

## Photocouplers / Optocouplers

### Insulation Distances

#### Abstract

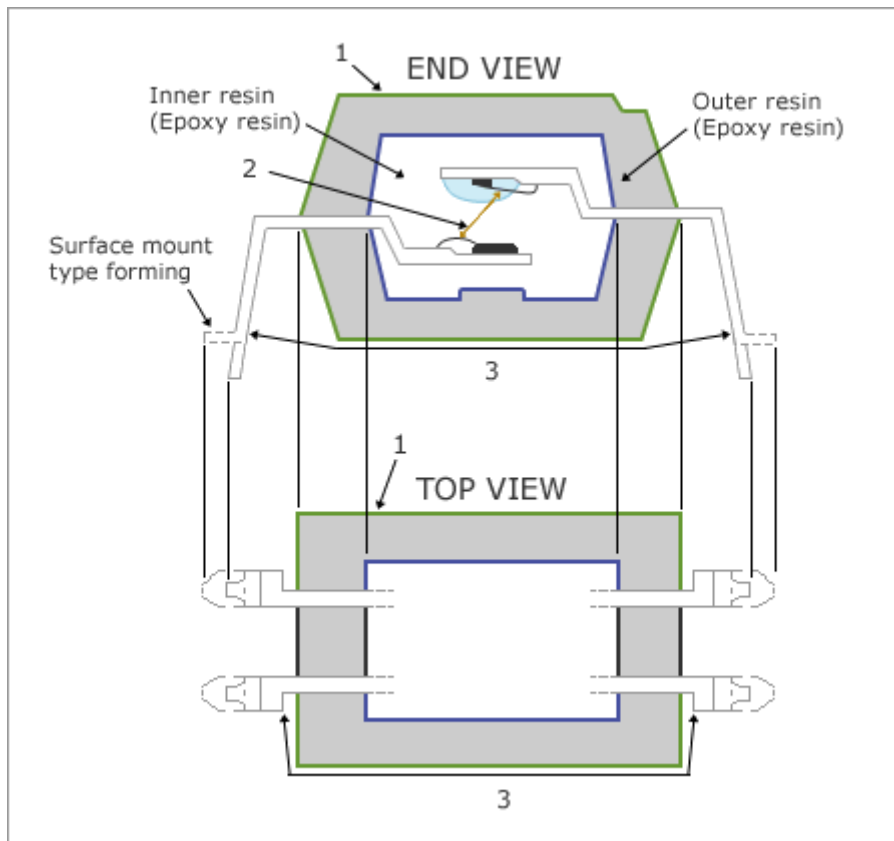
Our photocouplers use a double structure consisting of an inner resin with high optical transmittance between the light-emitting diode (LED) and the photo-diode, and an outer resin with high light shading effect on the outside.

As a result, both stable operation not influenced by external light and high sensitivity (small minimum operating input current) are achieved.

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## 1. Overview



| No. / Name                  | Description   |
|-----------------------------|---|
| 1. Creepage Distance        | Shortest distance between the light emitting side pin and the light receiving side pin, along the package surface (green line in the figure above).   |
| 2. Insulator Thickness      | Shortest distance between the light emitting side and the light receiving side insulated with resin   |
| 3. Clearance (Air distance) | Space outside the resin that is the shortest distance between the light emitting side pin and the light receiving side pin. Depending on the pin shape, this distance may be the same as the outer creepage distance. |

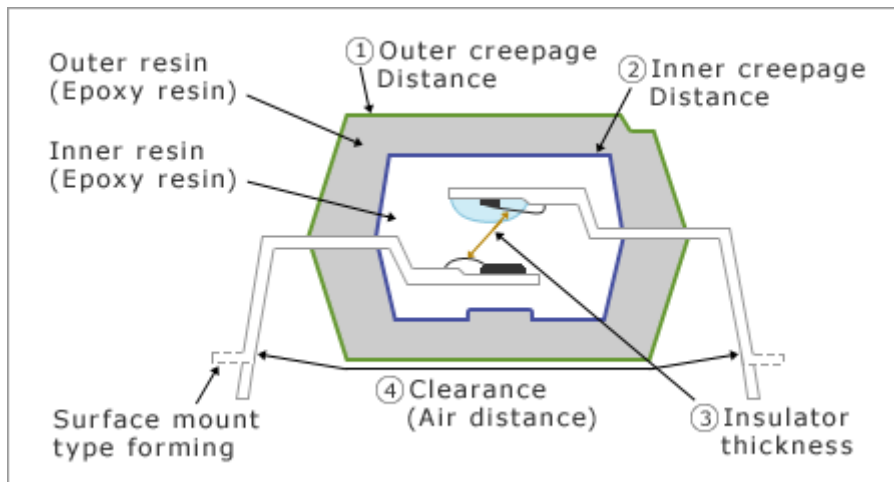
## Insulation Distances Application Note

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| Package Name         | Width of Molded Body<br>between Pin Lines (mm) | Length (mm) | Height (mm) | Mass (g) |
|----------------------|--|-------------|-------------|----------|
| 16-pin DIP           | 6.5  | 19.8        | 3.6         | 1.02     |
| 8-pin DIP            | 6.5  | 9.25        | 3.6         | 0.55     |
| 4-pin DIP            | 6.5  | 4.6         | 3.6         | 0.26     |
| 6-pin SDIP           | 6.8  | 4.58        | 3.7         | 0.35     |
| 8-pin SDIP           | 6.8  | 5.85        | 3.7         | 0.35     |
| 16-pin SSOP          | 4.4  | 10.3        | 2           | 0.2      |
| 12-pin SSOP          | 4.4  | 5.6         | 2.5         | 0.14     |
| 8-pin SSOP           | 3.95   | 5.21        | 3.27        | 0.14     |
| 5-pin LSSO5          | 7.5  | 2.5         | 2.1         | 0.075    |
| 5-pin SOP            | 4.4  | 4           | 2.1         | 0.08     |
| 4-pin SOP            | 4.4  | 4           | 2.1         | 0.08     |
| 4-pin LSSOP          | 7.5  | 2.5         | 2.1         | 0.075    |
| 4-pin SSOP           | 4.4  | 2.7         | 2           | 0.05     |
| 4-pin mini flat-lead | 4.6  | 2.5         | 2.1         | 0.05     |

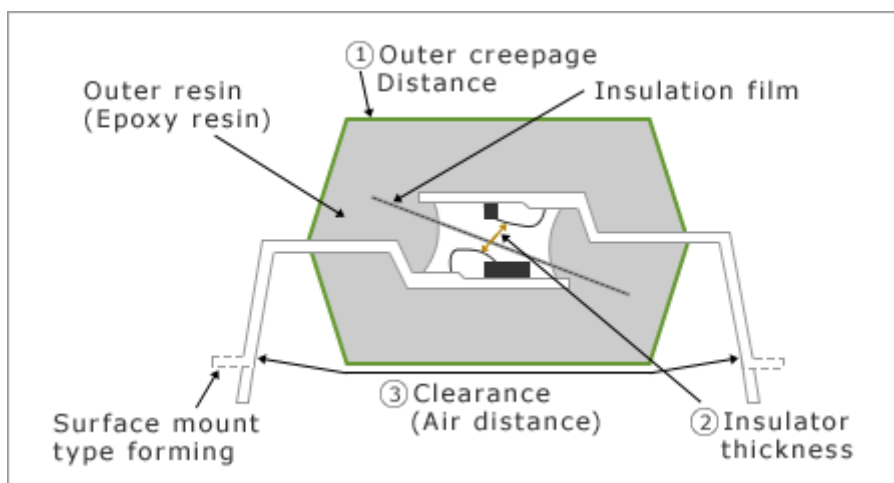
Caution: The values in the table differ slightly depending on the lead forming type.

## 2. 16-pin DIP (Dual Inline Package)



| Product Name           | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Inner Creepage Distance (mm) | 3 - Insulator Thickness (mm) | 4 - Clearance (mm) |
|------------------------|-------------------------------|----------------------------------|----------------------------------|------------------------------|--------------------|
| PS2501-4,<br>PS2501L-4 | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2502-4,<br>PS2502L-4 | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2505-4,<br>PS2505L-4 | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |

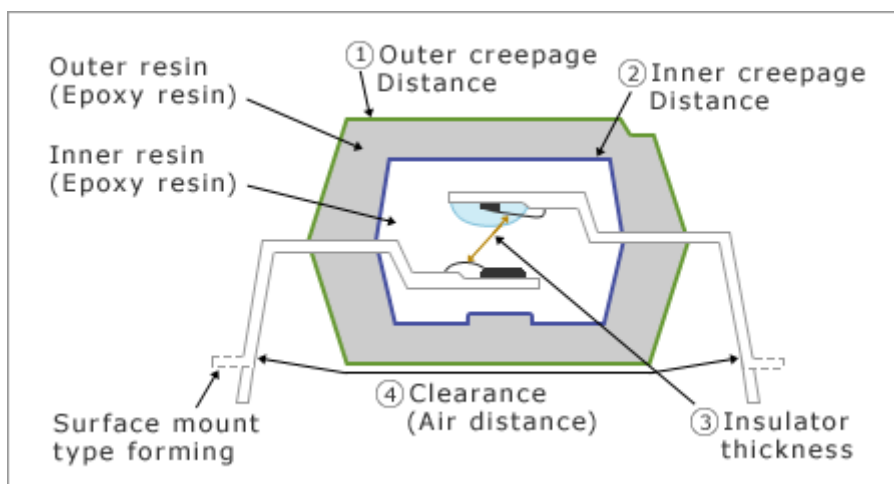
### 3. 8-pin DIP (Dual Inline Package)



| Product Name       | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Insulator Thickness (mm) | 3 - Clearance (mm) |
|--------------------|-------------------------------|----------------------------------|------------------------------|--------------------|
| PS8501, PS8501L3   | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS8501L1, PS8501L2 | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS8502, PS8502L3   | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS8502L1, PS8502L2 | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9505, PS9505L3   | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9505L1, PS9505L2 | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9513, PS9513L3   | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9513L1, PS9513L2 | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9587, PS9587L3   | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9587L1, PS9587L2 | 5.0                           | 8.0                              | 0.4                          | 8.0                |

## 4. 4-pin DIP (Dual Inline Package)

### 4.1 Normal, Surface mount (L)

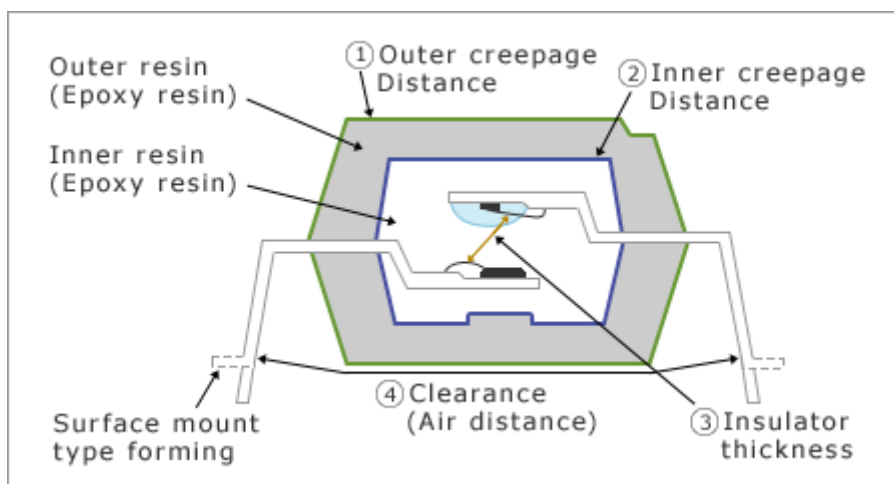


| Product Name             | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Inner Creepage Distance (mm) | 3 - Insulator Thickness (mm) | 4 - Clearance (mm) |
|--------------------------|-------------------------------|----------------------------------|----------------------------------|------------------------------|--------------------|
| PS2501-1,<br>PS2501L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2501A-1,<br>PS2501AL-1 | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2502-1,<br>PS2502L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2503-1,<br>PS2503L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2505-1,<br>PS2505L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2506-1,<br>PS2506L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2513-1,<br>PS2513L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2514-1,<br>PS2514L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2533-1,<br>PS2533L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2535-1,<br>PS2535L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2561-1,<br>PS2561L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2561A-1,<br>PS2561AL-1 | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2561B-1,<br>PS2561BL-1 | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2561D-1,<br>PS2561DL-1 | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |

## Insulation Distances Application Note

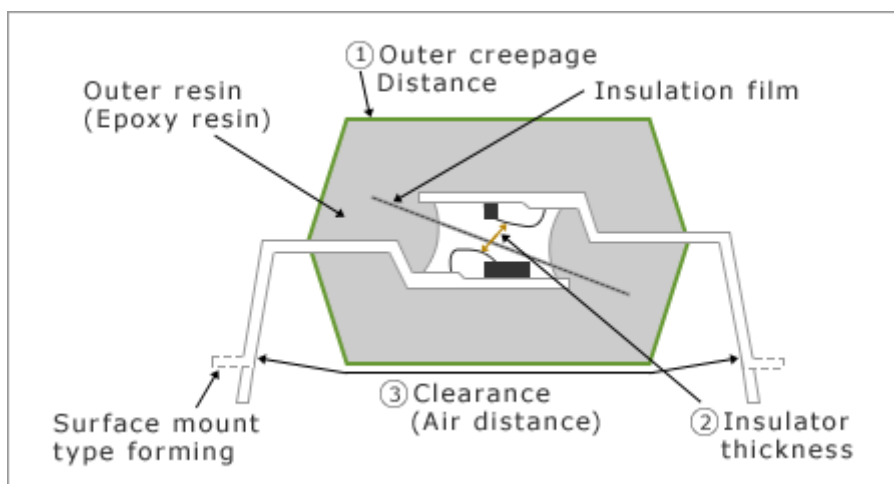
| Product Name             | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Inner Creepage Distance (mm) | 3 - Insulator Thickness (mm) | 4 - Clearance (mm) |
|--------------------------|-------------------------------|----------------------------------|----------------------------------|------------------------------|--------------------|
| PS2561F-1,<br>PS2561FL-1 | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2562-1,<br>PS2562L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |
| PS2565-1,<br>PS2565L-1   | 5.0                           | 7.0                              | 3.5                              | 0.3                          | 7.0                |

### 4.2 Long Clearance Distance (L1), Long Clearance Distance Surface Mount (L2)



| Product Name                | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Inner Creepage Distance (mm) | 3 - Insulator Thickness (mm) | 4 - Clearance (mm) |
|-----------------------------|-------------------------------|----------------------------------|----------------------------------|------------------------------|--------------------|
| PS2561L1-1,<br>PS2561L2-1   | 5.0                           | 7.0                              | 4.0                              | 0.4                          | 7.0                |
| PS2561AL1-1,<br>PS2561AL2-1 | 5.0                           | 7.0                              | 4.0                              | 0.4                          | 7.0                |
| PS2561BL1-1,<br>PS2561BL2-1 | 5.0                           | 7.0                              | 4.0                              | 0.4                          | 7.0                |
| PS2561DL1-1,<br>PS2561DL2-1 | 5.0                           | 8.0                              | 4.0                              | 0.4                          | 8.0                |
| PS2562L1-1,<br>PS2562L2-1   | 5.0                           | 7.0                              | 4.0                              | 0.4                          | 7.0                |
| PS2565L1-1,<br>PS2565L2-1   | 5.0                           | 7.0                              | 4.0                              | 0.4                          | 7.0                |
| PS2581L1,<br>PS2581L2       | 5.0                           | 8.0                              | 4.0                              | 0.4                          | 8.0                |
| PS2581AL1,<br>PS2581AL2     | 5.0                           | 8.0                              | 4.0                              | 0.4                          | 8.0                |

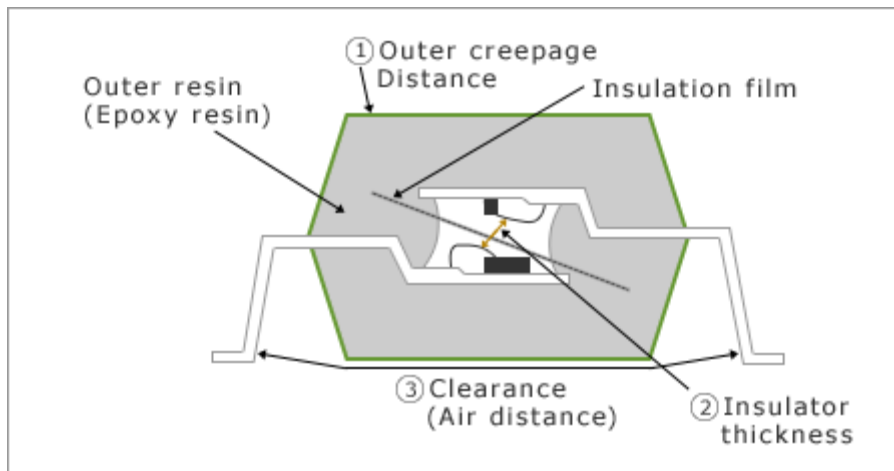
## 5. 6-pin SDIP (Shrink Dual Inline Package)



| Product Name | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Insulator Thickness (mm) | 3 - Clearance (mm) |
|--------------|-------------------------------|----------------------------------|------------------------------|--------------------|
| PS8302L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS8302L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9303L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9303L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9306L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9306L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9307L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9307L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9308L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9308L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9313L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9313L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9317L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9317L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9324L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9324L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9331L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9331L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9351L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9351L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |

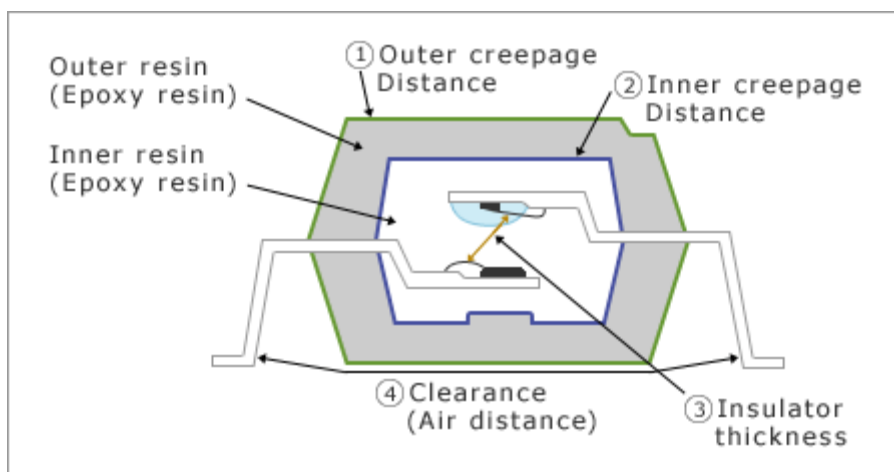


## 6. 8-pin SDIP (Shrink Dual Inline Package)



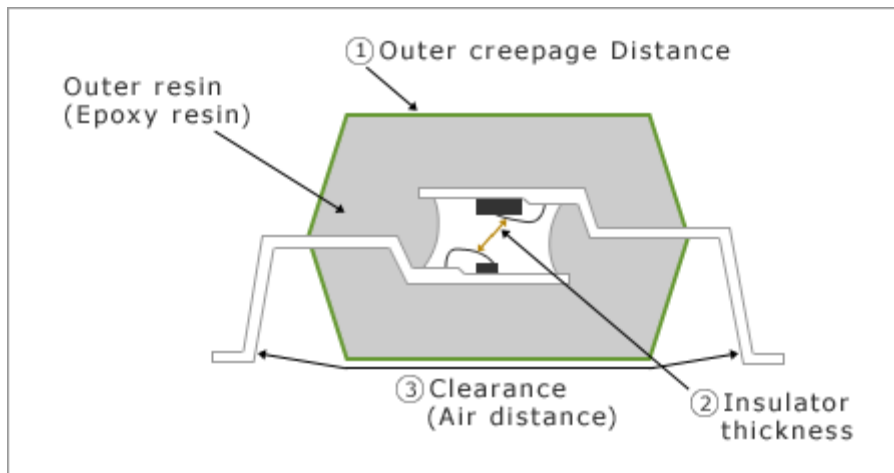
| Product Name | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Insulator Thickness (mm) | 3 - Clearance (mm) |
|--------------|-------------------------------|----------------------------------|------------------------------|--------------------|
| PS9305L      | 5.0                           | 8.0                              | 0.4                          | 7.0                |
| PS9305L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |
| PS9332L      | 5.0                           | 7.0                              | 0.4                          | 7.0                |
| PS9332L2     | 5.0                           | 8.0                              | 0.4                          | 8.0                |

## 7. 16-pin SSOP (Shrink Small Outline Package)



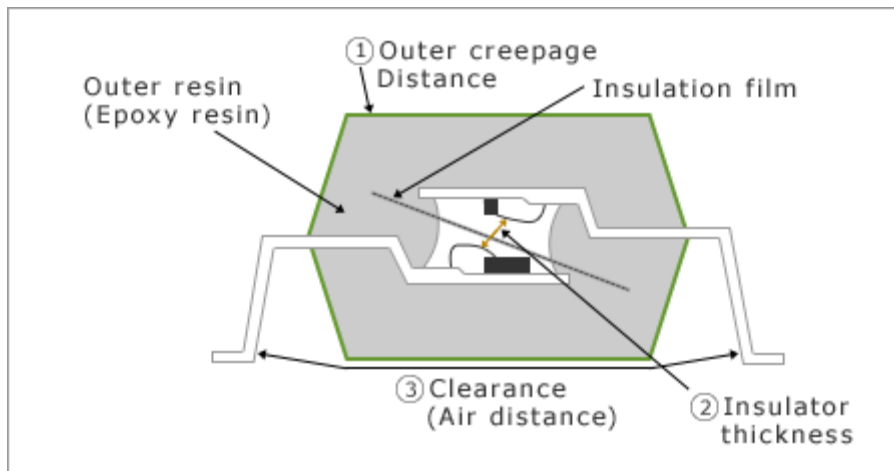
| Product Name | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Inner Creepage Distance (mm) | 3 - Insulator Thickness (mm) | 4 - Clearance (mm) |
|--------------|-------------------------------|----------------------------------|----------------------------------|------------------------------|--------------------|
| PS2801C-4    | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2802-4     | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2805C-4    | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2811-4     | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2815-4     | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2833-4     | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |

## 8. 12-pin SSOP (Shrink Small Outline Package)



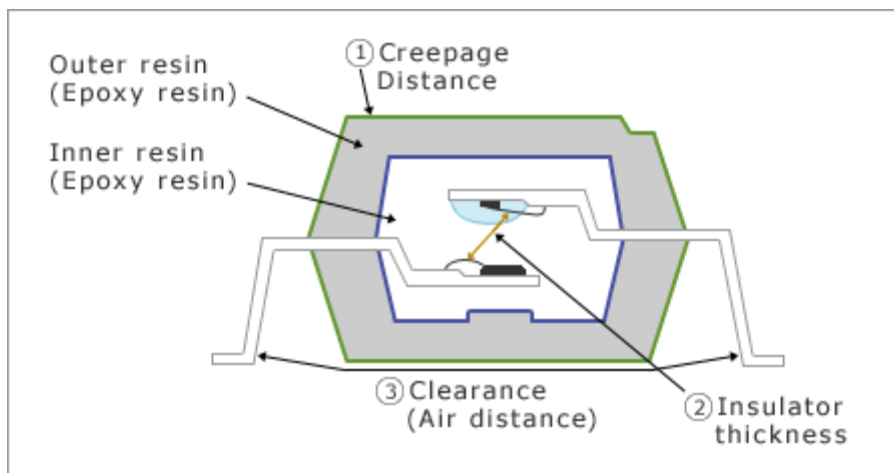
| Product Name | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Insulator Thickness (mm) | 3 - Clearance (mm) |
|--------------|-------------------------------|----------------------------------|------------------------------|--------------------|
| PS2841-4A    | 1.5                           | 4.0                              | 0.4                          | 4.0                |
| PS2841-4B    | 1.5                           | 4.0                              | 0.4                          | 4.0                |
| PS2845-4A    | 1.5                           | 4.0                              | 0.4                          | 4.0                |

## 9. 8-pin SSOP (Shrink Small Outline Package)



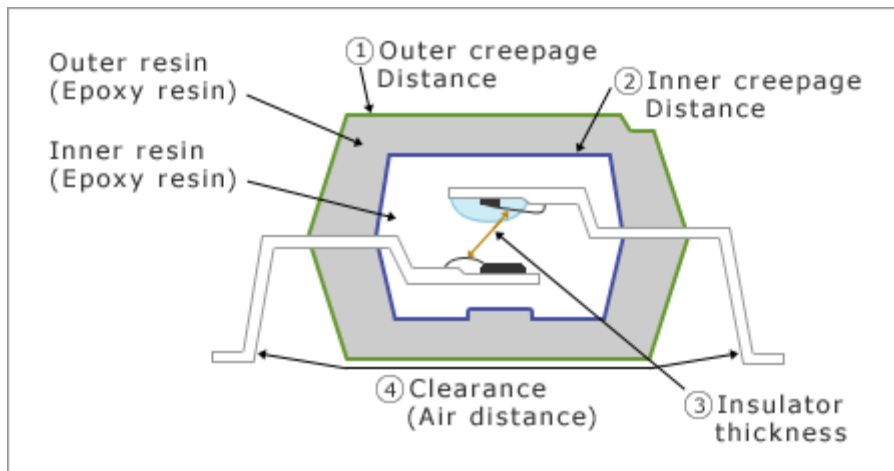
| Product Name         | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Insulator Thickness (mm) | 3 - Clearance (mm) |
|----------------------|-------------------------------|----------------------------------|------------------------------|--------------------|
| PS8802-1, PS8802-2   | 2.5                           | 4.0                              | 0.2                          | 4.0                |
| PS8821-1, PS8821-2   | 2.5                           | 4.0                              | 0.2                          | 4.0                |
| PS9817A-1, PS9817A-2 | 2.5                           | 4.0                              | 0.2                          | 4.0                |
| PS9821-1, PS9821-2   | 2.5                           | 4.0                              | 0.2                          | 4.0                |
| PS9822-1, PS9822-2   | 2.5                           | 4.0                              | 0.2                          | 4.0                |
| PS9851-1, PS9851-2   | 2.5                           | 4.0                              | 0.2                          | 4.0                |

## 10. 5-pin LSSO5 (Long Creepage Shrink Small Outline Package)



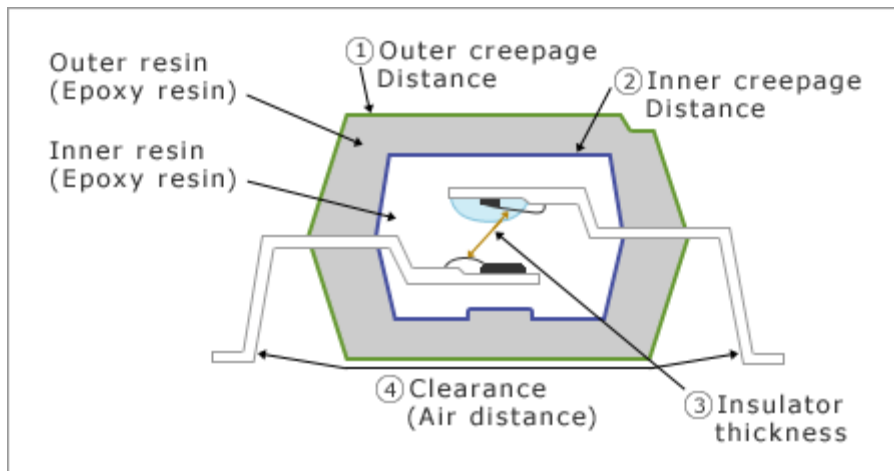
| Product Name | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Insulator Thickness (mm) | 3 - Clearance (mm) |
|--------------|-------------------------------|----------------------------------|------------------------------|--------------------|
| RV1S9213A    | 5.0                           | 8.2                              | 0.15                         | 8.2                |
| RV1S9260A    | 5.0                           | 8.2                              | 0.15                         | 8.2                |

## 11. 5-pin SOP (Small Outline Package)



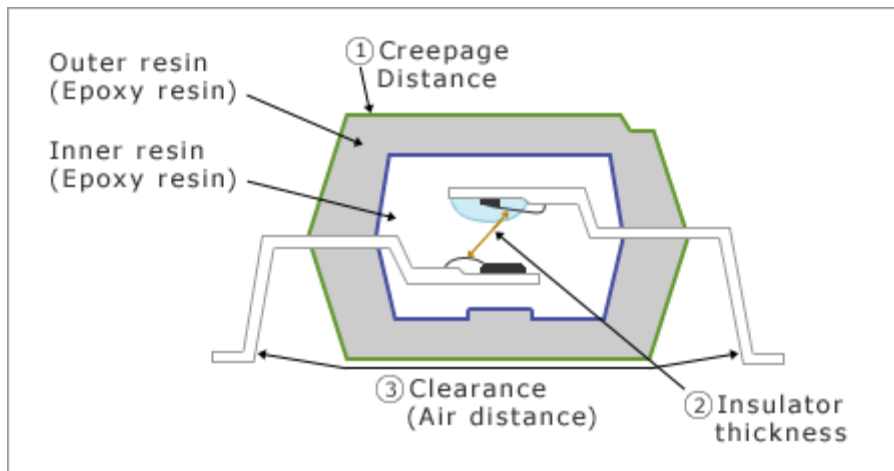
| Product Name | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Inner Creepage Distance (mm) | 3 - Insulator Thickness (mm) | 4 - Clearance (mm) |
|--------------|-------------------------------|----------------------------------|----------------------------------|------------------------------|--------------------|
| PS8101       | 3.75                          | 4.2                              | 2.5                              | 0.2                          | 4.2                |
| PS9113       | 3.75                          | 4.2                              | 2.5                              | 0.2                          | 4.2                |
| PS9117A      | 3.75                          | 4.2                              | 2.5                              | 0.2                          | 4.2                |
| PS9121       | 3.75                          | 4.2                              | 2.5                              | 0.2                          | 4.2                |
| PS9122       | 3.75                          | 4.2                              | 2.5                              | 0.2                          | 4.2                |
| PS9123       | 3.75                          | 4.2                              | 2.5                              | 0.2                          | 4.2                |
| PS9124       | 3.75                          | 4.2                              | 2.5                              | 0.2                          | 4.2                |
| PS9151       | 3.75                          | 4.2                              | 2.5                              | 0.2                          | 4.2                |

## 12. 4-pin SOP (Small Outline Package)



| Product Name | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Inner Creepage Distance (mm) | 3 - Insulator Thickness (mm) | 4 - Clearance (mm) |
|--------------|-------------------------------|----------------------------------|----------------------------------|------------------------------|--------------------|
| PS2381-1     | 5.0                           | 8.0                              | -                                | 0.4                          | 8.0                |
| PS2701A-1    | 3.75                          | 5.0                              | 2.5                              | 0.3                          | 5.0                |
| PS2702-1     | 3.75                          | 5.0                              | 2.5                              | 0.3                          | 5.0                |
| PS2703-1     | 3.75                          | 5.0                              | 2.5                              | 0.3                          | 5.0                |
| PS2705A-1    | 3.75                          | 5.0                              | 2.5                              | 0.3                          | 5.0                |
| PS2711-1     | 3.75                          | 5.0                              | 2.5                              | 0.3                          | 5.0                |
| PS2715-1     | 3.75                          | 5.0                              | 2.5                              | 0.3                          | 5.0                |
| PS2733-1     | 2.5                           | 5.0                              | 2.5                              | 0.3                          | 5.0                |
| PS2761B-1    | 3.75                          | 5.0                              | -                                | 0.4                          | 5.0                |

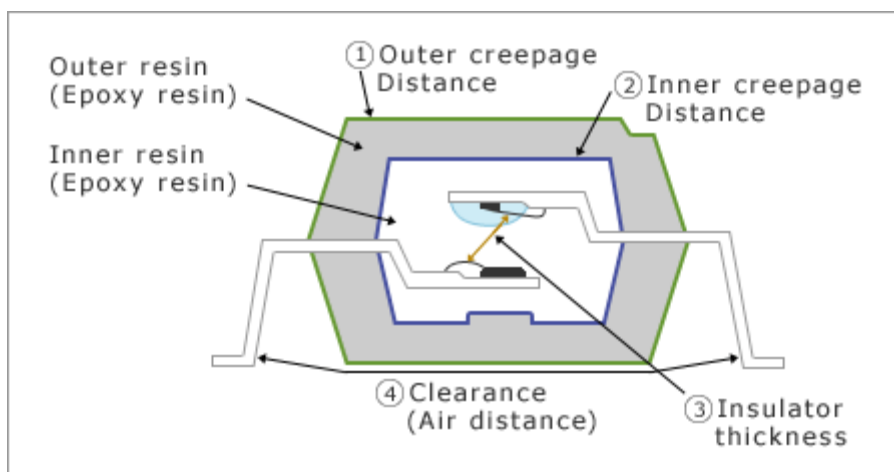
### 13. 4-pin LSSOP (Long Creepage Shrink Small Outline Package)



| Product Name | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Insulator Thickness (mm) | 3 - Clearance (mm) |
|--------------|-------------------------------|----------------------------------|------------------------------|--------------------|
| RV1S2211A    | 5.0                           | 8.2                              | 0.15                         | 8.2                |
| RV1S2281A    | 5.0                           | 8.2                              | 0.15                         | 8.2                |
| RV1S2285A    | 5.0                           | 8.2                              | 0.15                         | 8.2                |

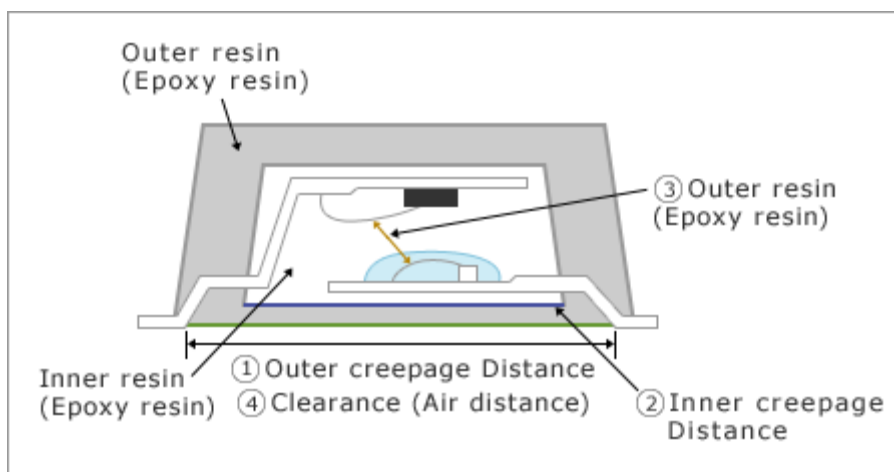


## 14. 4-pin SSOP (Shrink Small Outline Package)



| Product Name | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Inner Creepage Distance (mm) | 3 - Insulator Thickness (mm) | 4 - Clearance (mm) |
|--------------|-------------------------------|----------------------------------|----------------------------------|------------------------------|--------------------|
| PS2801C-1    | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2802-1     | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2805C-1    | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2811-1     | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2815-1     | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2833-1     | 2.5                           | 4.5                              | 2.5                              | 0.1                          | 4.5                |
| PS2861B-1    | 3.75                          | 5.0                              | -                                | 0.4                          | 5.0                |

## 15. 4-pin Mini Flat-lead



| Product Name | Insulation Voltage (kVr.m.s.) | 1 - Outer Creepage Distance (mm) | 2 - Inner Creepage Distance (mm) | 3 - Insulator Thickness (mm) | 4 - Clearance (mm) |
|--------------|-------------------------------|----------------------------------|----------------------------------|------------------------------|--------------------|
| PS2911-1     | 2.5                           | 4.0                              | 2.5                              | 0.4                          | 4.0                |
| PS2913-1     | 2.5                           | 4.0                              | 2.5                              | 0.4                          | 4.0                |
| PS2915-1     | 2.5                           | 4.0                              | 2.5                              | 0.4                          | 4.0                |
| PS2933-1     | 2.5                           | 4.0                              | 2.5                              | 0.4                          | 4.0                |

## 16. Revision History

| Revision | Date      | Description      |
|----------|-----------|------------------|
| 1.0      | Oct.20.20 | Initial release. |

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