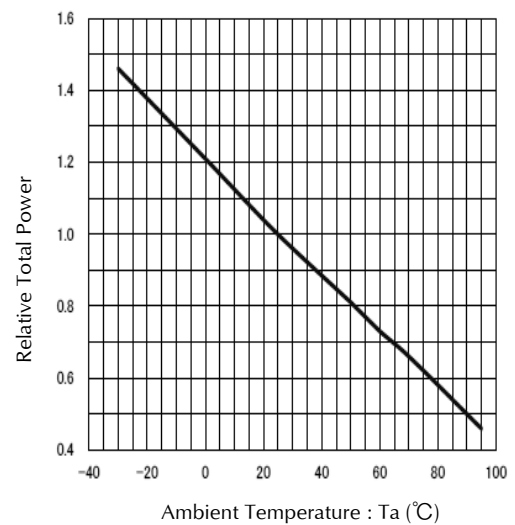
Ambient Temperature vs. Pulse Forward Voltage
Condition : $I_{FRM} = 500\text{mA}$, $t_w \leq 100 \mu\text{s}$, Duty $\leq 1/100$



Ambient Temperature vs. Peak Wavelength
Condition : $I_F = 50\text{mA}$

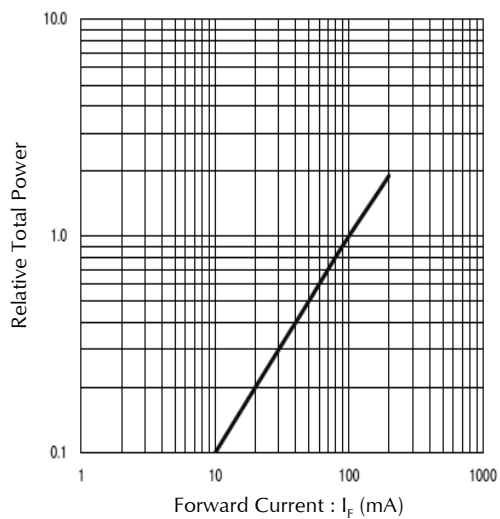


Ambient Temperature vs. Relative Total Power
Condition : $I_F = 50\text{mA}$

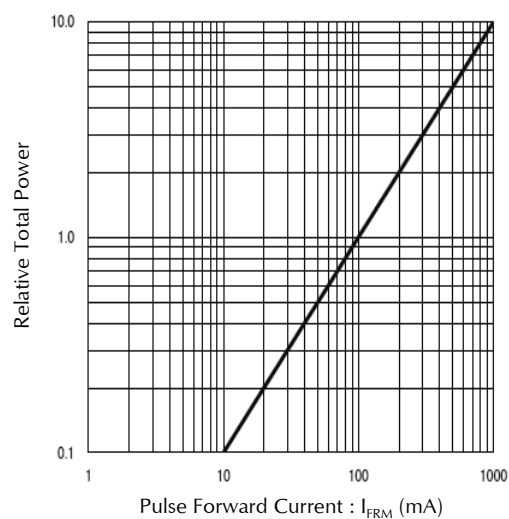


Technical Data

Forward Current vs. Relative Total Power
Condition : $T_a = 25^\circ\text{C}$



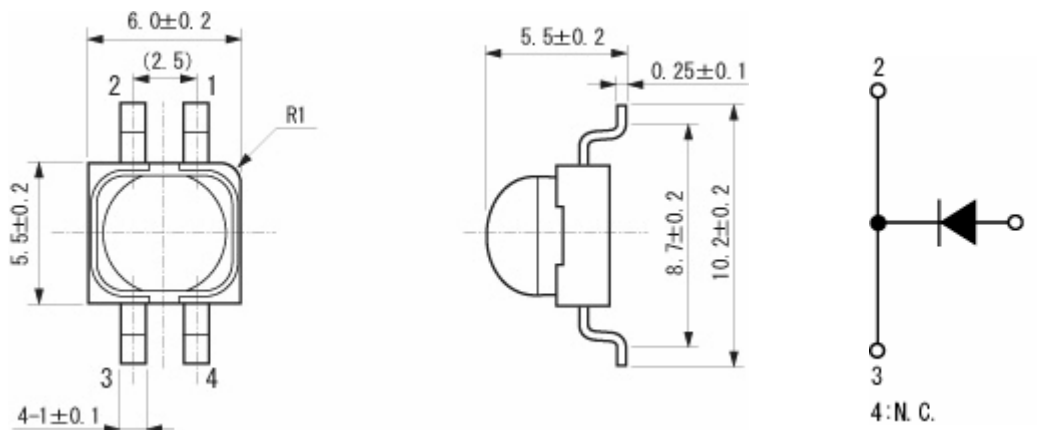
Pulse Forward Current vs. Relative Total Power
Condition : $t_w \leq 100 \mu\text{s}$, $\text{Duty} \leq 1/100$, $T_a = 25^\circ\text{C}$



Package Dimensions

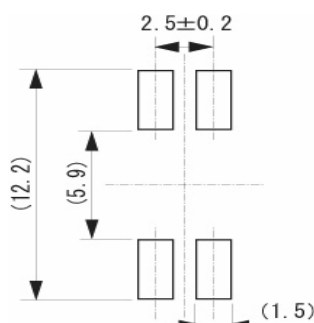
(Unit: mm)

Weight: (194)mg



Recommended Soldering Pattern

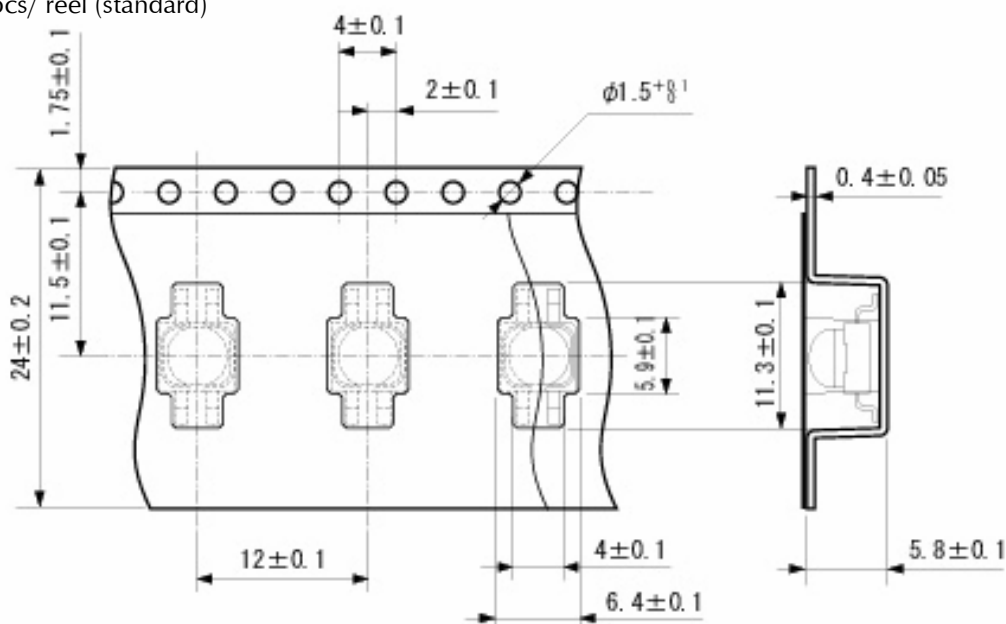
(Unit: mm)



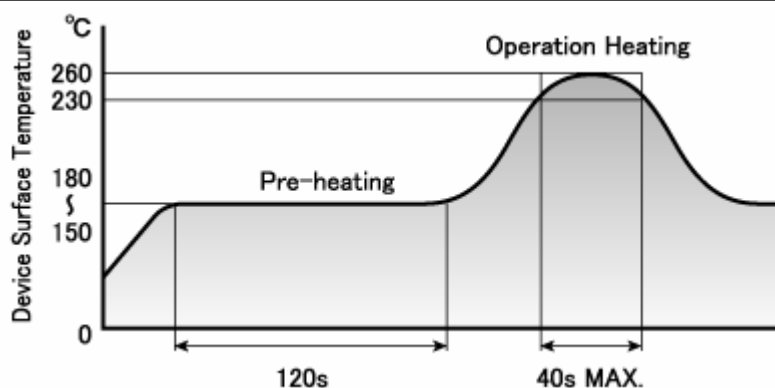
Taping Specification

(Unit: mm)

Quantity: 900pcs/ reel (standard)



Reflow Soldering Conditions



- 1) The above profile temperature gives the maximum temperature of the LED resin surface. Please set the temperature so as to avoid exceeding this range.
- 2) Total times of reflow soldering process shall be no more than 2 times.
When the second reflow soldering process is performed, intervals between the first and second reflow should be short as possible (while allowing some time for the component to return to normal temperature after the first reflow) in order to prevent the LED from absorbing moisture.
- 3) Temperature fluctuation to the LED during the pre-heating process shall be minimized.

Manual Soldering Conditions

Iron tip temp.	350 °C	(MAX.) (30 W Max.)
Soldering time and frequency	3 s	(MAX.)
	1 time	(MAX.)

Handling Note

1. Handling of the Products

Mold resin on the backside of the products has adhesiveness. If dust or your hand is stuck to the backside, Please slowly remove the product from there. And if the backside is strongly pushed, it affects the characteristics and reliability. Please be careful in handling.

2. Dirt

If dirt sticks to the surface of lens, it affects the radiant intensity. Please don't touch the lens with bare hands. If dirt affects function, please wipe the dirt off carefully not to cause scratches on the lens with lens paper or the like. And if flux is stuck to the lens, please wipe the flux off carefully with alcohol-based cleaner.

3. Dew

When the temperature changes suddenly at high temperature and humidity, dew is generated. Because dew is likely to cause reduction in radiant intensity, failure to light up, deterioration of insulation and the like, please care. Because color of lens changes into milky color by rapid cooling at the conditions of high temperature and humidity, please care.

4. Freezing

When temperature is below 0°C, water of dew and the like freezes. Because freezing is likely to cause reduction in radiant intensity, failure to light up, deterioration of insulation and the like, please care.

5. Strength

When mounting, assembling, cleaning the lens, storing the products and the like, please be careful not to apply mechanical stress and excessive vibration to products. They are likely to cause cracks, delamination and bending terminal. And they are likely to affect the characteristics and reliability badly.

6. Mechanical stress to terminals

When storing products and soldering, please be careful not to apply mechanical stress and excessive vibration to terminals. They are likely to cause cracks, delamination and bending terminal. And they are likely to affect the characteristics and reliability badly.

7. Backside

Dust is stuck to the backside easily on construction of this product. There is no problem on the characteristic even if dust is stuck to the backside. Please be careful not to wipe off forcibly and not to rub.

8. Moisture Absorption

If you use soldering with the over-specified humidity conditions, it affects the characteristics and reliability. Please use with the specified conditions.

9. Discoloration

This product might discolor by the heat of reflow and might change to yellowish. But there is no problem on the characteristic and reliability.

10. Application

Please stop to use by the applications that the breakdown and the wrong operation might influence the life or the human body.

11. Other

When there is a process of supersonic wave welding etc after mounting the product, there is a possibility of affecting on the reliability of junction part in package (junction part of die bonding and wire bonding). Please use after affirming beforehand there is no problem.

If this product is used excluding the content described to these specifications, we do not take any responsibility. If you use it excluding these ratings, please consult us beforehand.

★Safety of Near-Infrared Rays★

It is generally said that the near-infrared rays(870nm) used for this product is harmless to humans. But we can not say that direct rays to eyes are always safe as well as the visual light. Please pay attention when the product is used.

Reliability Testing Result

Reliability Testing Result	Applicable Standard	Testing Conditions	Duration	Failure
Room Temp. Operating Life	EIAJ ED-4701/100(101)	Ta = 25°C, If = 100mA	1,000 h	0/20
		Ta = 25°C, I _{FRM} = 1,000mA, (tw=100 μs, Duty=1/100)	1,000 h	0/20
High Temp. Operating Life	EIAJ ED-4701/100(101)	Ta = 95°C, If = 40mA	1,000 h	0/20
Low Temp. Operating Life	EIAJ ED-4701/100(101)	Ta = -30°C, If = 100mA	1,000 h	0/20
Wet High Temp. Operating Life	EIAJ ED-4701/100(102)	Ta = 85°C, 85%, If = 50mA	1,000 h	0/20
Thermal Shock	EIAJ ED-4701/100(105)	Ta = -40°C ~ 120°C (each 15min.)	1,000 cycles	0/20
High Temp. Storage Life	EIAJ ED-4701/200(201)	Ta = 120°C	1,000 h	0/20
Low Temp. Storage Life	EIAJ ED-4701/200(202)	Ta = -40°C	1,000 h	0/20
Resistance to Soldering Heat	EIAJ ED-4701/300(301)	(Pretreatment) Individual standard (Reflow Soldering) Pre-heating 180°C 120s →Operating Heating 260°C 5s	Twice	0/20
Electric Static Discharge (ESD)	EIAJ ED-4701/300(304)	C = 100pF, R2 = 1.5KΩ, ±2,000V	once each polarity	0/10
Vibration, Variable Frequency	EIAJ ED-4701/400(403)	44.1m/s ² (4.5G), 20 ~ 500Hz, 20min, XYZ each direction	2 h	0/10
Shock	EIAJ ED-4701/400(404)	5000m/s ² (510G), 0.5ms, 6directions	3 times	0/10

Failure Criteria

Items	Symbols	Conditions	Failure criteria
Radiant Intensity	I _E	If Value of each product Radiant Intensity	Testing Min. Value < Initial Value x 0.5
Forward Voltage	V _F	If Value of each product Forward Voltage	Testing Max. Value > Spec. Max. Value x 1.2
Reverse Current	I _R	V _R = Maximum Rated Reverse Voltage V	Testing Max. Value ≥ Spec. Max. Value x 2.5

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- 4) The products that have been described to this catalog are manufactured so that they will be used for the electrical instrument of the benchmark (OA equipment, telecommunications equipment, AV machine, home appliance and measuring instrument).
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