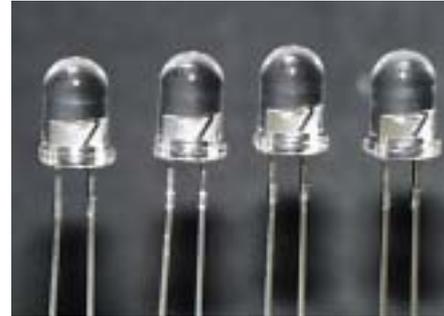


**Technical Data****Ultra Bright LED Lamp for Traffic Sign**

<b>LTL2P3SEK</b>	<b>Red (22°)</b>
<b>LTL2R3SEK</b>	<b>Red (30°)</b>
<b>LTL2P3SYK</b>	<b>Amber (22°)</b>
<b>LTL2R3SYK</b>	<b>Amber (30°)</b>

**Benefits**

- \* Lower system cost.
- \* Higher luminous efficiency than incandescent lamp.
- \* Fewer LED are required due to the TS AlInGaP technology.

**Features**

- \* High luminous intensity output.
- \* Low power consumption.
- \* High efficiency.
- \* Versatile mounting on PCB or panel.
- \* I.C. Compatible / low current requirements.
- \* Popular T-1  $\frac{3}{4}$  diameter (5 mm).

**Applications**

- \* Traffic signals.
- \* Versatile warning signals.
- \* Outdoor traffic display panels.

**Description**

The source color light emitting diode dice of these devices is made of AlInGaP on a transparent substrate (TS).

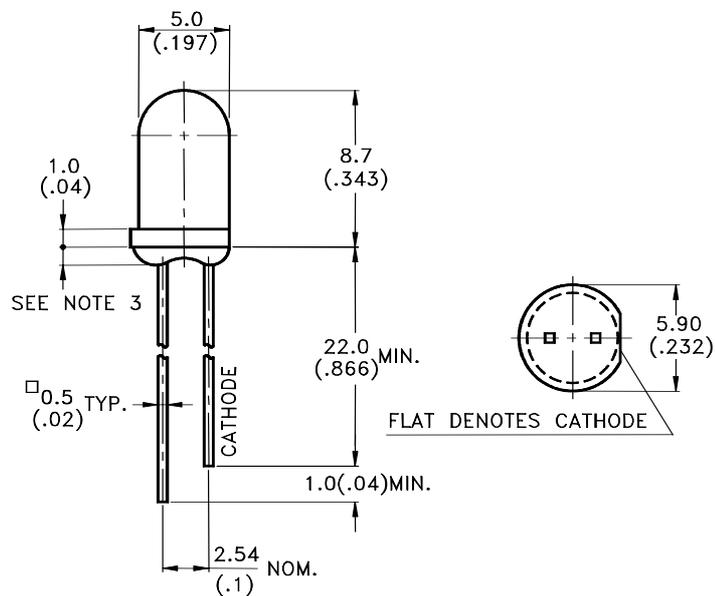
The water clear epoxy lens on these devices create viewing angles of 22 and 30 degrees that match international specifications for traffic sign utilization.

These LED lamps provide superior endurance against moisture and high temperatures thus are reliable for outdoor environment use. With a lower power consumption than traditional incandescent lamps, these devices yield lower system cost.

## Features

- \* High luminous intensity output.
- \* Low power consumption.
- \* High efficiency.
- \* Versatile mounting on PCB or panel.
- \* I.C. Compatible / low current requirements.
- \* Popular T-1 3/4 diameter.

## Package Dimensions



Part No.	Lens	Source Color
LTL2P3SEK / LTL2R3SEK	Water Clear	TS AlInGaP Red
LTL2P3SYK / LTL2R3SYK	Water Clear	TS AlInGaP Amber

### Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is  $\pm 0.25\text{mm}$  (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

**Absolute Maximum Ratings at TA=25 °C**

Parameter	Maximum Rating	Unit
Power Dissipation	130	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	100	mA
DC Forward Current	50	mA
Derating Linear From 50 °C	0.6	mA/°C
Reverse Voltage	5	V
Operating Temperature Range	-40°C to + 80°C	
Storage Temperature Range	-55°C to + 100°C	
Lead Soldering Temperature [1.6mm(.063") From Body]	260°C for 5 Seconds	

## Electrical / Optical Characteristics at TA=25 °C

Parameter	Symbol	Part NO. (LTL)	Min.	Typ.	Max.	Unit	Test Condition
Luminous Intensity	I <sub>v</sub>	2P3SEK	2500	4800		mcd	I <sub>F</sub> = 20mA Note 1
		2R3SEK	1900	3700			
		2P3SYK	1900	3700			
		2R3SYK	1900	2800			
Viewing Angle	2θ <sub>1/2</sub>	2P3SXX		22		deg	Note 2 (Fig.5)
		2R3SXX		30			
Peak Emission Wavelength	λ <sub>p</sub>	Red		639		nm	Measurement @Peak (Fig.1)
		Amber		591			
Dominant Wavelength	λ <sub>d</sub>	Red		630		nm	Note 4
		Amber		590			
Spectral Line Half-Width	Δλ	Red		17		nm	
		Amber		17			
Forward Voltage	V <sub>F</sub>	Red		2.25	2.7	V	I <sub>F</sub> = 20mA
		Amber		2.35	2.7		
Reverse Current	I <sub>R</sub>				100	μA	V <sub>R</sub> = 5V
Capacitance	C			40		pF	V <sub>F</sub> = 0 , f = 1MHz

NOTE:

1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. θ<sub>1/2</sub> is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. I<sub>v</sub> classification code is marked on each packing bag.
4. The dominant wavelength, λ<sub>d</sub> is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

## Typical Electrical / Optical Characteristics Curves

(25 °C Ambient Temperature Unless Otherwise Noted)

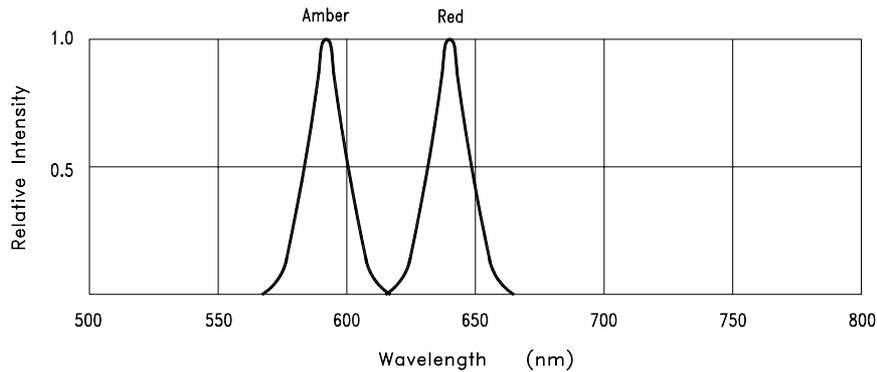


Fig.1 Relative Intensity vs. Wavelength

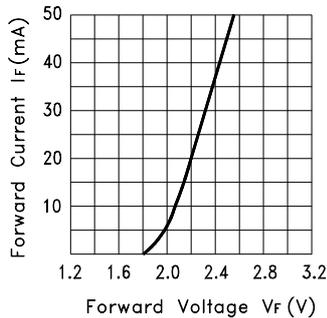


Fig.2 Forward Current vs. Forward Voltage

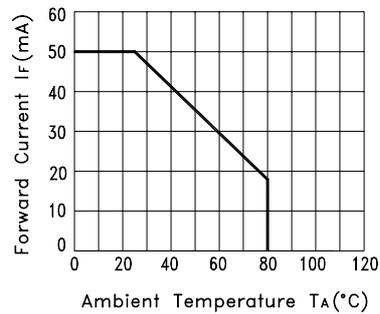


Fig.3 Forward Current Derating Curve

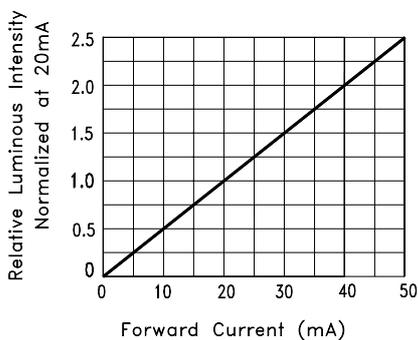


Fig.4 Relative Luminous Intensity vs. Forward Current

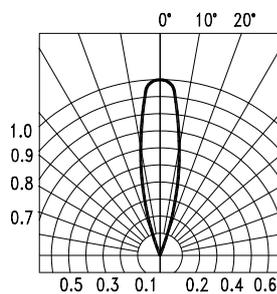


Fig.5-1 Spatial Distribution For LTL2P3XK

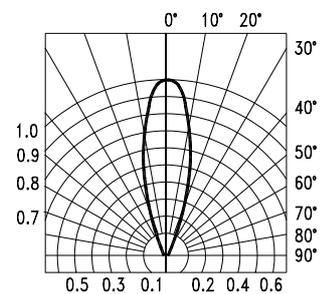
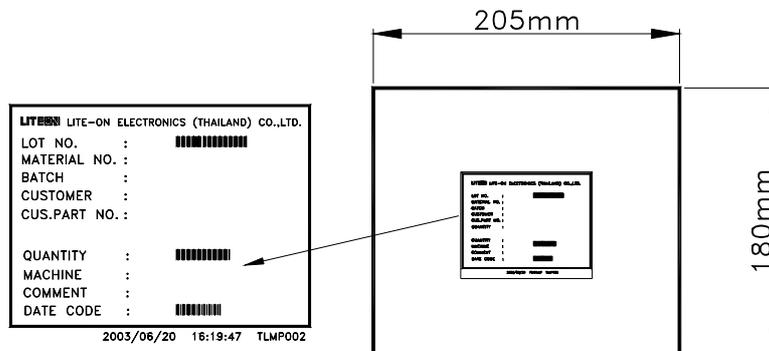


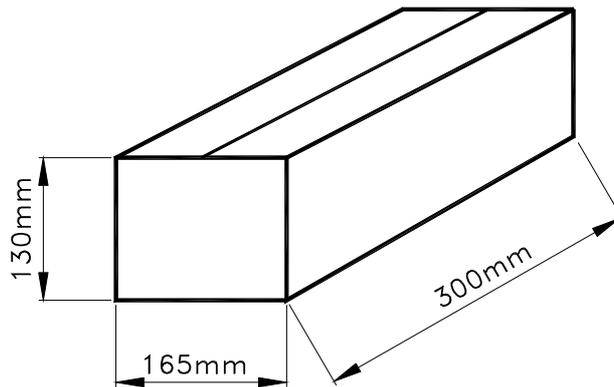
Fig.5-2 Spatial Distribution For LTL2R3XK

## Packing Spec

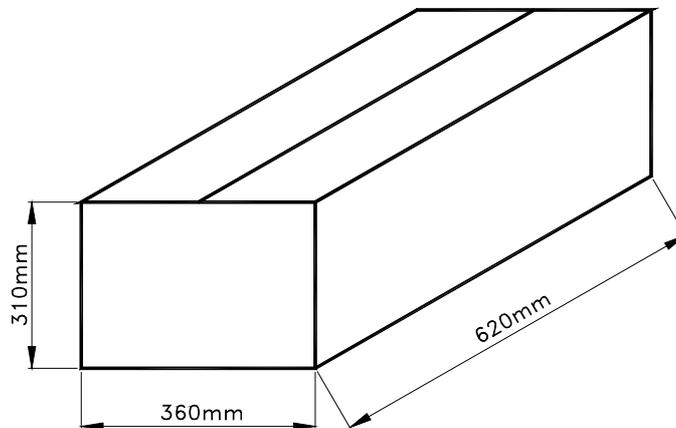
**1000, 500 or 250 pcs per packing bag**



**8 packing bags per inner carton  
 total 8000 pcs per inner carton**



**8 Inner cartons per outer carton  
 total 64000 pcs per outer carton  
 In every shipping lot, only the last pack will be non-full packing**



**Bin Code List For Reference**

<b>Luminous Intensity <math>I_v</math>(mcd)</b>		<b><math>I_F@20mA</math></b>
Bin Code	Min.	Max.
S	1900	2500
T	2500	3200
U	3200	4200
V	4200	5500
W	5500	7200
X	7200	9300

Note: Tolerance of each bin limit is  $\pm 15\%$ 

<b>Dominant Wavelength <math>\lambda_d</math>(nm)</b>		<b><math>I_F@20mA</math></b>
Bin Code	Min.	Max.
A	584.5	587.0
B	587.0	589.5
C	589.5	592.0
D	592.0	594.5
E	594.5	597.0

Note: Tolerance of each bin limit is  $\pm 1nm$ 

<b>Forward Voltage <math>V_f</math> (Volts)</b>		<b><math>I_F@20mA</math></b>
Bin Code	Min.	Max.
1	1.8	1.9
2	1.9	2.0
3	2.0	2.1
4	2.1	2.2
5	2.2	2.3
6	2.3	2.4
7	2.4	2.5
8	2.5	2.6
9	2.6	2.7

**CAUTIONS****1. Application**

The LEDs described here are intended to be used for ordinary electronic equipment (such as office equipment, communication equipment and household applications). Consult Liteon's Sales in advance for information on applications in which exceptional reliability is required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as in aviation, transportation, traffic control equipment, medical and life support systems and safety devices).

**2. Storage**

The storage ambient for the LEDs should not exceed 30°C temperature or 70% relative humidity.

It is recommended that LEDs out of their original packaging are used within three months.

For extended storage out of their original packaging, it is recommended that the LEDs be stored in a sealed container with appropriate desiccant or in desiccators with nitrogen ambient.

**3. Cleaning**

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LEDs if necessary.

**4. Lead Forming & Assembly**

During lead forming, the leads should be bent at a point at least 3mm from the base of LED lens.

Do not use the base of the lead frame as a fulcrum during forming.

Lead forming must be done before soldering, at normal temperature.

During assembly on PCB, use minimum clinch force possible to avoid excessive mechanical stress.

**5. Soldering**

When soldering, leave a minimum of 2mm clearance from the base of the lens to the soldering point.

Dipping the lens into the solder must be avoided.

Do not apply any external stress to the lead frame during soldering while the LED is at high temperature.

Recommended soldering conditions :

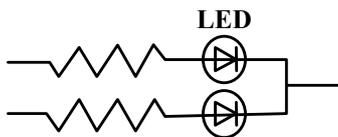
Soldering iron		Wave soldering	
Temperature	300°C Max.	Pre-heat	100°C Max.
Soldering time	3 sec. Max. (one time only)	Pre-heat time	60 sec. Max.
		Solder wave	260°C Max.
		Soldering time	10 sec. Max.

Note: Excessive soldering temperature and/or time might result in deformation of the LED lens or catastrophic failure of the LED

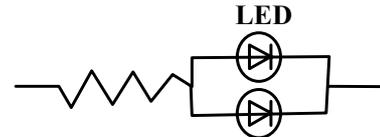
## 6. Drive Method

An LED is a current-operated device. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in Circuit A below.

**Circuit model A**



**Circuit model B**



(A) Recommended circuit

(B) The brightness of each LED might appear different due to the differences in the I-V characteristics of those LEDs

## 7. ESD (Electrostatic Discharge)

Static Electricity or power surge will damage the LED.

Suggestions to prevent ESD damage:

- Use a conductive wrist band or anti- electrostatic glove when handling these LEDs
- All devices, equipment, and machinery must be properly grounded
- Work tables, storage racks, etc. should be properly grounded
- Use ion blower to neutralize the static charge which might have built up on surface of the LEDs plastic lens as a result of friction between LEDs during storage and handing

**Suggested checking list :****Training and Certification**

1. Everyone working in a static-safe area is ESD-certified?
2. Training records kept and re-certification dates monitored?

**Static-Safe Workstation & Work Areas**

1. Static-safe workstation or work-areas have ESD signs?
2. All surfaces and objects at all static-safe workstation and within 1 ft measure less than 100V?
3. All ionizer activated, positioned towards the units?
4. Each work surface mats grounding is good?

**Personnel Grounding**

1. Every person (including visitors) handling ESD sensitive (ESDS) items wear wrist strap, heel strap or conductive shoes with conductive flooring?
2. If conductive footwear used, conductive flooring also present where operator stand or walk?
3. Garments, hairs or anything closer than 1 ft to ESD items measure less than 100V\*?
4. Every wrist strap or heel strap/conductive shoes checked daily and result recorded for all DSL?
5. All wrist strap or heel strap checkers calibration up to date?

Note: \*50V for Blue LED.

**Device Handling**

1. Every ESDS items identified by EIA-471 labels on item or packaging?
2. All ESDS items completely inside properly closed static-shielding containers when not at static-safe workstation?
3. No static charge generators (e.g. plastics) inside shielding containers with ESDS items?
4. All flexible conductive and dissipative package materials inspected before reuse or recycle?

**Others**

1. Audit result reported to entity ESD control coordinator?
2. Corrective action from previous audits completed?
3. Are audit records complete and on file?

## 8. Reliability Test

Classification	Test Item	Test Condition	Reference Standard
Endurance Test	Operation Life	Ta= Under Room Temperature As Per Data Sheet Maximum Rating *Test Time= 1000HRS (-24HRS,+72HRS)	MIL-STD-750D:1026 (1995) MIL-STD-883D:1005 (1991) JIS C 7021:B-1 (1982)
	High Temperature High Humidity Storage	Ta= 65±5°C RH= 90 ~ 95% Test Time= 240HRS±2HRS	MIL-STD-202F: 103B(1980) JIS C 7021 : B-11(1982)
	High Temperature High Humidity Reverse BIAS	Ta= 65±5°C RH= 90 ~ 95% VR=5V Test Time = 500HRS (-24HRS, +48HRS)	JIS C 7021 : B-11(1982)
	High Temperature Storage	Ta= 105±5°C *Test Time= 1000HRS (-24HRS,+72HRS)	MIL-STD-883D:1008 (1991) JIS C 7021:B-10 (1982)
	Low Temperature Storage	Ta= -55±5°C *Test Time=1000HRS (-24HRS,+72HRS)	JIS C 7021:B-12 (1982)
Environmental Test	Temperature Cycling	105°C ~ 25°C ~ -55°C ~ 25°C 30mins 5mins 30mins 5mins 10 Cycles	MIL-STD-202F:107D (1980) MIL-STD-750D:1051(1995) MIL-STD-883D:1010 (1991) JIS C 7021: A-4(1982)
	Thermal Shock	105 ± 5°C ~ -55°C ± 5°C 10mins 10mins 10 Cycles	MIL-STD-202F:107D(1980) MIL-STD-750D:1051(1995) MIL-STD-883D:1011 (1991)
	Solder Resistance	T.sol = 260 ± 5°C Dwell Time= 10 ± 1secs	MIL-STD-202F:210A(1980) MIL-STD-750D:2031(1995) JIS C 7021: A-1(1982)
	Solderability	T. sol = 230 ± 5°C Dwell Time= 5 ± 1secs	MIL-STD-202F:208D(1980) MIL-STD-750D:2026(1995) MIL-STD-883D:2003(1991) JIS C 7021: A-2(1982)

## 9. Others

The appearance and specifications of the product may be modified for improvement, without prior notice.