

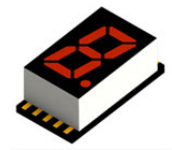
KD1-S321ARD / KD1-S321CRD

0.32-inch (8 mm) 1-Digit Seven-Segment Display
Red Surface-Mount Single-Digit LED Numeric Display

Technical Data Sheet

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-S321ARD (Common Anode) and KD1-S321CRD (Common Cathode) are 0.32-inch (8 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 black surface with red segments; a gray surface version is also available as an option.

Applications

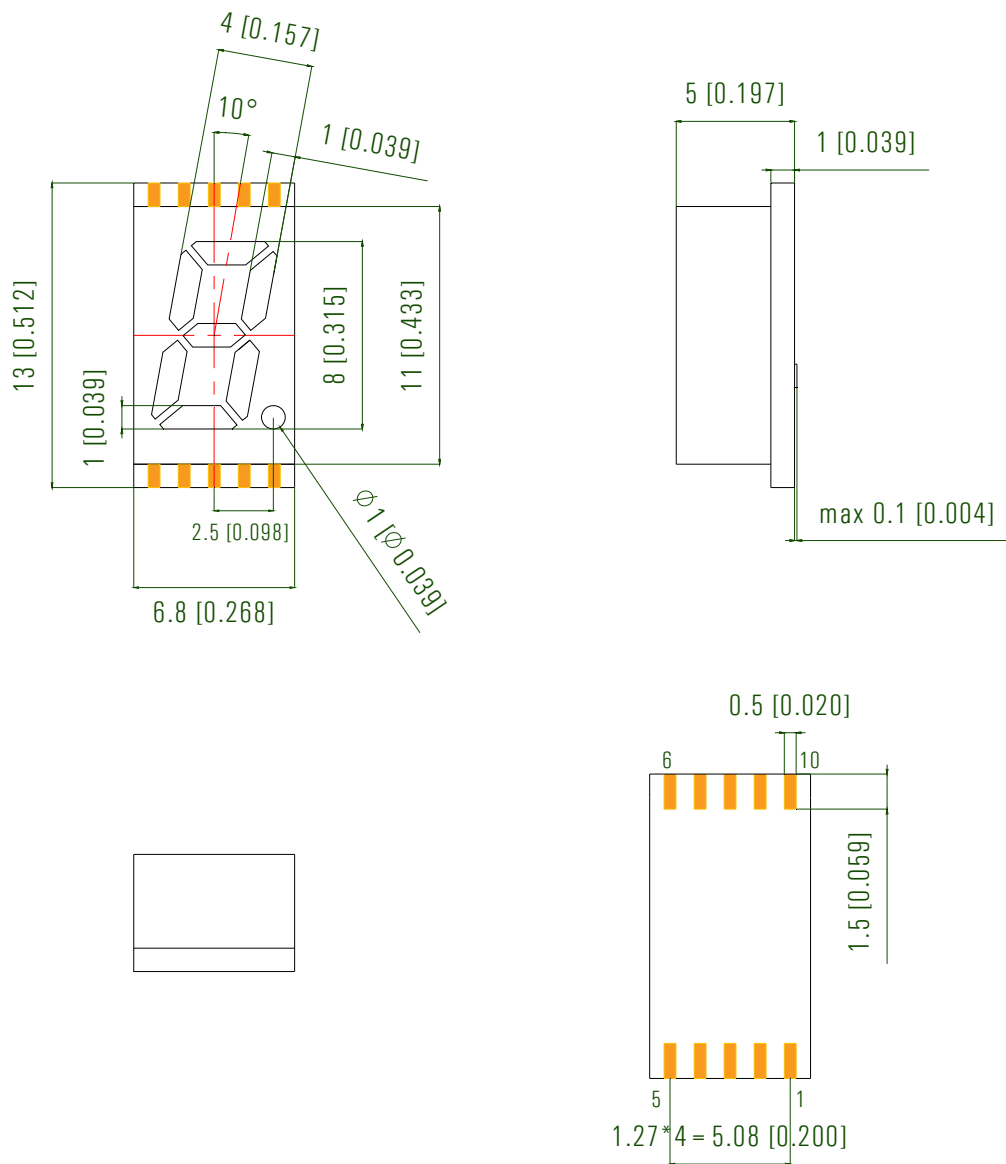
- **Consumer Electronics:** Home appliances, Game console systems
- **Commercial Terminals:** Point-of-sale terminals
- **General Use:** Digital readout displays
- **Industrial Equipment:** Instrumentation panels, Test and measurement equipment, Control systems

Device Selection Guide

Part No.	Emitting Color	Circuit Type
KD1-S321ARD	Red	Common Anode
KD1-S321CRD	Red	Common Cathode

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Package Dimension



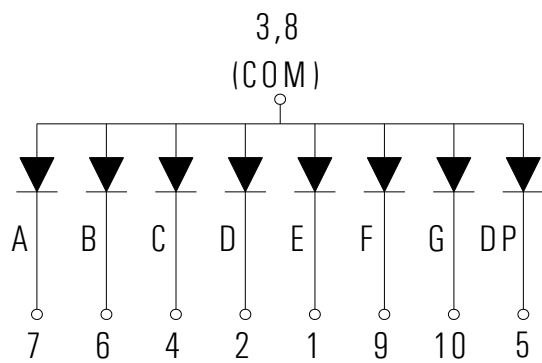
Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is $\pm 0.25\text{mm}$ (.010") unless otherwise noted.
3. The specifications, characteristics and technical data described in the datasheet are subject to change without prior notice.

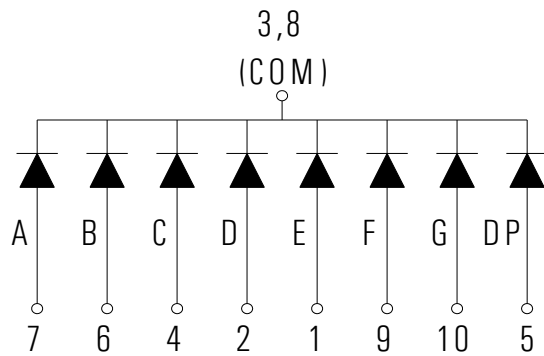
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Internal Circuit Diagram

KD1- S321ARD (Common Anode)



KD1- S321CRD (Common Cathode)



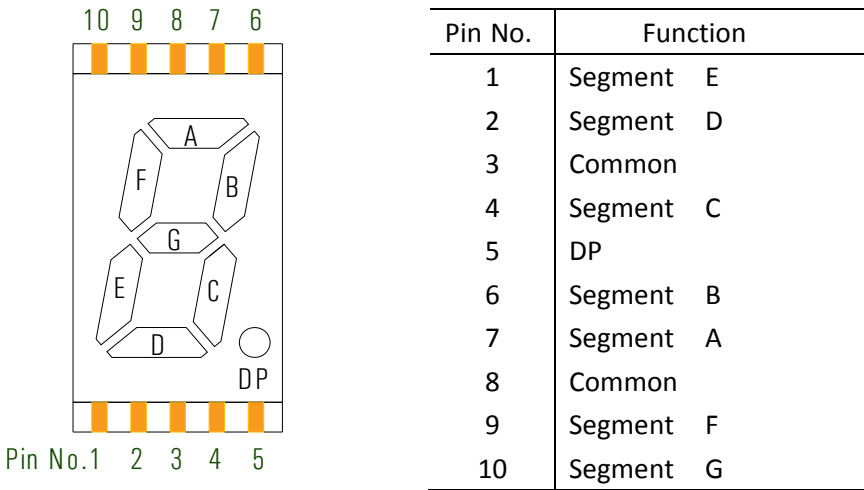
KD1-S321ARD / KD1-S321CRD

0.32-inch (8 mm) 1-Digit Seven-Segment Display

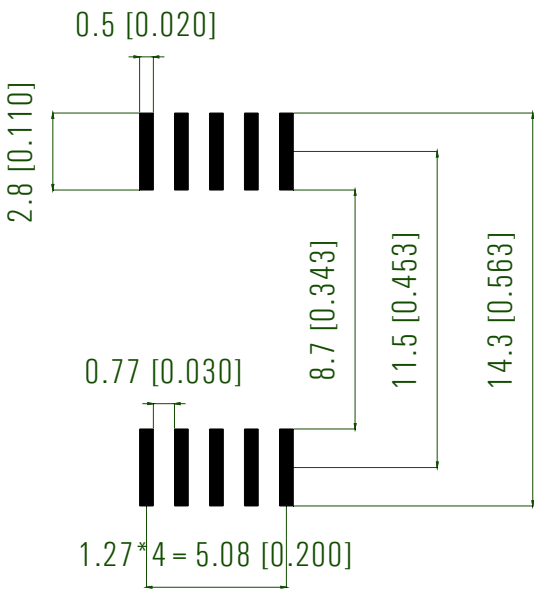
Red Surface-Mount Single-Digit LED Numeric Display

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Pin Connection



Recommended PCB Layout



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Absolute Maximum Ratings at T_A=25°C

Parameters	Symbol	Max	Unit
Power Dissipation (Per Chip)	P _D	36	mW
Peak Forward Current (Per Segment) (1/10 Duty Cycle, 0.1ms Pulse Width)	I _{FP}	60	mA
Forward Current (Per Segment)	I _F	15	mA
Reverse Voltage (Per Chip)	V _R	5	V
Operating Temperature Range	T _{opr}	-40°C to +80°C	
Storage Temperature Range	T _{stg}	-40°C to +85°C	

Electrical Optical Characteristics at T_A=25°C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I _{v-m}	4.0	10.8	---	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	Δλ	---	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:

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

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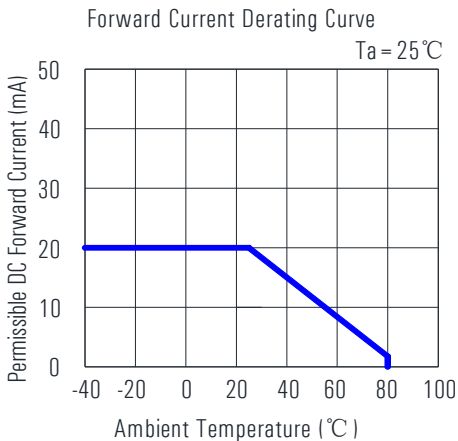
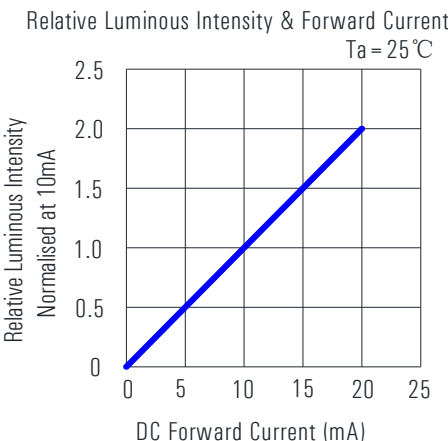
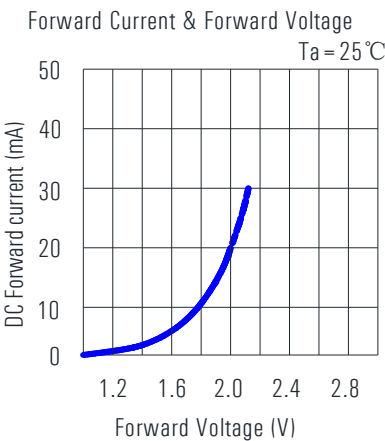
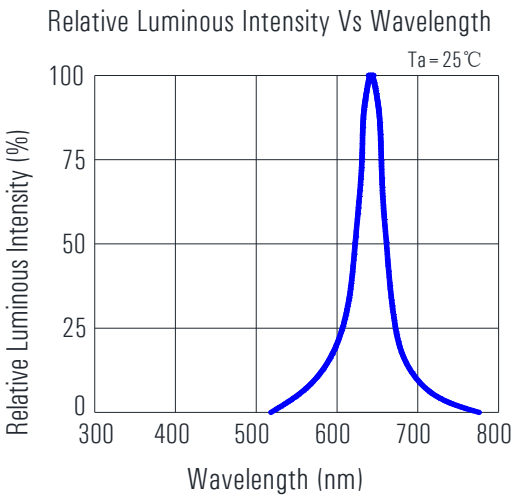
Bin Limits

Light Intensity (mcd) at 10mA		
Bin Code	Min	Max.
C	4.0	6.0
D	6.0	9.0
E	9.0	13.5
F	13.5	20.25

Tolerance of Luminous Intensity: ± 10%

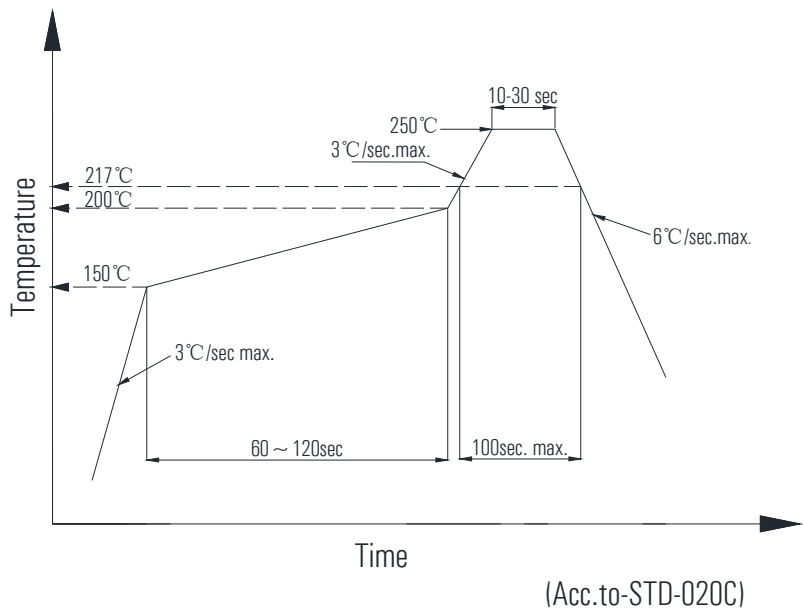
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Typical Electrical/Optical Characteristic Curves at T_A = 25°C



Precautions for Use

1. Pb-Free Reflow Soldering Profile.

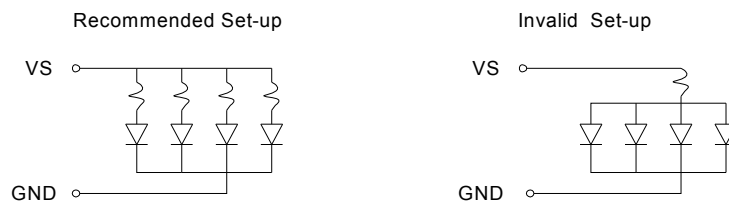


Pre-heat		Other	
Temperature min	150 °C	Liquidus Temperature	217°C
Temperature max	200 °C	Time above Liquidus Temperature	100sec.max
Time	60-120sec	Peak Temperature	250°C
Average ramp-up rate	3 °C/sec.max.	Ramp- Down Rate from Peak Temperature	6 °C/sec. max.
		Reflow times	1 time

- 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.

Revision History

Revision	Date	Contents	Page
Rev. 1	May 22, 2025	Original Version	/
Rev. 1.1	May 27, 2025	Optimize the metal foil on the side of the PCB	2