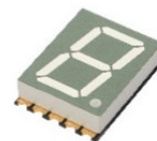


Features

- High reliability
- Low current operation
- Low profile and light weight (for space-saving designs)
- Packaged in tape and reel for automated SMT assembly
- Compatible with IR-reflow soldering
- Excellent character appearance
- RoHS compliant



Descriptions

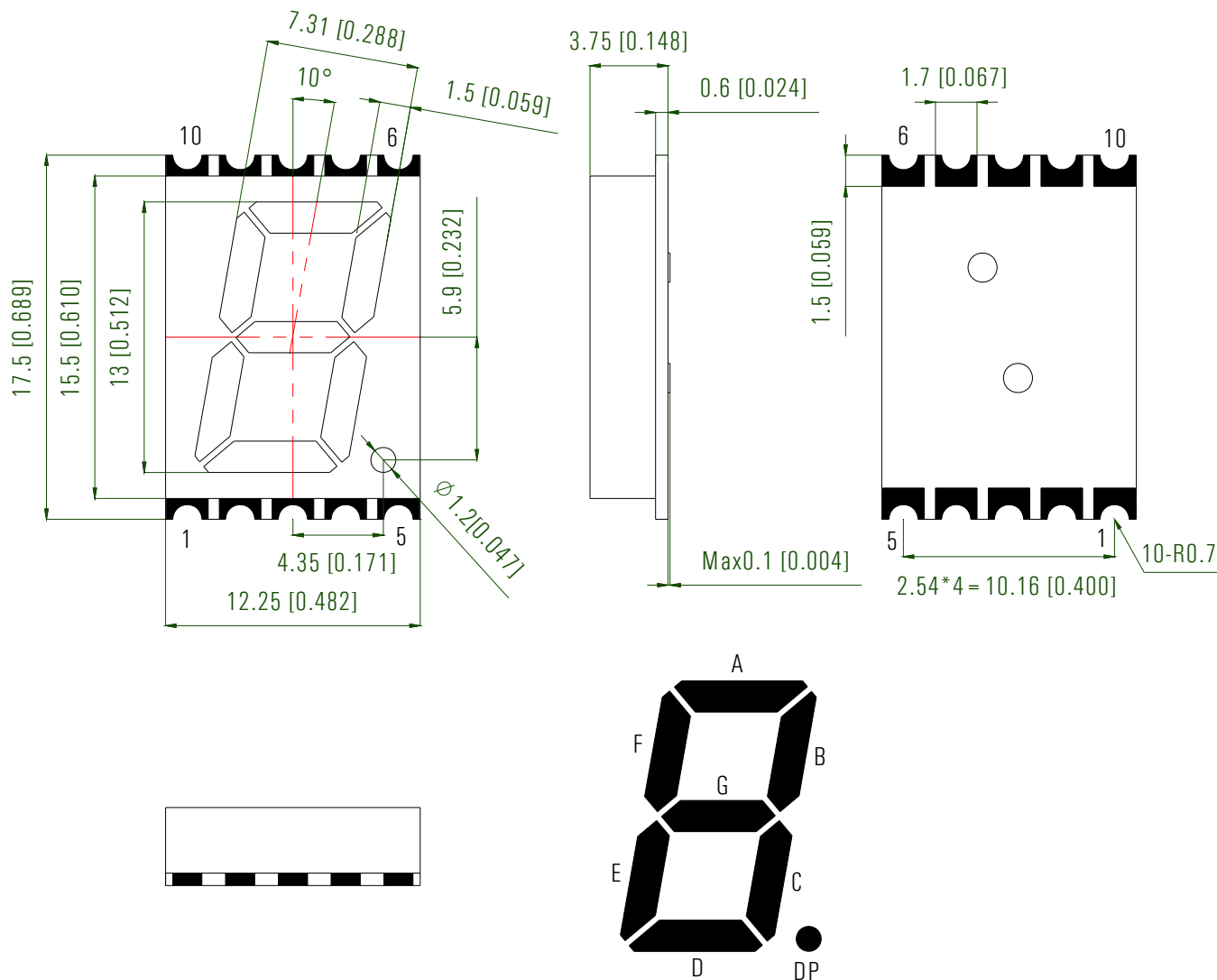
KD1-S511ARA (Common Anode) and KD1-S511CRA (Common Cathode) are 0.51-inch (13 mm) character height surface-mount (SMD) red 1-digit seven-segment displays. These devices provide excellent readability at distances up to 7 meters and offer stable performance under high ambient light conditions. The standard version features a gray surface with white segments; a black surface version is also available as an option.

Applications

- **Consumer Electronics:** Home appliances, Game console systems
- **Commercial Terminals:** Point-of-sale terminals
- **General Use:** Digital readout displays
- **Industrial Equipment:** Instrumentation panels, Test and measurement equipment, Control systems

Device Selection Guide

Part No.	Emitting Color	Circuit Type
KD1-S511ARA	Red	Common Anode
KD1-S511CRA	Red	Common Cathode

Package Dimension**Notes:**

1. All dimensions are in millimeters (inches).
2. Tolerance is $\pm 0.25\text{mm}$ (.010") unless otherwise noted.
3. The gap between the reflector and PCB shall not exceed 0.25mm.

Spec No.: S-KD1-S511-M016

Issue No.: Rev. 1

LuckyLight Electronics Co., Ltd

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Date: May 20, 2017

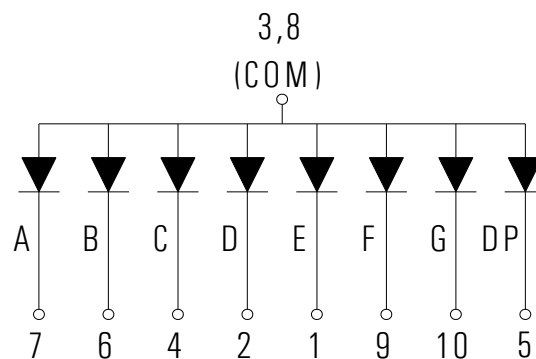
E-mail: sales@luckylight.cn

<https://www.luckylight.cn>

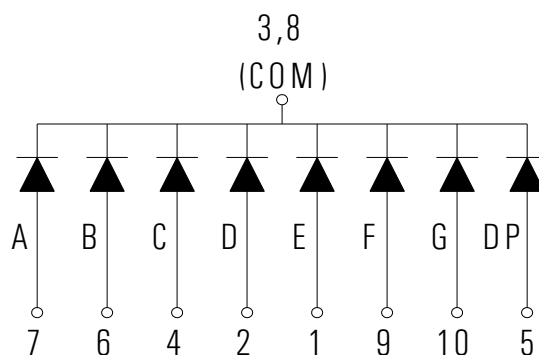
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Internal Circuit Diagram

KD1-S511ARA (Common Anode)

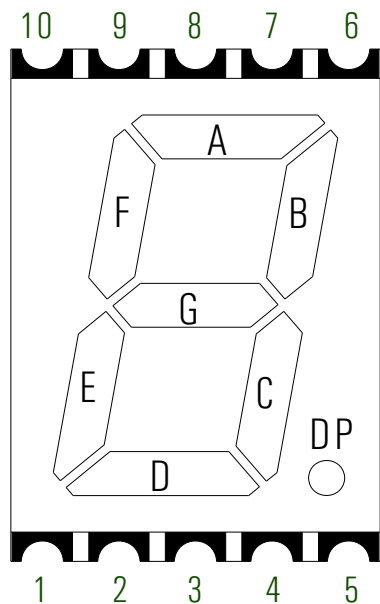


KD1-S511CRA (Common Cathode)



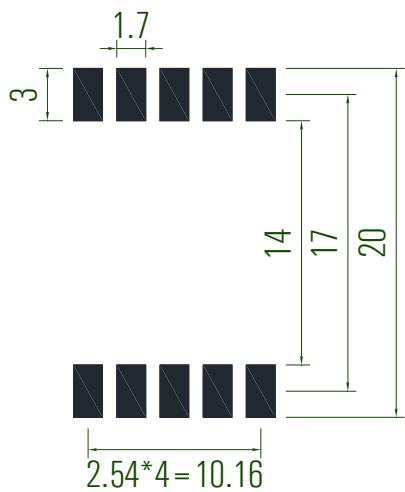
KD1-S511ARA / KD1-S511CRA
0.51-inch (13 mm) 1-Digit Seven-Segment Display
Red Surface-Mount Single-Digit LED Numeric Display
Technical Data Sheet

Pin Connection



Pin No.	Function
1	Segment E
2	Segment D
3	Common
4	Segment C
5	Segment DP
6	Segment B
7	Segment A
8	Common
9	Segment F
10	Segment G

Recommended PCB Layout



0.51-inch (13 mm) 1-Digit Seven-Segment Display**Red Surface-Mount Single-Digit LED Numeric Display****Technical Data Sheet****Absolute Maximum Ratings at $T_A=25^{\circ}\text{C}$**

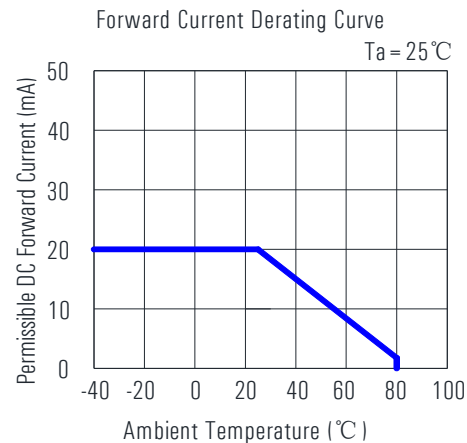
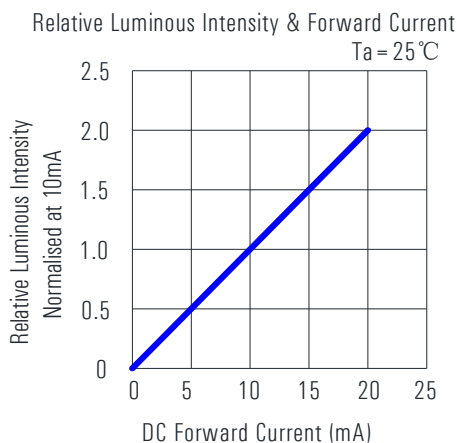
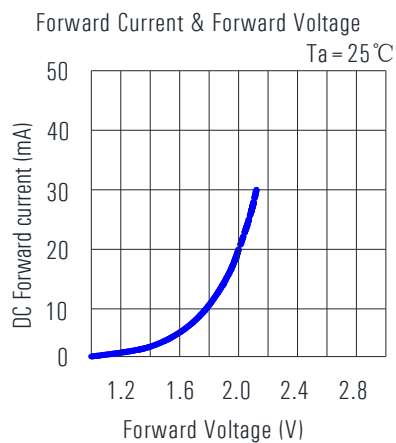
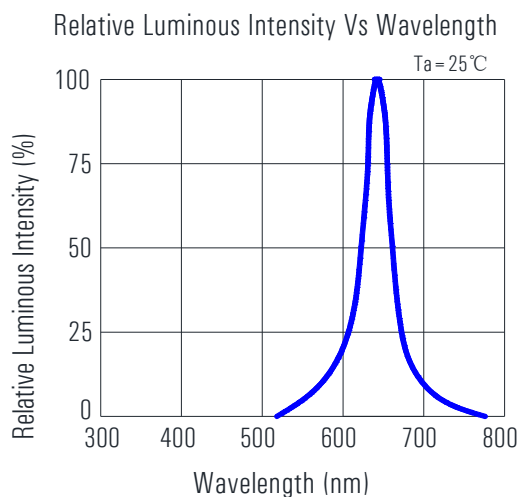
Parameters	Symbol	Max	Unit
Power Dissipation (Per Chip)	P_D	48	mW
Peak Forward Current (Per Segment) (1/10 Duty Cycle, 0.1ms Pulse Width)	I_{FP}	40	mA
Forward Current (Per Segment)	I_F	20	mA
Reverse Voltage (Per Chip)	V_R	5	V
Operating Temperature Range	T_{opr}	-40°C to $+80^{\circ}\text{C}$	
Storage Temperature Range	T_{stg}	-40°C to $+85^{\circ}\text{C}$	

Electrical Optical Characteristics at $T_A=25^{\circ}\text{C}$

Parameters	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I_{v-m}	9.5	19.0	---	mcd	IF=10mA (Note a)
Luminous Intensity Matching Ratio	I_{v-m}	---	---	2:1		IF=10mA
Peak Emission Wavelength	λ_p	---	645	---	nm	IF=10mA
Dominant Wavelength	λ_d	---	630	---	nm	IF=10mA (Note b)
Spectral Line Half-Width	$\Delta\lambda$	---	20	---	nm	IF=10mA
Forward Voltage (Per Segment)	V_F	---	1.9	2.4	V	IF=10mA (Note c)
Reverse Current (Per Segment)	I_R	---	---	50	μA	VR=5V

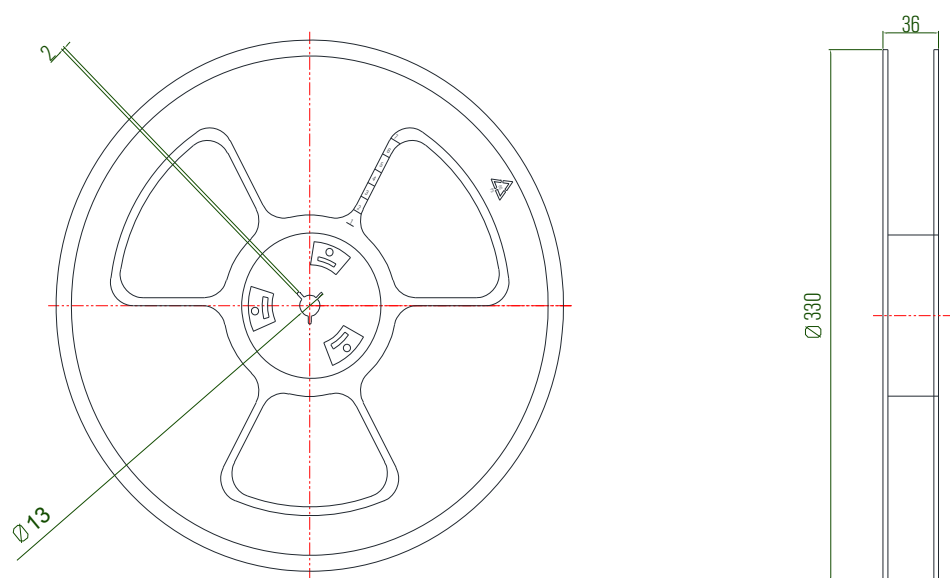
Notes:

- Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve. Tolerance of Luminous Intensity: $\pm 10\%$.
- The dominant wavelength (λ_d) is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
- Tolerance of Forward Voltage: $\pm 0.1\text{V}$.

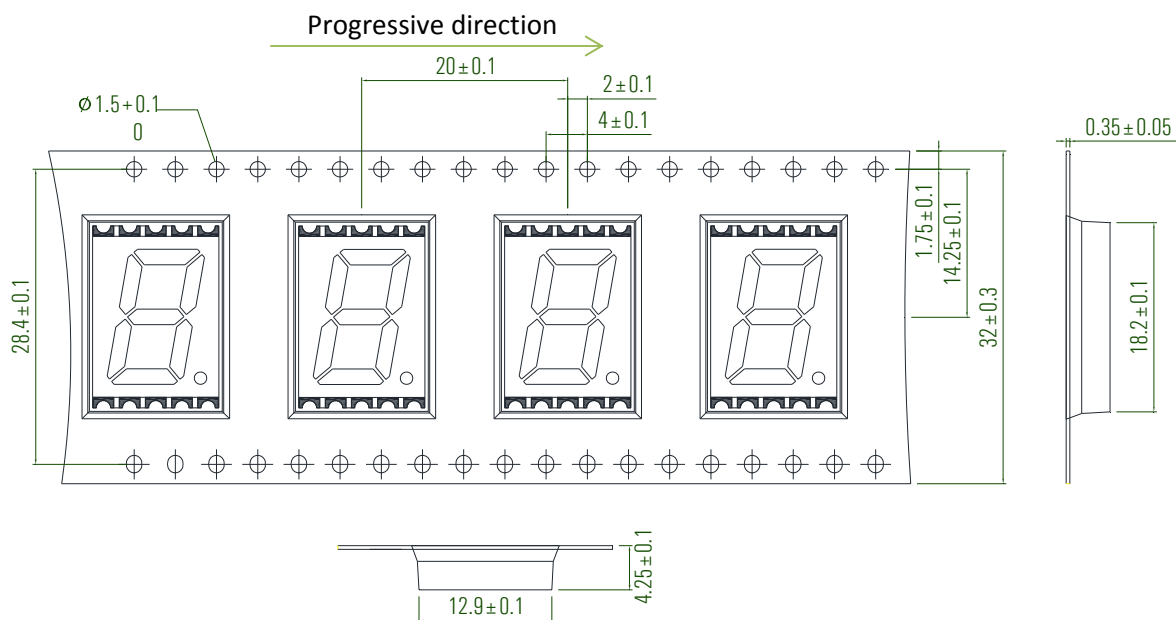
Typical Electrical/Optical Characteristic Curves at $T_A = 25^\circ\text{C}$ 

KD1-S511ARA / KD1-S511CRA
0.51-inch (13 mm) 1-Digit Seven-Segment Display
Red Surface-Mount Single-Digit LED Numeric Display
Technical Data Sheet

Reel Dimensions (units: mm)



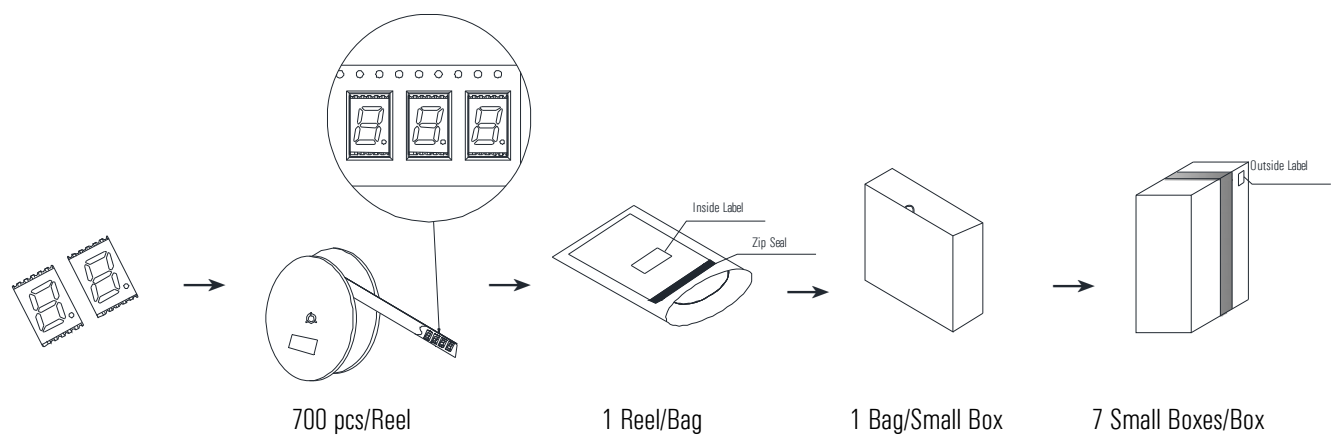
Tape Specifications (units: mm)



Note: Tolerances unless mentioned ±0.25mm.

KD1-S511ARA / KD1-S511CRA
0.51-inch (13 mm) 1-Digit Seven-Segment Display
Red Surface-Mount Single-Digit LED Numeric Display
Technical Data Sheet

Packing & Label Specifications



LuckyLight

MFG P/N:XXXXXXXXXX



CPN:XXXXXXXXX



QTY:XXXX PCS



LOT NO:XXXXXXXXXX



TRACEABILITY



DATE CODE

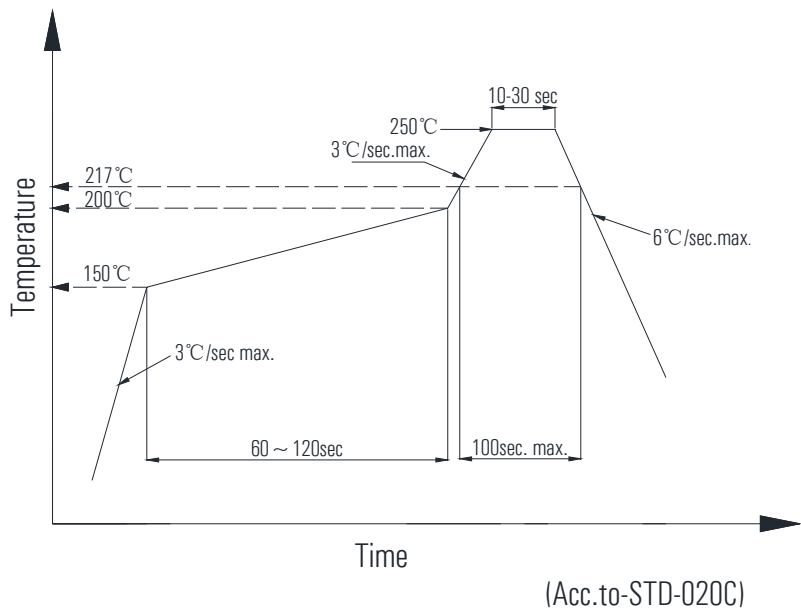




KD1-S511ARA / KD1-S511CRA
0.51-inch (13 mm) 1-Digit Seven-Segment Display
Red Surface-Mount Single-Digit LED Numeric Display
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Precautions for Use

1. Pb-Free Reflow Soldering Profile.

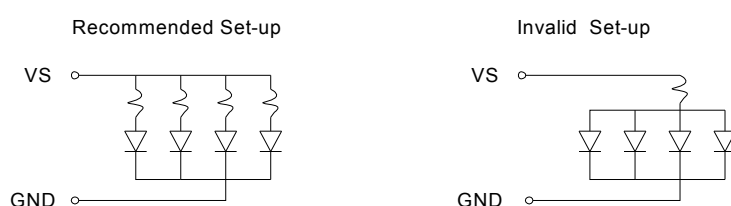


Pre-heat		Other	
Temperature min	150 °C	Liquidus Temperature	217°C
Temperature max	200 °C	Time above Liquidus Temperature	100sec.max
Time	60-120sec	Peak Temperature	250°C
Average ramp-up rate	3 °C/sec.max.	Ramp- Down Rate from Peak Temperature	6 °C/sec. max.
		Reflow times	1 time

- a. Reflow soldering is recommended. Other soldering methods are not recommended as they might cause damage to the product.
- b. All parameters are maximum body case temperature values and cannot be considered as a soldering profile. The body case temperature was measured by soldering a thermal couple to the soldering point of LEDs.
- c. No more than one reflows welding is recommended.

2. Circuit Design Notes:

- Protective current-limiting resistors may be necessary to operate the LEDs within the specified range.
- LEDs mounted in parallel should each be placed in series with its own current-limiting resistor.
- The driving circuit should be designed to protect the LED against reverse voltages and transient voltage spikes when the circuit is powered up or shut down.
- The safe operating current should be chosen after considering the maximum ambient temperature of the operating environment.

**Terms and Conditions for Product Usage**

1. Technical Reference: The information included in this document reflects representative usage scenarios and is intended for technical reference only.

2. Specification Changes: Part numbers, types, and specifications are subject to change or improvement without notice. Customers should verify the latest specifications with the current datasheet before starting mass production.

3. Forward Bias: LEDs must be operated with a forward bias. The driving circuit should be designed to ensure the LEDs are not subjected to reverse voltage when turned off. Continuous reverse voltage may cause metal migration and lead to device damage.

4. Surface Appearance: Surface appearance, including foreign particles or stains, is controlled within a 0.2 mm limit to meet quality standards.

5. LED Storage Instructions:

- Store LEDs at or below 30°C and 80% relative humidity (RH) before opening the package.
- LEDs should be used within one year of purchase.
- After opening the package, store LEDs at or below 30°C and 60% RH.

Disclaimer**1. Product Material and Specification Adjustment Rights:**

LuckyLight reserves the right to update product materials or specifications to improve reliability, functionality, design, or for other valid reasons.

2. Description of Data in Datasheets:

The data presented in this datasheet represents typical values and does not constitute guaranteed figures. The data provided is for reference purposes only.

3. Compliance with Usage Instructions:

When using this product, please strictly adhere to the absolute maximum ratings and instructions outlined in the specification sheets. LuckyLight shall not be held responsible for any damage resulting from non-compliance with these instructions.

4. Application Limitations:

This product is not intended for applications in military, aviation, automotive, medical, life-sustaining, or life-saving fields where failure could cause personal injury or death. For specific application requirements, please consult an authorized LuckyLight sales representative.

5. Disclaimer:

LuckyLight strives for accuracy in its datasheets, specifications, and disclosures. However, we cannot be held liable for any errors or omissions. Product suitability for specific applications is the customer's responsibility.

6. Limitation of Liability:

LuckyLight's liability is limited to the cost of the product. We are not liable for any damages arising from product application, continued production, or any product usage.

KD1-S511ARA / KD1-S511CRA
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Revision History

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