

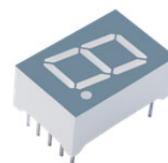
KD1-504ARA / KD1-504CRA

0.5-inch (12.70 mm) 1-Digit Seven-Segment Display
Red Through-Hole Single-Digit LED Numeric Display

Technical Data Sheet

Features

- High reliability
- Low power consumption
- Mechanically rugged and durable
- Excellent character appearance
- Easy mounting on PC boards or socket
- Stable performance under vibration and shock
- RoHS compliant



Descriptions

KD1-504ARA and KD1-504CRA are single-digit red 7-segment LED displays with a character height of 0.5-inch (12.70 mm). KD1-504ARA adopts a common anode configuration, while KD1-504CRA uses a common cathode configuration. Designed for readability at distances up to approximately 7 meters, these display deliver excellent reliability under bright ambient lighting.

The standard version features white segments on a gray surface. An optional version with white segments on a black surface is also available upon request.

Applications

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

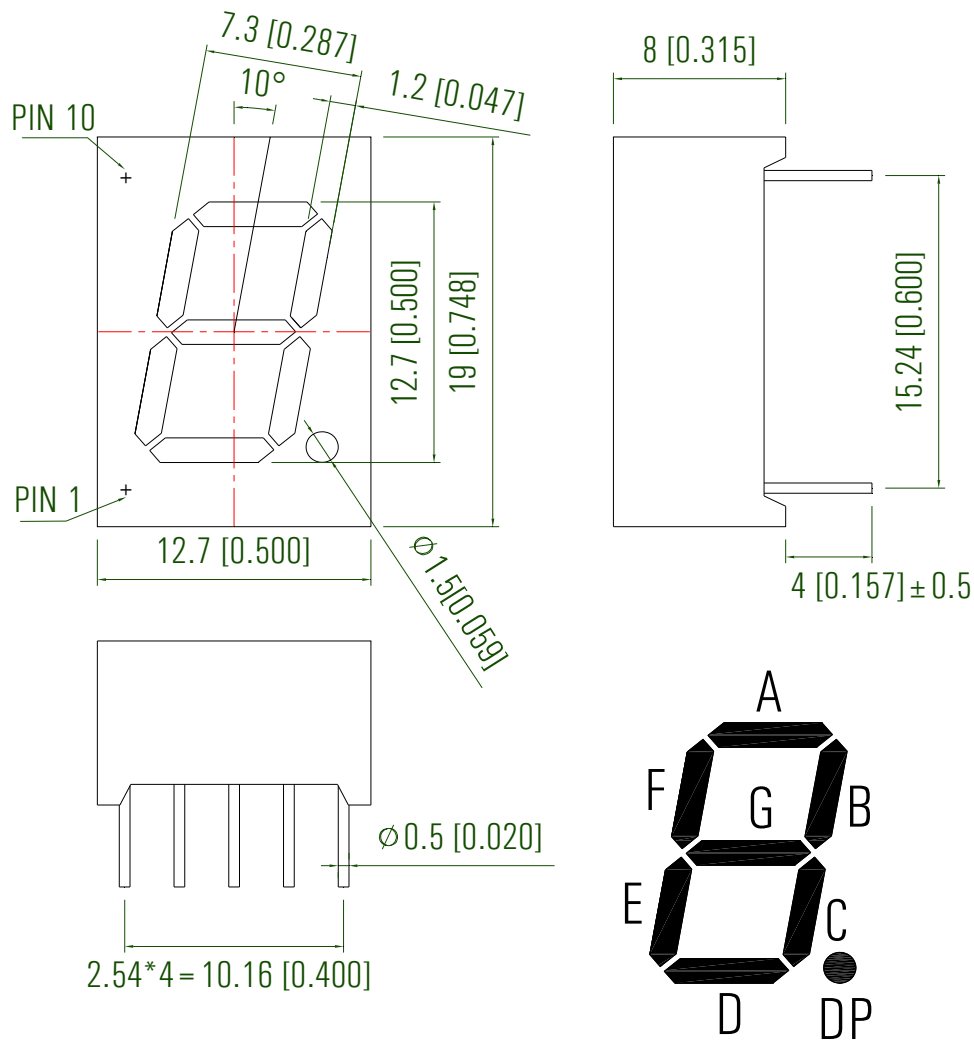
Device Selection Guide

Part No.	Emitting Color	Circuit Type
KD1-504ARA	Red	Common Anode
KD1-504CRA	Red	Common Cathode

KD1-504ARA / KD1-504CRA

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Package Dimension



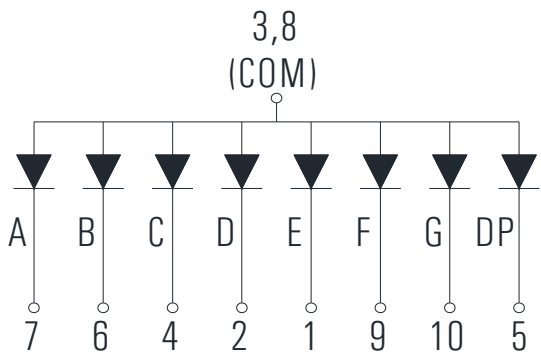
Notes:

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.

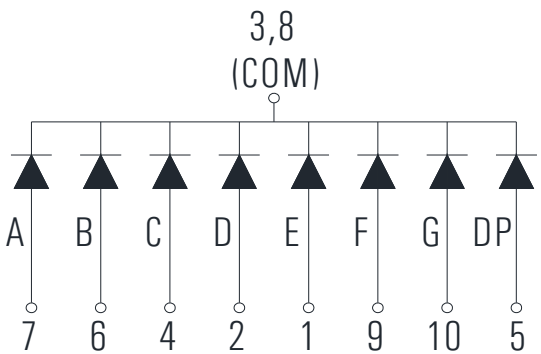
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Internal Circuit Diagram

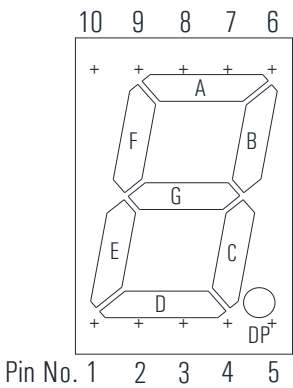
KD1-504ARA (Common Anode)



KD1-504CRA (Common Cathode)



Pin Connection



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

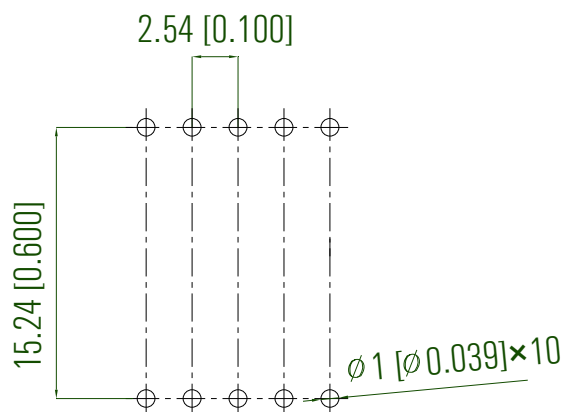
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Recommended PCB Layout



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Absolute Maximum Ratings at $T_A=25^{\circ}\text{C}$

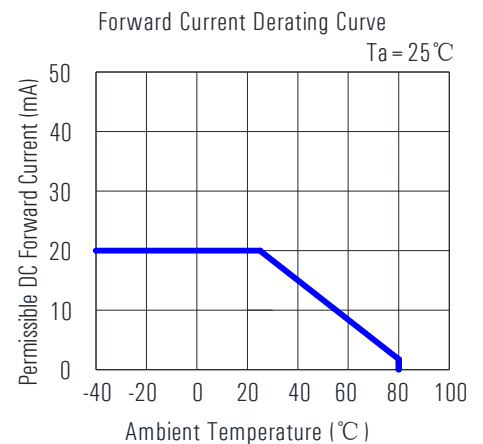
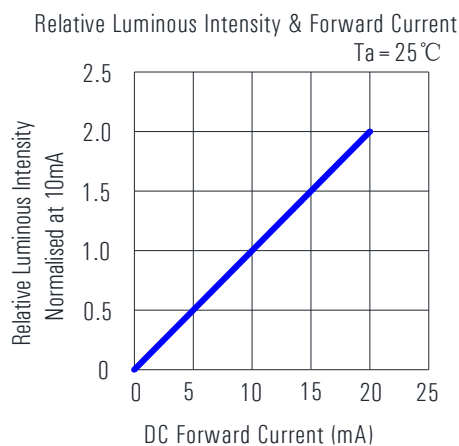
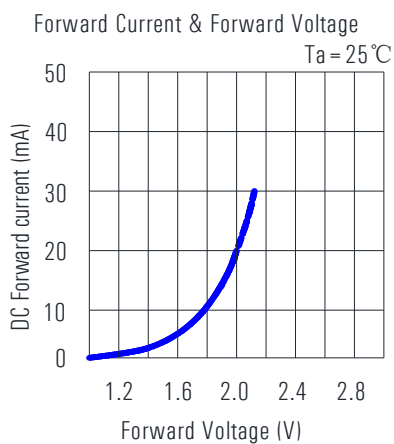
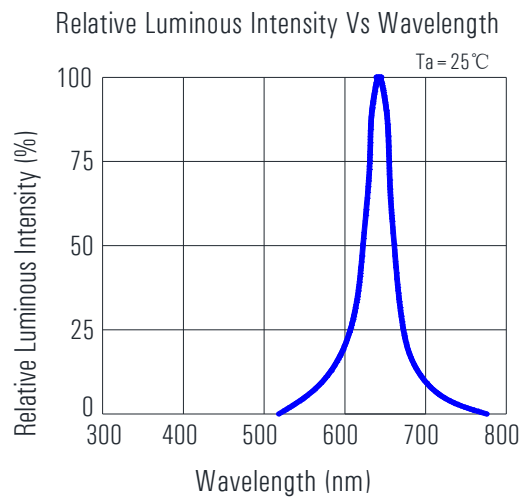
Parameters	Symbol	Max	Unit
Power Dissipation (Per Chip)	P_D	48	mW
Peak Forward Current (Per Segment) (1/10 Duty Cycle, 0.1ms Pulse Width)	I_{FP}	40	mA
Forward Current (Per Segment)	I_F	20	mA
Reverse Voltage (Per Chip)	V_R	5	V
Operating Temperature Range	T_{opr}	-40°C to $+80^{\circ}\text{C}$	
Storage Temperature Range	T_{stg}	-40°C to $+85^{\circ}\text{C}$	
Soldering Temperature	T_{sld}	260 $^{\circ}\text{C}$ for 5 Seconds	

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

Parameters	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Average Luminous Intensity	I_v	7.5	15.0	---	mcd	$I_F=5\text{mA}$ (Note a)
		15.0	30.0	---	mcd	$I_F=10\text{mA}$ (Note a)
Luminous Intensity Matching Ratio	I_{v-m}	---	---	2:1		$I_F=10\text{mA}$
Peak Emission Wavelength	λ_p	---	645	---	nm	$I_F=10\text{mA}$
Dominant Wavelength	λ_d	---	630	---	nm	$I_F=10\text{mA}$ (Note b)
Spectral Line Half-Width	$\Delta\lambda$	---	20	---	nm	$I_F=10\text{mA}$
Forward Voltage (Per Segment)	V_F	---	1.9	2.4	V	$I_F=10\text{mA}$ (Note c)
Reverse Current (Per Segment)	I_R	---	---	50	μA	$V_R=5\text{V}$

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: $\pm 0.1\text{V}$.

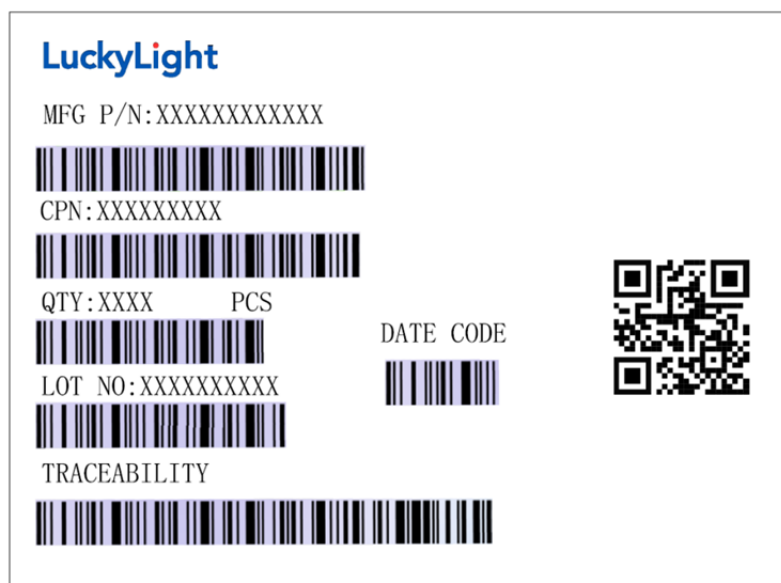
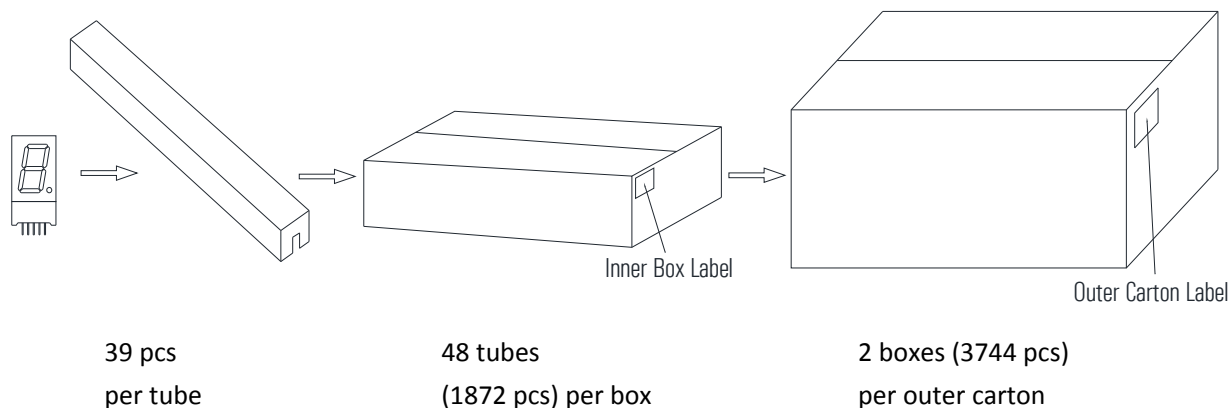
Typical Electrical/Optical Characteristic Curves at $T_A = 25^\circ\text{C}$ 

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Packing & Label Specifications



Notes:

1. The above "Packing & Label Specifications" refer to bag packaging and are for reference only.
2. Bag packaging will be used for through-hole LED digital displays with character heights exceeding 0.8 inches.
3. Luckylight through-hole LED digital displays offer three packaging options: tube, bag, and box. If customers have special packaging requirements, please confirm the required packaging method with the salesperson in advance when placing an order.

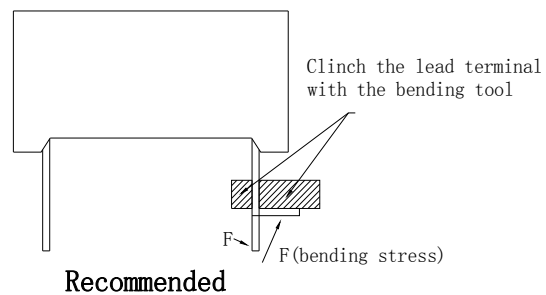
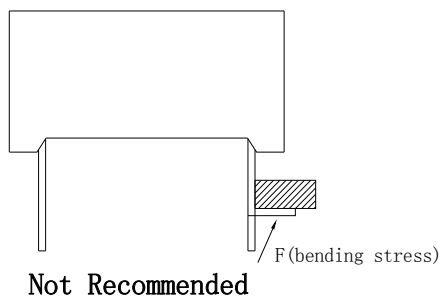
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Precautions

Through Hole Digital Display Mounting Method

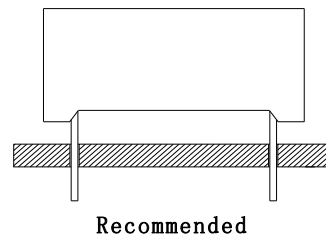
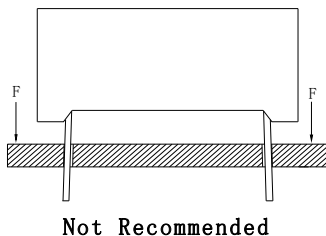
1. Lead Forming

- 1.1. Do not bend the component leads by hand without proper tools.
- 1.2. The leads should be bent by clinching the upper part of the lead firmly so that the bending force is not exerted on the plastic body.

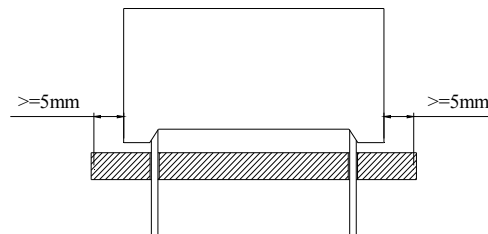
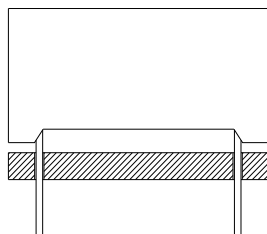


2. Installation

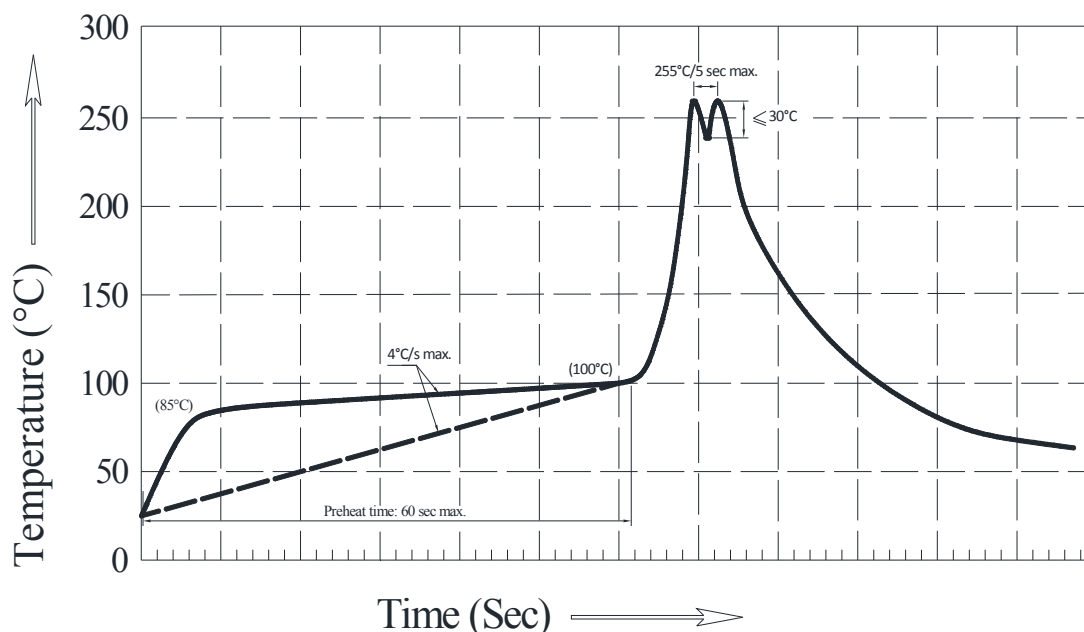
- 2.1. The installation process should not apply stress to the lead terminals.
- 2.2. When inserting for assembly, ensure the terminal pitch matches the substrate board's hole pitch to prevent spreading or pinching of the lead terminals.



- 2.3. The component shall be placed at least 5mm from the edge of the PCB to avoid damage caused by excessive heat during wave soldering.



3. Recommended Wave Soldering Profiles



Notes:

- 3.1. It is recommended to pre-heat at a temperature of 105°C or lower (measured using a thermocouple attached to the LED pins) before immersion in the solder wave, with a maximum solder bath temperature of 260°C.
- 3.2. The peak wave soldering temperature should be between 245°C to 255°C for 3 seconds (maximum of 5 seconds).
- 3.3. Avoid applying stress to the epoxy resin when the temperature exceeds 85°C.
- 3.4. Fixtures should not exert stress on the component during mounting and soldering processes.
- 3.5. Only one wave soldering pass is allowed.
- 3.6. Maintain the PCB top-surface temperature below 105°C during wave soldering.

4. Soldering General Notes

- 4.1. Through-hole LED digital displays are not suitable for reflow soldering.
- 4.2. If components will undergo multiple soldering processes or other high-heat treatments, please consult LuckyLight for compatibility.

5. Cleaning

- 5.1. Mild "no-clean" fluxes are recommended for soldering purposes.
- 5.2. If cleaning is necessary, LuckyLight suggests washing components with water only. Avoid using harsh organic solvents for cleaning as they can damage the plastic parts.

5.3. The cleaning process should occur at room temperature, and the devices should not be washed for more than one minute.

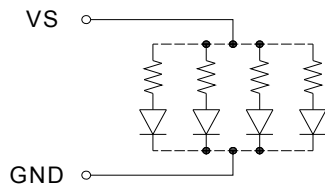
5.4. After using water in the cleaning process, promptly remove excess moisture from the component by utilizing forced-air drying.

6. Circuit Design Notes

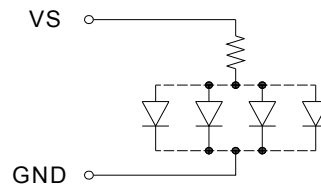
6.1. Protective current-limiting resistors may be necessary to operate the LEDs within the specified range.

6.2. LEDs mounted in parallel should each be placed in series with its own current-limiting resistor.

Recommended Set-up



Invalid Set-up



6.3. 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.

6.4. The safe operating current should be selected by taking into account the maximum ambient temperature of the operating environment.

6.5. Extended reverse bias should be avoided as it may result in metal migration, leading to an escalation in leakage current or potential short circuits.

7. LED Storage Instructions

7.1. Store LEDs at or below 30°C and 80% relative humidity (RH) before opening the package.

7.2. LEDs should be used within one year of purchase.

7.3. After opening the package, store LEDs at or below 30°C and 60% RH.

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Disclaimer

The information contained in this document is provided for technical reference only and is based on representative operating conditions.

Product part numbers, configurations, specifications and other information contained herein are subject to change or improvement without prior notice. Before product selection, design-in or mass production, customers should refer to the latest version of this datasheet and confirm the applicable specifications.

The products described in this document must be operated within the electrical, mechanical and environmental ratings specified herein. LuckyLight shall not be liable for any malfunction, damage or loss resulting from operation outside the specified ratings or from improper handling, installation or use.

The products described in this document are intended for use in standard industrial and electronic equipment, including industrial control equipment, automation systems, communication equipment, office equipment and general electronic devices.

For applications requiring exceptionally high levels of reliability or safety, where product failure could directly result in personal injury, loss of life or significant property damage, including aerospace systems, transportation systems, traffic control equipment, medical life-support equipment and safety-critical devices, please contact a LuckyLight sales representative in advance for technical evaluation and written approval.

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Revision History

Revision	Date	Contents	Page
Rev. 1	March 15, 2012	Original Version	/
Rev. 1.1	March 23, 2012	Updated PD & IFP & IF Values PD =48 mW. IFP=40 mA. IF = 20 mA	5
		Updated 39 pcs per tube	7