

**Piranha LEDs**

LTL911VRKSA

LTL911VEKSA

LTL911VHKSA

LTL911VYKSA

LTL912VEKSA

LTL912VHKSA

LTL912VYKSA

**Selection Guide**

| Part No.    | Color      | $\Phi_v$ (lm) | Va(deg.) | $\lambda_d$ (nm) |
|-------------|------------|---------------|----------|------------------|
| LTL911VRKSA | Super Red  | 1.5           | 70       | 631              |
| LTL911VEKSA | Red        | 2.0           | 70       | 624              |
| LTL911VHKSA | Red-Orange | 2.0           | 70       | 618              |
| LTL911VYKSA | Amber      | 2.0           | 70       | 595              |
| LTL912VEKSA | Red        | 2.0           | 50       | 624              |
| LTL912VHKSA | Red-Orange | 2.0           | 50       | 618              |
| LTL912VYKSA | Amber      | 2.0           | 50       | 595              |

**Benefits**

- Fewer LEDs Required
- Lower lighting System Cost

**Applications**

- Signs and Signals
- Room Lighting



## Features

- High Current Operation
- High Flux Output
- Low Thermal Resistance
- Low Profile
- Wide Viewing Angle
- Meet SAE/ ECE/ JIS Automotive Color Requirement
- Tube Package for Automatic Loading and Insertion Process

## Description

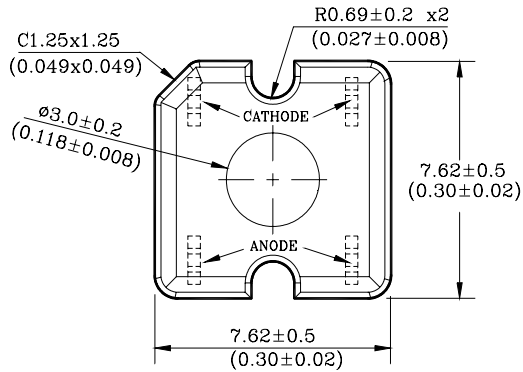
These parts are designed for high current operation and high flux output applications. In order to solve the high temperature produced by the higher current operation, the package's design features better thermal management characteristics than other LED solutions coupled with an efficient optical design.

This package design allows the lighting designer to reduce the number of LEDs required as well as the overall lighting system cost. The low profile package can be easily coupled to reflectors or lenses to efficiently distribute light and provide the desired illuminated appearance. This product family employs the world's brightest red, red-orange, amber, blue, cyan, green, and white LED materials etc., which allow designers to match the color of popular lighting applications, such as automotive lighting and electronic signs.

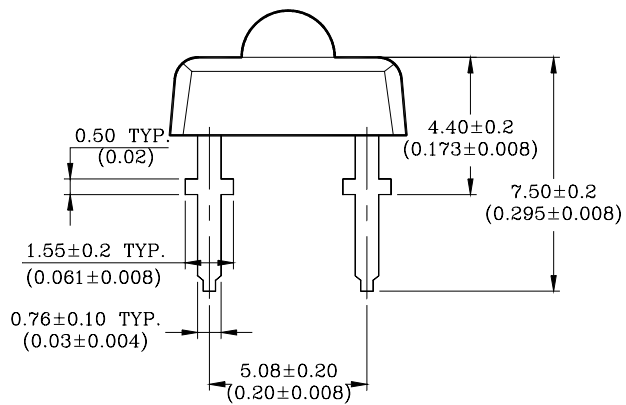
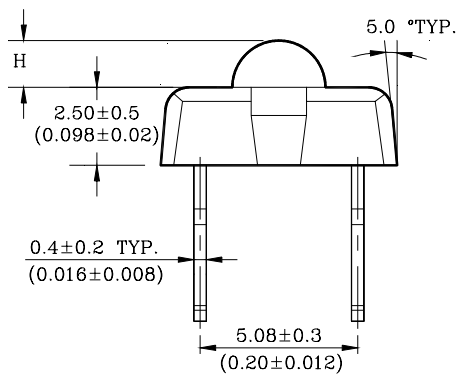
## Devices

| Part No (LTL*) | Lens        |              | Source      |            |
|----------------|-------------|--------------|-------------|------------|
|                | Color       | Diffusion    | Dice Source | Color      |
| LTL911VRKSA    | Water Clear | Non-Diffused | AllnGaP     | Super Red  |
| LTL911VEKSA    | Water Clear | Non-Diffused | AllnGaP     | Red        |
| LTL911VHKSA    | Water Clear | Non-Diffused | AllnGaP     | Red-Orange |
| LTL911VYKSA    | Water Clear | Non-Diffused | AllnGaP     | Amber      |
| LTL912VEKSA    | Water Clear | Non-Diffused | AllnGaP     | Red        |
| LTL912VHKSA    | Water Clear | Non-Diffused | AllnGaP     | Red-Orange |
| LTL912VYKSA    | Water Clear | Non-Diffused | AllnGaP     | Amber      |

## Package Dimensions



| Part No.    | H           |
|-------------|-------------|
| LTL911XXXXX | 1.50(0.059) |
| LTL912XXXXX | 1.90(0.075) |



### NOTES:

1. All dimensions are in millimeters (inches).
2. Protruded resin is 1.0mm(.04") max.
3. Lead spacing is measured where the leads emerge from the package.
4. Specifications are subject change to without notice.



# LITE-ON TECHNOLOGY CORPORATION

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

| Parameter  | Super Red   | Red  | Red-Orange | Amber | Unit                   |
|--|---|------|------------|-------|------------------------|
| Power Dissipation  | 190   | 190  | 190        | 190   | mW                     |
| Peak Forward Current<br>(1/10 Duty Cycle, 0.1ms Pulse Width) | 130   | 130  | 90         | 90    | mA                     |
| Continuous Forward Current                                   | 70  | 70   | 70         | 70    | mA                     |
| Derating Linear From $70^{\circ}\text{C}$                    | 1.17  | 1.17 | 1.17       | 1.17  | mA/ $^{\circ}\text{C}$ |
| Reverse Voltage ( $I_R = 100 \mu\text{A}$ )                  | 10  | 10   | 10         | 10    | V                      |
| Operating Temperature Range                                  | $-40^{\circ}\text{C}$ to $+100^{\circ}\text{C}$   |      |            |       |                        |
| Storage Temperature Range                                    | $-55^{\circ}\text{C}$ to $+100^{\circ}\text{C}$   |      |            |       |                        |
| LED Junction Temperature                                     | $125^{\circ}\text{C}$   |      |            |       |                        |
| Soldering Preheat Temperature<br>Lead Soldering Temperature  | $100^{\circ}\text{C}$ for 30 Seconds<br>$260^{\circ}\text{C}$ for 5 Seconds [1.5mm (.06") From Seating Plane] |      |            |       |                        |

Notes:

1. Operation at currents below 10mA is not recommended.
2. Derating linear as shown in Fig. 3

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

| Parameter                              | Symbol              | Part No.   | Min.                     | Typ.                     | Max. | Unit   | Test Condition         |
|--|---------------------|--|--------------------------|--------------------------|------|--------|------------------------|
| Total Flux<br><Note1>                  | ØV                  | LTL91xVRKSA<br>LTL91xVEKSA<br>LTL91xVHKSA<br>LTL91xVYKSA | 1.0<br>1.5<br>1.5<br>1.5 | 1.5<br>2.0<br>2.0<br>2.0 |      | lm     | IF=70mA                |
| Luminous Intensity<br>/ Total Flux     | I <sub>v</sub> / ØV | LTL911VxKSA<br>LTL912VxKSA                               |                          | 0.6<br>1.2               |      | cd /lm | IF=70mA                |
| Viewing Angle<br><Note2, Fig 5>        | 2θ1/2               | LTL911VxKSA<br>LTL912VxKSA                               |                          | 70<br>50                 |      | deg.   |                        |
| Peak Emission<br>Wavelength<br><Fig 1> | λ <sub>P</sub>      | LTL91xVRKSA<br>LTL91xVEKSA<br>LTL91xVHKSA<br>LTL91xVYKSA |                          | 639<br>632<br>624<br>598 |      | nm     | IF=70mA                |
| Dominant<br>Wavelength<br><Note 3>     | λ <sub>d</sub>      | LTL91xVRKSA<br>LTL91xVEKSA<br>LTL91xVHKSA<br>LTL91xVYKSA |                          | 631<br>624<br>618<br>595 |      | nm     | IF=70mA                |
| Spectral Line Half-<br>Width           | Δλ                  | LTL91xVRKSA<br>LTL91xVEKSA<br>LTL91xVHKSA<br>LTL91xVYKSA |                          | 20<br>20<br>18<br>16     |      | nm     |                        |
| Forward Voltage                        | V <sub>F</sub>      |  | 1.83                     | 2.15                     | 2.67 | V      | IF=70mA                |
| Reverse Voltage                        | V <sub>R</sub>      |  | 10                       | 20                       |      | V      | I <sub>R</sub> = 100μA |
| Thermal resistance                     | Rθ <sub>J-PIN</sub> |  |                          | 160                      |      | °C/W   |                        |

- Note:
1. ØV is the total luminous flux output as measured with an integrating sphere.
  2. θ1/2 is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
  3. 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)

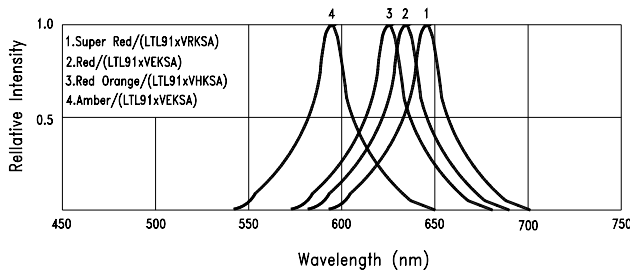


Fig.1 Relative Intensity v.s Wavelength

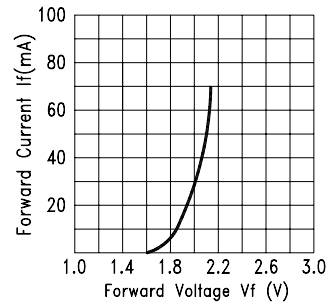


Fig.2 Forward Current v.s Forward Voltage

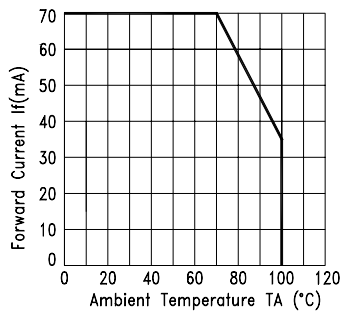


Fig.3 Forward Current v.s Ambient Temperature

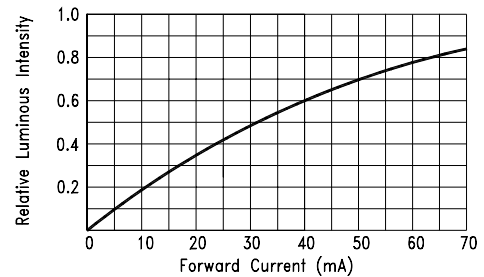


Fig.4 Relative Luminous Intensity v.s Forward Current

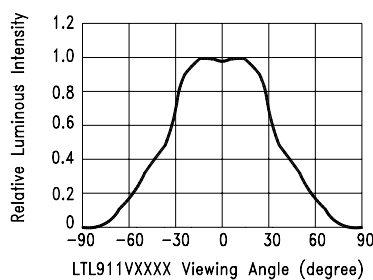


Fig.5-1 Relative Luminous Intensity v.s Off Axis Angle

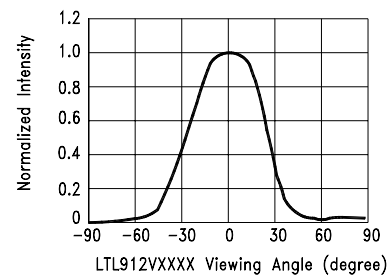


Fig.5-2 Relative Luminous Intensity v.s Off Axis Angle

## Bin Code List For Reference

| Category Code |   |    |
|---------------|---|----|
| D             | 1 | H2 |

**Luminous Flux**  
(Light-output; lm)  
@ $I_F=70\text{mA}$ ,  $T_A=25^\circ\text{C}$

| Bin Code | Minimum | Maximum |
|----------|---------|---------|
| A        | 0.6     | 1.2     |
| B        | 1.0     | 1.8     |
| C        | 1.5     | 2.4     |
| D        | 2.0     | 3.0     |
| E        | 2.5     | 3.6     |
| F        | 3.0     | 4.2     |
| G        | 3.5     | 4.8     |
| H        | 4.0     | 6.1     |
| J        | 5.0     | 7.3     |
| L        | 6.0     | 9.7     |

**Hue**  
(nm)  
@ $I_F=70\text{mA}$ ,  $T_A=25^\circ\text{C}$

| Bin Code | Minimum | Maximum |
|----------|---------|---------|
| H1       | 611     | 618     |
| H2       | 614     | 622     |
| H3       | 616     | 631     |

For LTL91xVHKSA

**Forward Voltage**  
(Volt)  
@ $I_F=70\text{mA}$ ,  $T_A=25^\circ\text{C}$

| Bin Code | Minimum | Maximum |
|----------|---------|---------|
| Y        | 1.83    | 2.07    |
| Z        | 1.95    | 2.19    |
| 0        | 2.07    | 2.31    |
| 1        | 2.19    | 2.43    |
| 2        | 2.31    | 2.55    |
| 3        | 2.43    | 2.67    |

For LTL911VHKSA  
LTL912VEKSA  
LTL912VYKSA

**Hue**  
(nm)  
@ $I_F=70\text{mA}$ ,  $T_A=25^\circ\text{C}$

|     |     |     |
|-----|-----|-----|
| H28 | 615 | 623 |
| H29 | 619 | 627 |
| H30 | 623 | 631 |

For LTL912VEKSA

**Hue**  
(nm)  
@ $I_F=70\text{mA}$ ,  $T_A=25^\circ\text{C}$

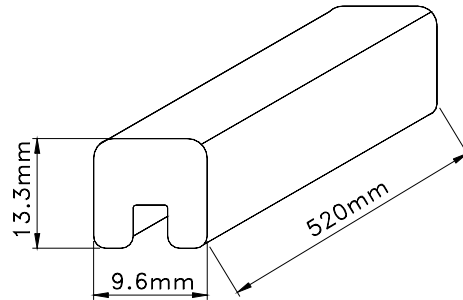
| Bin Code | Minimum | Maximum |
|----------|---------|---------|
| Y0       | 585     | 589     |
| Y1       | 587     | 591     |
| Y2       | 589     | 594     |
| Y3       | 592     | 597     |
| Y4       | 595     | 600     |
| Y5       | 598     | 603     |

For LTL91xVYKSA

**Packing Spec**

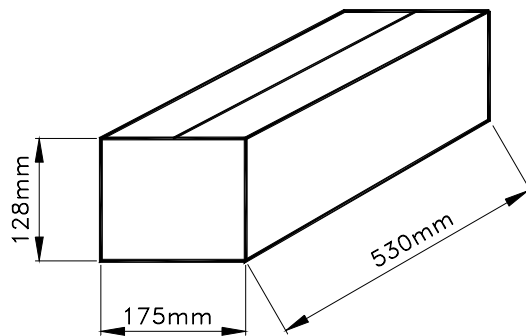
1. Tube: 65pcs

Dim: 520mm x 9.6mm x 13.3mm



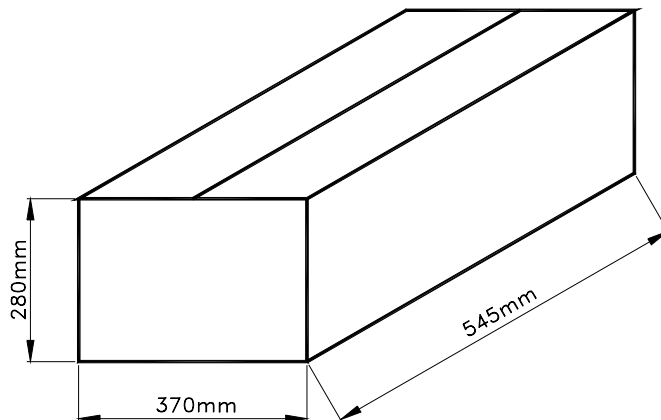
2. Inner carton: 153 tubes x 65 pcs = 9,945 pcs

Dim: 530mm x 175mm x 128mm



3. Outer carton: 4 inner cartons x 9,945 pcs = 39,780 pcs

Dim: 545mm x 370mm x 280mm





**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**

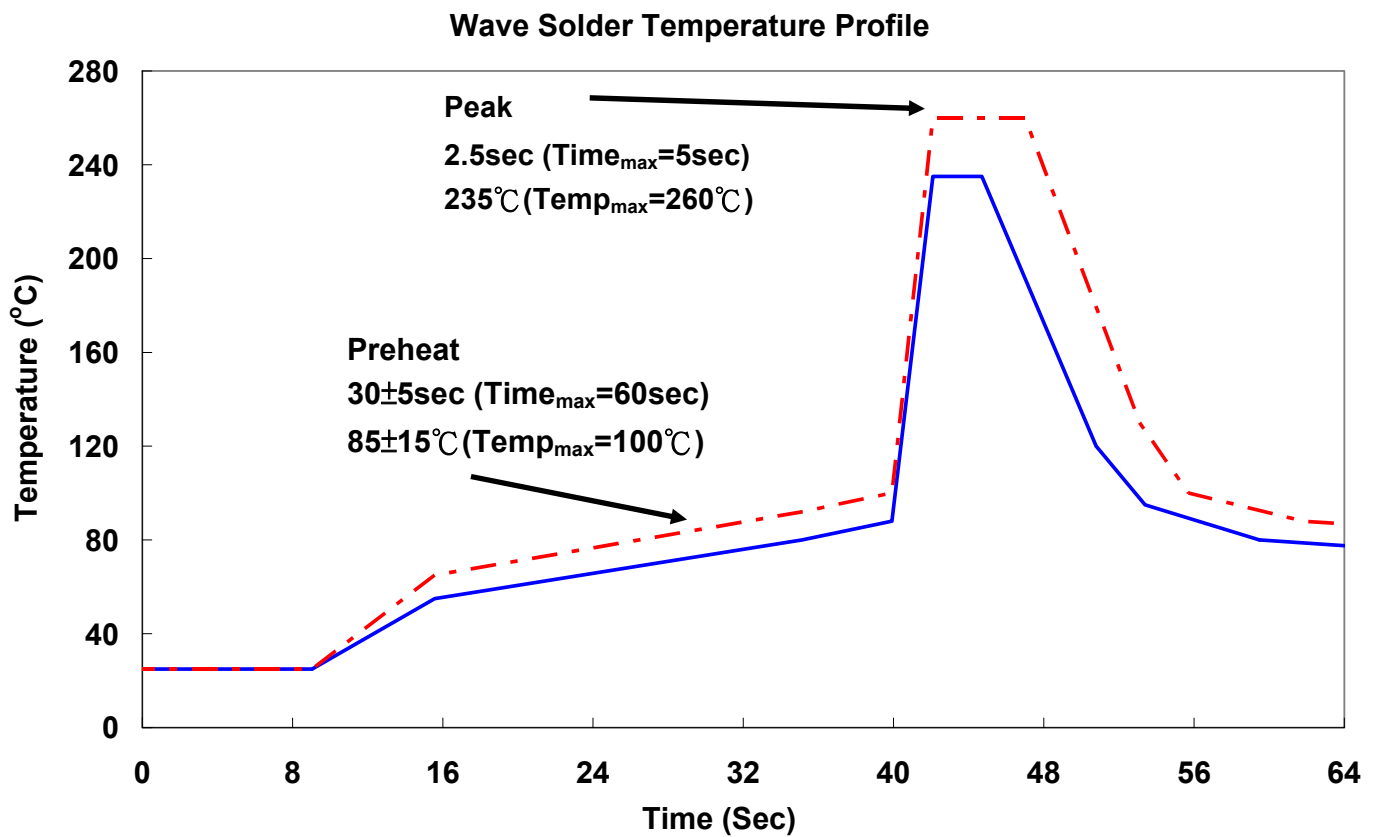
When soldering, leave a minimum of 2mm clearance from the base of the lens to the soldering point. Dipping the lens into the solder must be avoided. Do not apply any external stress to the lead frame during soldering while the LED is at high temperature.

Recommended soldering conditions :

| Soldering iron |                                | Wave soldering |              |
|----------------|--------------------------------|----------------|--------------|
| Temperature    | 300°C Max.                     | Pre-heat       | 100°C Max.   |
| Soldering time | 3 sec. Max.<br>(one time only) | Pre-heat time  | 60 sec. Max. |
|                |                                | Solder wave    | 260°C Max.   |
|                |                                | Soldering time | 5 sec. Max.  |

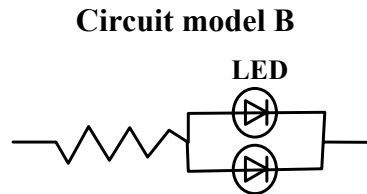
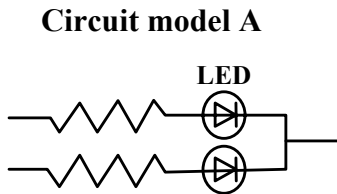
Note: Excessive soldering temperature and/or time might result in deformation of the LED lens or catastrophic failure of the LED. IR re-flow is not suitable process for through whole type Piranha LED production.

The suggesting soldering conditions are listed in table which is on page 9. The wave solder temperature profile which is showed as below figure is taken on the bottom side of the PCB board. Both of the suggesting and maximum conditions are all shown in the figure as below.



## 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.



(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

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward voltage, or “no light up” at low currents. To verify for ESD damage, check for “light up” and  $V_f$  of the suspect LEDs at low currents.

The  $V_f$  of “good” LEDs should be  $>2.0V@0.1mA$  for InGaN product and  $>1.4V@0.1mA$  for AlInGaP product.

## 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 &amp; 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. Others**

The appearance and specifications of the product may be modified for improvement, without prior notice. Liteon may make process or materials changes affecting the performance or other characteristics of our products. These products supplied after such changes will continue to meet published specifications, but may not be identical to products supplied as samples or under prior orders.