Standard Product Specifications

FKR1111C–TR

Features

<table>
<thead>
<tr>
<th>Package</th>
<th>1608 Flat lens type, Milky white resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product features</td>
<td>• Outer dimension 1.6 x 0.8 x 0.7mm (L x W x H)</td>
</tr>
<tr>
<td></td>
<td>• Lead-free soldering compatible</td>
</tr>
<tr>
<td></td>
<td>• RoHS compliant</td>
</tr>
<tr>
<td></td>
<td>• Two times brighter than current product (as Typical)</td>
</tr>
</tbody>
</table>

Recommended Applications

• Amusement machine, Home appliances, OA/FA use, Various indicators, etc.
Outline Dimensions

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PART NAME</th>
<th>MATERIAL</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>LED Die</td>
<td>AlGaInP</td>
<td>1</td>
</tr>
<tr>
<td>②</td>
<td>Lens</td>
<td>Epoxy Resin</td>
<td>1</td>
</tr>
<tr>
<td>③</td>
<td>Substrate</td>
<td>Glass Fabrics</td>
<td>1</td>
</tr>
</tbody>
</table>

Recommended Pad

Unit: mm

2012.12.07
# Specifications

## 【Product Overview】

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Max. Ratings</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Die Material</td>
<td></td>
<td>AlGaInP</td>
<td></td>
</tr>
<tr>
<td>Emitting Color</td>
<td></td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>Resin Color</td>
<td></td>
<td>Milky white</td>
<td></td>
</tr>
</tbody>
</table>

## 【Absolute Maximum Ratings】

(Ta=25℃)

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Maximum Ratings</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Dissipation</td>
<td>Pd</td>
<td>84</td>
<td>mW</td>
</tr>
<tr>
<td>Forward Current</td>
<td>If</td>
<td>30</td>
<td>mA</td>
</tr>
<tr>
<td>Repetitive Peak Forward Current</td>
<td>IFRM</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>Repetitive Peak Forward Current “Pulse width 1ms, Duty 1/20duty”</td>
<td>ΔIf</td>
<td>0.4</td>
<td>mA/℃</td>
</tr>
<tr>
<td>Repetitive Peak Forward Current “Pulse width 1ms, Duty 1/20duty”</td>
<td>ΔIFRM</td>
<td>1.33</td>
<td>mA/℃</td>
</tr>
<tr>
<td>Reverse Voltage</td>
<td>Vr</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>Topr</td>
<td>-40 ~ +85</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>Tstg</td>
<td>-40 ~ +100</td>
<td></td>
</tr>
<tr>
<td>Soldering Temperature</td>
<td>Tsld</td>
<td>260</td>
<td>℃</td>
</tr>
</tbody>
</table>

Note: Please refer to page 8, Soldering conditions.

## 【Electro and Optical Characteristics】

(Ta=25℃)

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward Voltage</td>
<td>Vf</td>
<td>If = 20mA</td>
<td>2.1</td>
<td>2.6</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Current</td>
<td>If</td>
<td>Vr = 5V</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>ΜA</td>
</tr>
<tr>
<td>Luminous Intensity</td>
<td>Iν</td>
<td>If = 20mA</td>
<td>150</td>
<td>-</td>
<td>470</td>
<td>mcd</td>
</tr>
<tr>
<td>Peak Wavelength</td>
<td>λp</td>
<td>If = 20mA</td>
<td>638</td>
<td>-</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Dominant Wavelength</td>
<td>λd</td>
<td>If = 20mA</td>
<td>620</td>
<td>-</td>
<td>632</td>
<td>nm</td>
</tr>
<tr>
<td>Spectral Line Half Width</td>
<td>Δλ</td>
<td>If = 20mA</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>nm</td>
</tr>
</tbody>
</table>

Above the table of Luminous Intensity (IV) values and Dominant Wavelength (λd) values are the setup value of the selection machine. 【Tolerance: IV…±10%, λd…±1nm】

2012.12.07
【Sorting For Luminous Intensity and Dominant Wavelength】
LED's shall be sorted out into the following ranks of Luminous Intensity and Dominant Wavelength.

<table>
<thead>
<tr>
<th>Luminous Intensity (Iv) Rank</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank</td>
<td>Iv (mcd)</td>
</tr>
<tr>
<td>CB</td>
<td>150</td>
</tr>
<tr>
<td>CC</td>
<td>220</td>
</tr>
<tr>
<td>CD</td>
<td>330</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dominant Wavelength (λd) Rank</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank</td>
<td>λd (nm)</td>
</tr>
<tr>
<td>A</td>
<td>620</td>
</tr>
<tr>
<td>B</td>
<td>626</td>
</tr>
</tbody>
</table>

Notes: Above the table of Luminous Intensity (Iv) values and Dominant Wavelength (λd) values are the setup value of the selection machine.
【Tolerance : Iv...±10%, λd...±1nm】
### Technical Data

**Relative Intensity vs. wavelength**

Conditions: $T_a = 25\,^\circ C$, $I_f = 20\,mA$

**Spatial Distribution**

Conditions: $T_a = 25\,^\circ C$, $I_f = 20\,mA$

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**Relative Radiant Intensity (%)**

- 100
- 50
- 0
- 50
- 100

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Technical Data

Forward Voltage vs. Forward Current
Condition: Ta = 25°C

Forward Current vs. Relative Intensity
Condition: Ta = 25°C

Ambient Temperature vs. Forward Voltage
Condition: If = 20mA

Ambient Temperature vs. Relative Intensity
Condition: If = 20mA

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Page: 6
Technical Data

Forward Current vs. Dominant Wavelength
Condition: Ta = 25 °C

Ambient Temperature vs. Dominant Wavelength

Ambient Temperature: Ta (°C)

Dominant Wavelength: λd (nm)

Maximum Forward Current: IF MAX (mA)

Duty cycle vs. Maximum Forward Current
Condition: Ta = 25 °C

Duty(%)

Maximum Forward Current: IF MAX (mA)

Repeatition Frequency: f  50Hz/Pulse Width: tw  1ms

Duty=5%
Duty=10%
Duty=20%
Duty=50%
DC

2012.12.07
1. **Reflow Soldering**

   **[Recommended Reflow Soldering Condition]**

   ![Graph showing the recommended reflow soldering condition.](image)

   - **Peak Temperature**
     - 260°C MAX.
     - 230°C MAX.
   - **Temperature Range**
     - 150°C~180°C (Pre-heating)
     - 90~120sec MAX.
   - **Soldering Duration**
     - 40sec MAX.
   - **Temperature Fluctuation**
     - +1.5~+5°C/s
     - -1.5~+5°C/s

   1. The above temp. profile shall be at the surface of LED resin.

   2. The number of reflow process shall be 2 time MAX. If second reflow process would be performed, intervals between first and second process shall be as short as possible to prevent absorption of moisture to resin of LED. Cooling process to normal temp. shall be required between first and second reflow process.

   3. Temp. fluctuation to LED at pre-heat process shall be minimized.

2. **Manual Soldering (Soldering iron)**

<table>
<thead>
<tr>
<th>Temperature of Iron Tip</th>
<th>350 °C MAX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soldering Duration, Time</td>
<td>3sec. MAX., 1 time</td>
</tr>
</tbody>
</table>

   - The number of manual soldering process shall be 1 time.

3. **Other Caution**

   1. As manual soldering, please heat the solder pad, should not contact a tip of iron to a product (especially resin).

   2. Heat or UV(or both) curing resin shall used for preliminary fixing.
      Curing condition temp. : 150 °C MAX., time : 120s MAX.

   3. After soldering, any mechanical force or any excess vibration shall not be accepted to apply during cooling process to normal temp.
1. **Cleaning**

   1. Special care shall be taken when applying the chemicals listed below for cleaning because certain chemicals may damage the surface of lens or care and cause discoloration.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Adaptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl Alcohol</td>
<td>○</td>
</tr>
<tr>
<td>Isopropyl Alcohol</td>
<td>○</td>
</tr>
<tr>
<td>Pure Water</td>
<td>○</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>×</td>
</tr>
<tr>
<td>Chlorothene</td>
<td>×</td>
</tr>
<tr>
<td>Acetone</td>
<td>×</td>
</tr>
<tr>
<td>Thinner</td>
<td>×</td>
</tr>
</tbody>
</table>

   □ Dipping time is 3 minutes MAX. (In normal temp.)
   □ It can be cleaned on the next page conditions, about pure water.

2. Effect of ultrasonic cleaning on the LED resin body differs depending on such factors as the oscillator output, size of P.C.B. and LED mounting method. So the use of ultrasonic cleaning is strongly recommended after confirming that there is no problem.

3. When using Freon equivalent solvent, discoloration on the LED surface may be caused by one of the first confirming that there is no problem.
   - Freon substitute detergent
     - Clean through 750H
     - Pine alpha ST-100S

4. In the case of water-washing, ensure to use pure water (not city water) and, immediately after the washing is over, apply forced drying to remove all the moisture from the LED.

2. **Warrant period**

   1. Within 6 month by following conditions. Un-opened, +5 ~+30 ˚C / 70% MAX.

3. **Handling after opened**

   1. In case of no-using promptly or on the way to using, LEDs should be restored following conditions and the bag should be fastened the zip lock to prevent absorption of moisture to resin of LEDs. +5 ~+30 ˚C / 70% MAX.

   2. Unpacked LEDs should be stored under the following conditions. LEDs must be soldered on board within 72h whether they are restored in the bag or not. +5 ~+30 ˚C / 70% MAX.

   3. In any case **over 72h has past after opening** the bag or the indicator color of the desiccant has changed (Blue □ Pink), baking should be performed under the following conditions. +60±5 ˚C, 10 ~12 hours

2013.09.04
Handling Precaution

【Other Precautions】

1. Stanley LED Lamps have semiconductor characteristics and are designed to ensure high reliability. However, the performance may vary depending on usage conditions.

2. Absolute Maximum Ratings are set to prevent LED lamps from failing due to excess stress (temperature, current, voltage, etc.). Usage conditions must not exceed the ratings for a moment, nor do reach one item of absolute maximum ratings simultaneously.

3. In order to ensure high reliability from LED Lamps, variable factors that arise in actual usage conditions should be taken into account for designing. (Derating of TYP., MAX Forward Voltage, etc.)

4. Please insert protective resistors into the circuit in order to stabilize LED operation and to prevent the device from igniting due to excess current.

5. Please check the actual performance in the assembly because the Specification Sheets are described for LED device only.

6. Please refrain from looking directly at the light source of LED at high output, as it may harm your vision.

7. The products are designed to operate without failure in recommended usage conditions. However, please take the necessary precautions to prevent fire, injury, and other damages should any malfunction or failure arise.

8. The products are manufactured to be used for ordinary electronic equipment. Please contact our sales staff beforehand when exceptional quality and reliability are required, and the failure or malfunction of the products might directly jeopardize life or health (such as for airplanes, aerospace, transport equipment, medical applications, nuclear reactor control systems and so on).

9. When there is a process of supersonic wave welding etc. after mounting the product, there is a possibility of affecting on the reliability of junction part in package (junction part of die bonding and wire bonding). Please make sure there is no problem before using.

10. The formal specification sheets shall be valid only by exchange of documents signed by both parties.
2. Packaging Box Specifications

Flow Chart - Package Opening to Mounting

- Stored under recommended condition
- Moisture-proof package first time opening
- Allowable leaving time exceeded (x)
  - Yes: Discoloration of silica gel
  - No
- Baking LED under recommended condition
- Product Mounting
- Unused-product remained
  - Yes: Return to moisture-proof package and seal
  - No: Finished
- Reopen the moisture-proof package

Allowable leaving time means the maximum allowable leaving time after opening package, which depends on each LED type. The allowable leaving time should be calculated from the first opening of package to the time when soldering process is finished. When judging if the allowable leaving time has exceeded or not, please subtract the soldering time. The allowable leaving time after reopening should be calculated from the first opening of package, or from the time when baking process is finished.
### Packaging Specifications

**【Packing box】**
(RoHS・ELV Compliant)

<table>
<thead>
<tr>
<th>Box TYPE</th>
<th>Outline dimension L × W × H (mm)</th>
<th>Capacity of the box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>280 × 265 × 45 (mm)</td>
<td>3 reels</td>
</tr>
<tr>
<td>Type B</td>
<td>310 × 235 × 265 (mm)</td>
<td>15 reels</td>
</tr>
<tr>
<td>Type C</td>
<td>440 × 310 × 265 (mm)</td>
<td>30 reels</td>
</tr>
</tbody>
</table>

The above measure is all the reference value.
The box is selected out of the above table, by the shipping quantity.

![Diagram of packing box]

**Type A**
Material / box : Cardboard C5BF

**Type B,C**
Material / box : Cardboard K5AF
Partition : Cardboard K5BF
【Label Specification】
(acc.to ; JIS-X0503(Code-39))

A. Product label

A. Parts number (Indicated the whole parts number)
B. Bar-code for parts number
C. Parts code (In-house identification code for each parts number)
D. Packed parts quantity (Indicated Parts Qty in the packing)
E. Bar-Code for packed parts quantity
F. Lot number & Rank (indicated the following 16 digits)
G. Bar-Code for Lot number & Rank

B. Opto device label

A. Customer Name
B. Parts Type
C. Parts Code
D. Parts Number
E. Packed Parts Quantity
F. Carton Number
G. Shipping Date
H. Bar-Code for In-house identification Number

<Remark> Bar-code font : acc.to Code-39(JIS0503)
### Lot Number Notational System

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
</table>

1. **1 digit**: Production Location (Mark identify alphabet)
   - Produces a location code.

2. **1 digit**: Production Year (Last Digit of Production Year 2009 9, 2010 0, 2011 1, etc.)
   - Represents the year of production.

3. **2 digits**: Production Month (Jan. to Sep., Should be 01, 02, 03, etc.)
   - Specifies the month of production.

4. **2 digits**: Production Date
   - Indicates the date of production.

5. **3 digits**: Serial Number
   - Identifies a unique sequence number.

6. **2 digits**: Tape and Reel following Number
   - Specifies tape and reel identifiers.

7. **2 digits**: Luminous Intensity Rank. (If only 1 digit, second digit must be dash “.” and if not identified rank, its “-”)
   - Measures the luminous intensity.

8. **2 digits**: Chromaticity Rank (If only 1 digit, second digit must be dash “.” and if not identified rank, its “-”)
   - Evaluates chromaticity.
   - Special rank identification such as Y', A' rank must be "YY" or "AA", not using prime "'".

9. **1 digit**: Option Rank (Normally its "")
   - Indicative of optional or additional characteristics.
1. Appearance

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leader area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cover-tape</td>
<td>Cover-tape shall be longer than 200mm without carrier-tape</td>
<td>The end of cover-tape shall be held with adhesive tape.</td>
</tr>
<tr>
<td>Carrier-tape</td>
<td>Empty pocket shall be more than 10 pieces.</td>
<td>Please refer to the above figure for Taping &amp; reel orientation.</td>
</tr>
<tr>
<td>Trailer area</td>
<td>Empty pocket shall be more than 15 pieces.</td>
<td>The end of taping shall be inserted into a slit of the hub.</td>
</tr>
</tbody>
</table>
2. Qty. per Reel
   4,000 pcs./reel

3. Mechanical strength
   Cover-tape adhesive strength shall be 0.1~1.0N (An angle between carrier-tape and cover-tape shall
   be 170 deg.) Both tapes shall be so sealed that the contained parts will not come out from the tape
   when it is bent at a radius of 15mm.

4. Others
   Reversed-orientation, Up-side down placing, side placing and out of spec. parts mix shall not be held.
   No more than 1 connecting empty pockets of taping.
   Empty Pocket per reel is assumed until 5 piece.
5. Taping Dimensions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Part name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carrier-tape</td>
<td>Anti-static grade</td>
</tr>
<tr>
<td>2</td>
<td>Cover-tape</td>
<td>Anti-static grade</td>
</tr>
<tr>
<td>3</td>
<td>Carrier-real</td>
<td>Conductive grade</td>
</tr>
</tbody>
</table>

Unit: mm

6. Reel Dimensions
This product is in compliance with RoHS•ELV.

Prohibition substance and it's criteria value of RoHS•ELV are as follows.

• RoHS instruction ...... Refer to following (1)〜(6).
• ELV instruction ........ Refer to following (1)〜(4).

<table>
<thead>
<tr>
<th>Substance group name</th>
<th>Criteria value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Lead and its compounds</td>
<td>1,000ppm Max</td>
</tr>
<tr>
<td>(2) Cadmium and its compounds</td>
<td>100ppm Max</td>
</tr>
<tr>
<td>(3) Mercury and its compounds</td>
<td>1,000ppm Max</td>
</tr>
<tr>
<td>(4) Hexavalent chromium</td>
<td>1,000ppm Max</td>
</tr>
<tr>
<td>(5) PBB</td>
<td>1,000ppm Max</td>
</tr>
<tr>
<td>(6) PBDE</td>
<td>1,000ppm Max</td>
</tr>
</tbody>
</table>
## Reliability Testing Result

### Room Temp. Operating Life
- **Applicable Standard**: EIAJ ED-4701/100(101)
- **Testing Conditions**: Ta = 25°C, If = 30mA
- **Duration**: 1,000 h
- **Failure**: 0/25

### Resistance to Soldering Heat
- **Applicable Standard**: EIAJ ED-4701/300(301)
- **Duration**: Twice
- **Failure**: 0/25

### Temperature Cycling
- **Applicable Standard**: EIAJ ED-4701/100(105)
- **Testing Conditions**: ~40°C (30min) ～ Normal Temperature(15min) ～ +100°C (30min) ～ Normal Temperature(15min)
- **Duration**: 5 cycles
- **Failure**: 0/25

### Wet High Temp. Storage Life
- **Applicable Standard**: EIAJ ED-4701/100(103)
- **Testing Conditions**: Ta = 60±2°C, RH = 90±5%
- **Duration**: 1,000 h
- **Failure**: 0/25

### High Temp. Storage Life
- **Applicable Standard**: EIAJ ED-4701/200(201)
- **Testing Conditions**: Ta = +100°C
- **Duration**: 1,000 h
- **Failure**: 0/25

### Low Temp. Storage Life
- **Applicable Standard**: EIAJ ED-4701/200(202)
- **Testing Conditions**: Ta = ~40°C
- **Duration**: 1,000 h
- **Failure**: 0/25

### Vibration, Variable Frequency
- **Applicable Standard**: EIAJ ED-4701/400(403)
- **Testing Conditions**: 98.1m/s² (10G), 100 ～ 2KHz sweep for 20min., XYZ each direction
- **Duration**: 2 h
- **Failure**: 0/10

## Failure Criteria

<table>
<thead>
<tr>
<th>Items</th>
<th>Symbols</th>
<th>Conditions</th>
<th>Failure criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luminous Intensity</td>
<td>I₀</td>
<td>20mA</td>
<td>Testing Min. Value &lt; Spec. Min. Value x 0.5</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>Vᵢ</td>
<td>20mA</td>
<td>Testing Max. Value &gt; Spec. Max. Value x 1.2</td>
</tr>
<tr>
<td>Reverse Current</td>
<td>Iᵢ</td>
<td>5V</td>
<td>Testing Max. Value &gt; Spec. Max. Value x 2.5</td>
</tr>
<tr>
<td>Cosmetic Appearance</td>
<td>-</td>
<td>-</td>
<td>Occurrence of notable decoloration, deformation and cracking</td>
</tr>
</tbody>
</table>

2013.09.04
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1) The technical information shown in the data sheets are limited to the typical characteristics and circuit examples of the referenced products. It does not constitute the warranting of industrial property nor the granting of any license.

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3) When using the products described in the data sheets, please adhere to the maximum ratings for operating voltage, heat dissipation characteristics, and other precautions for use. We are not responsible for any damage which may occur if these specifications are exceeded.

4) The products that have been described to this catalog are manufactured so that they will be used for the electrical instrument of the benchmark (OA equipment, telecommunications equipment, AV machine, home appliance and measuring instrument).

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