Japan Display Inc.

Characteristics of the LumiFree during long-term use

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Japan Display Inc.

Summary

- This document provides information on the reliability of LumiFree.

Long-term use verification*

- There is no significant change in optical properties after 50,000 hours of use in 80°C and 90°C environments
- When degradation occurs, cloudiness appears in the active area; however, even after the equivalent of 65,000 hours of use at 90°C, the decrease in transmittance remains below 20% at most.
- Provided that the product is used within the specified operating temperature range (-20°C to 80°C), it maintains performance suitable for long-term use.

Examples of damage under excessive environmental conditions

- Exposure to UV light may cause the liquid crystal molecules to degrade, potentially resulting in malfunction of the device.
- Exposure to excessive heat or intense light may lead to the denaturation and discoloration of organic materials.

✓ Please ensure that LumiFree is used strictly within the specified operating temperature range.

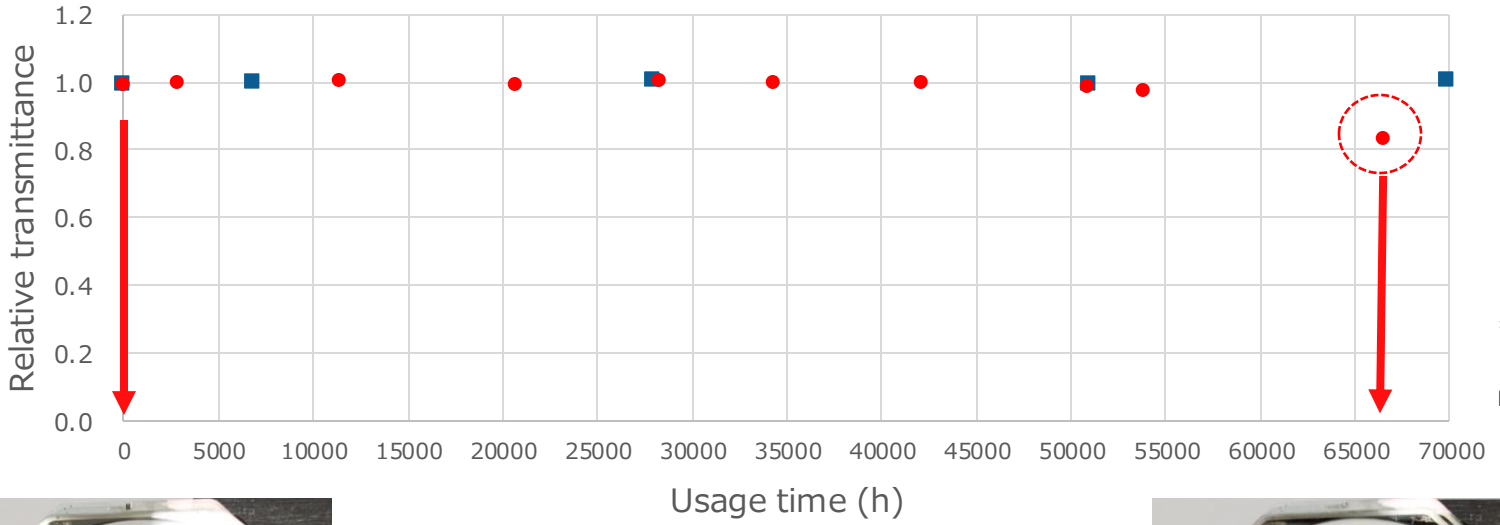
✓ Protect the product from UV light, moisture, and dust during use.

✓ These results are based on our internal evaluations and do not guarantee the same outcomes under all environmental conditions. **Please validate under the final product conditions (e.g., lighting fixture).**

*Long-term use verification figures are estimates based on reliability engineering verified based on accelerated tests

Long-term use and product degradation

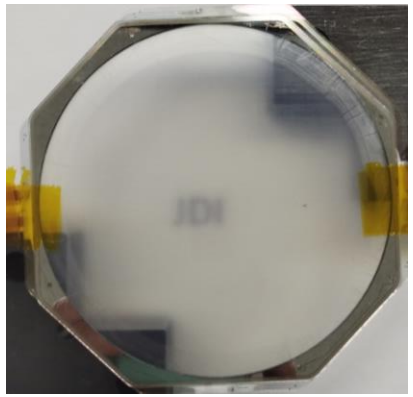
- **Testing was conducted under assumed usage conditions at 80°C and 90°C, and no degradation was observed even after over 50,000 hours of operation.**
- **When LumiFree degrades, cloudiness appears in the active area; however, even after 65,000 hours of use at 90°C, the decrease in transmittance remained below 20%.**



* Transmittance at 0h is standardized as 1.0.
Usage time is an estimate based on the results of accelerated testing

LumiFree OFF
Initial (0h) state

If you use it at high temperature for a long time
The LCD panel becomes cloudy.

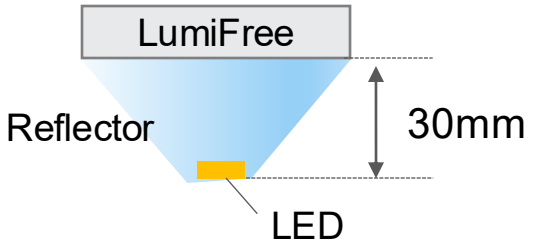


LumiFree OFF
After 65,000h of use in a 90°C environment

[Appendix] Long-term use and product degradation (test conditions)

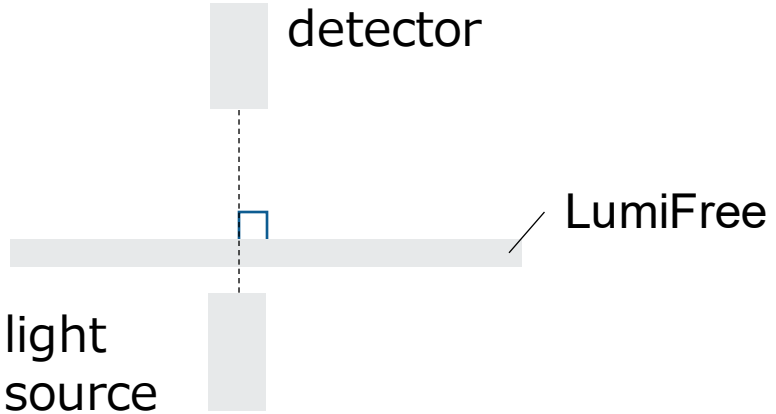
- **The evaluation was conducted using the LED and reflector defined in the figure below.**
- **Additionally, the transmittance was measured using the method described below.**

Validation conditions



※Reflector： C16907_ALISE-50-S (LEDiL)
LED：5000lm considerably （at Tc=25℃ (typical)）

Transmittance measurement method

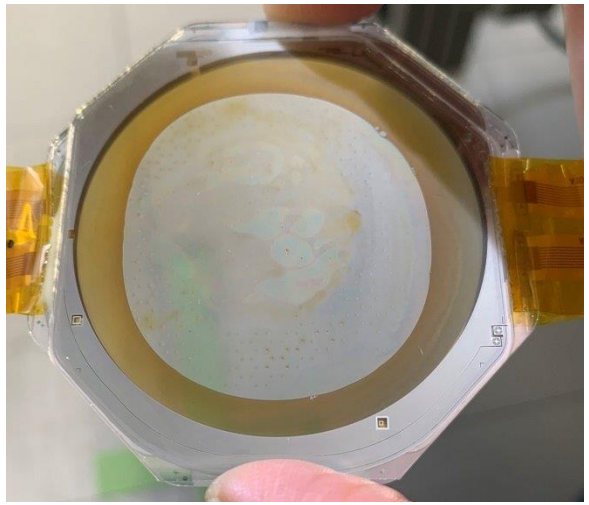


$$Transmittance\ (\%) = \frac{Transmitted\ brightness}{Light\ sourcebrightness} \times 100$$

Examples of damage under excessive environmental conditions

- **Installation under UV light or in the vicinity of extremely high heat sources or strong light may destroy the product.**
- **When used outdoors, etc., the product should be adequately protected from ultraviolet light, water, dust, etc.,**
- **Also, please ensure that the ambient temperature around the product remains within the specified operating temperature range during use.**

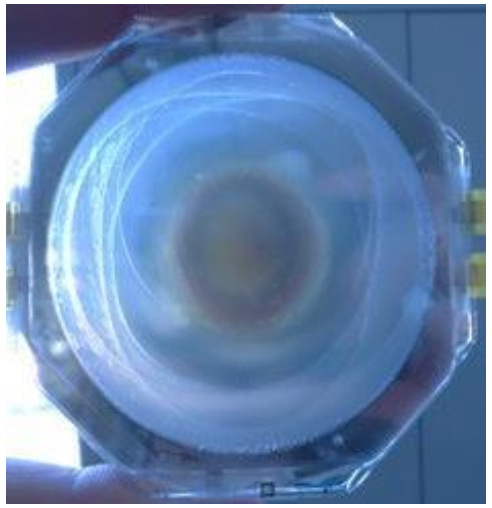
UV irradiation



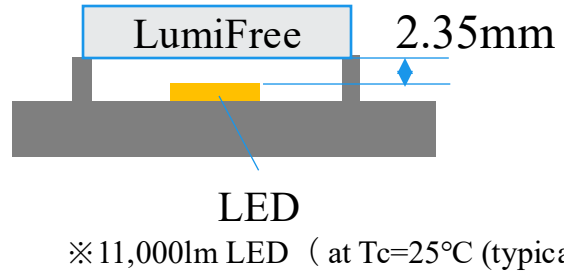
Decomposition of liquid crystal

※Exposure to direct UV light may damage the structure of the liquid crystal molecules. Please use the product with appropriate protection to prevent direct exposure to UV light.

Excessive heat and light



Denaturation of organic matter



Experimental conditions of the figure on the left

※When exposed to extremely high temperatures—such as when placed very close to an LED—or to intense light, the organic materials in the product may undergo changes and discoloration. Please use the product within the specified operating temperature conditions (recommended panel temperature: below 90°C).

Thank you so much

- This measurement data is from JDI’s tests and is for reference only.
- This measurement data is not representative for all light sources.
- Since the optical characteristics of LumiFree depend on the light source it is paired with,please evaluate LumiFree with your light source of choice.
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