



Japan Display Inc.

LumiFree
New Light Distribution Control Technology

LumiFree Business Development Office

LumiFree Basic Information

- Combination with LCD Technology-

Freedom for Light, Beauty for the World

JDI has developed a new Liquid Crystal Technology LumiFree, for use in combination with LED lighting

Control of Light Distribution Characteristics

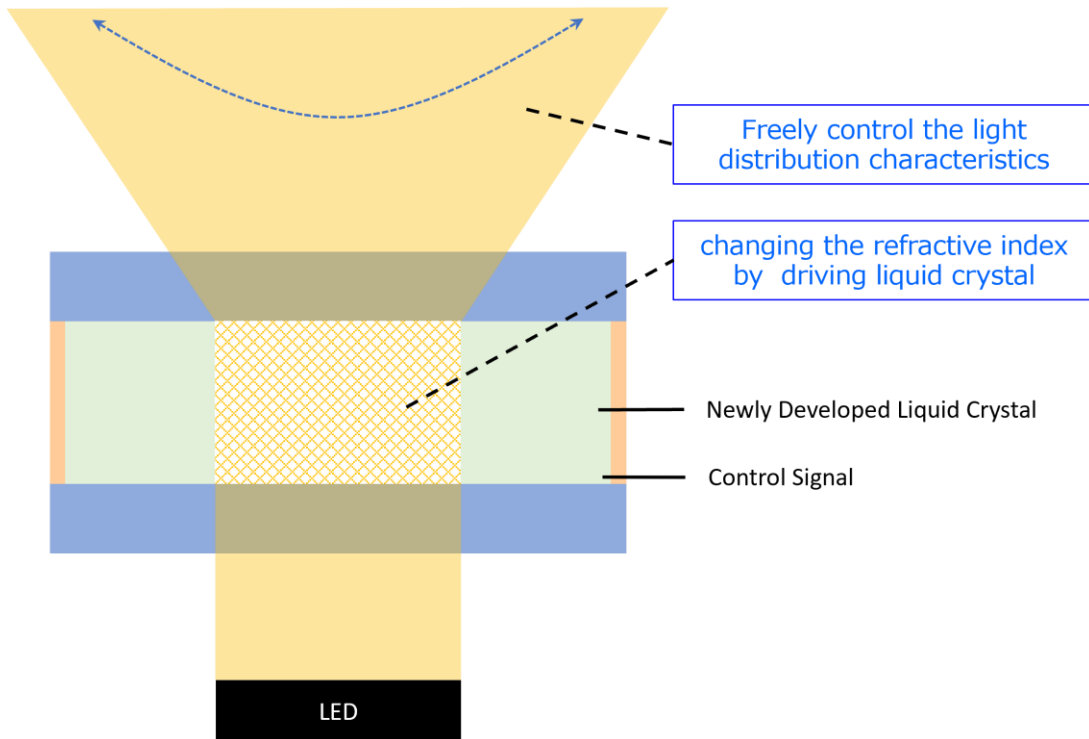
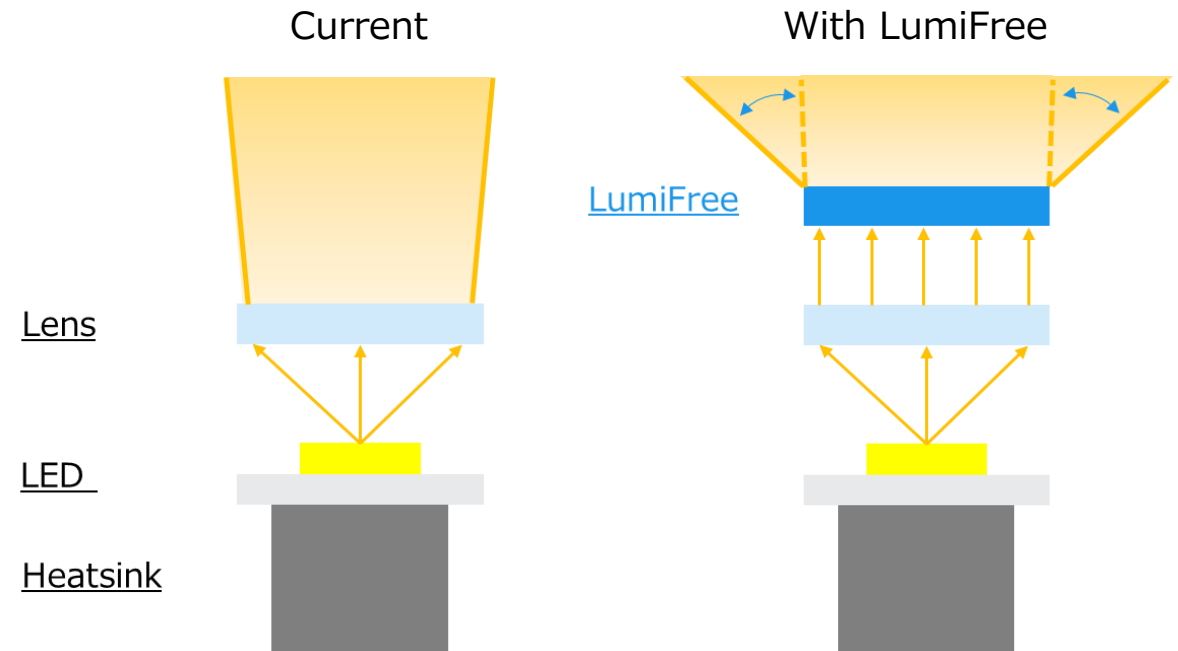
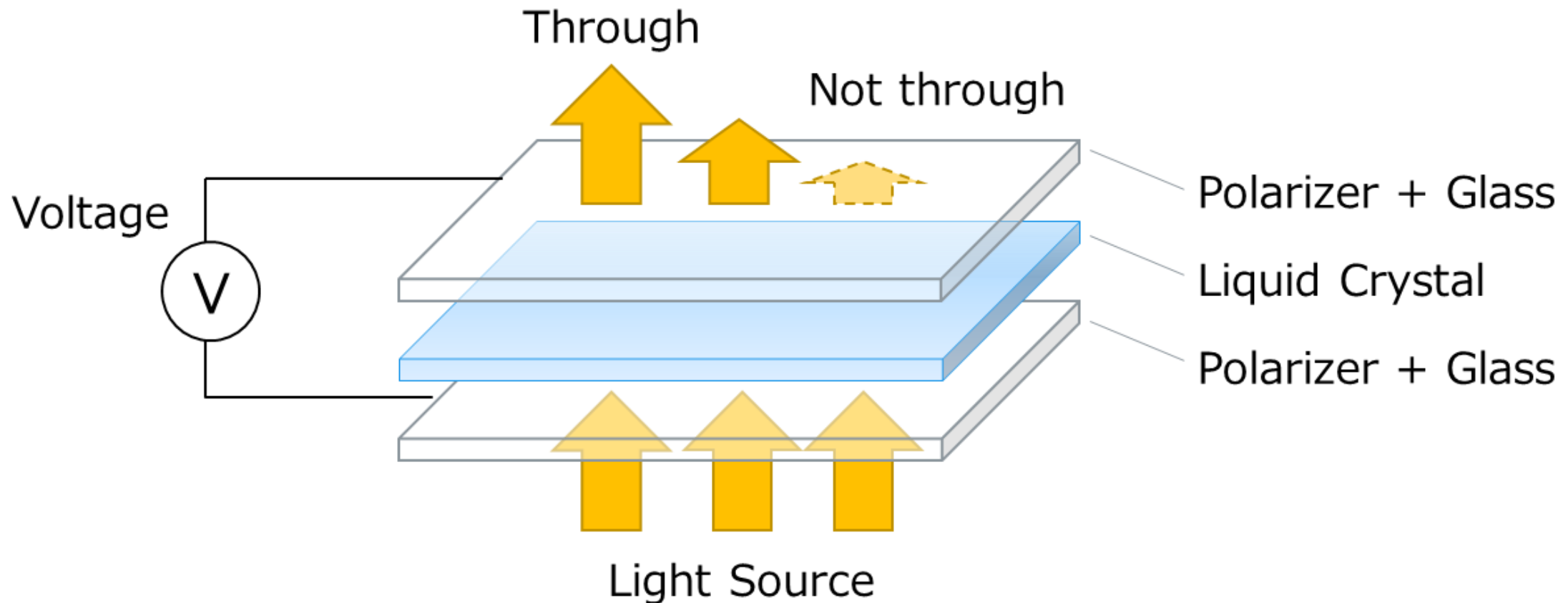


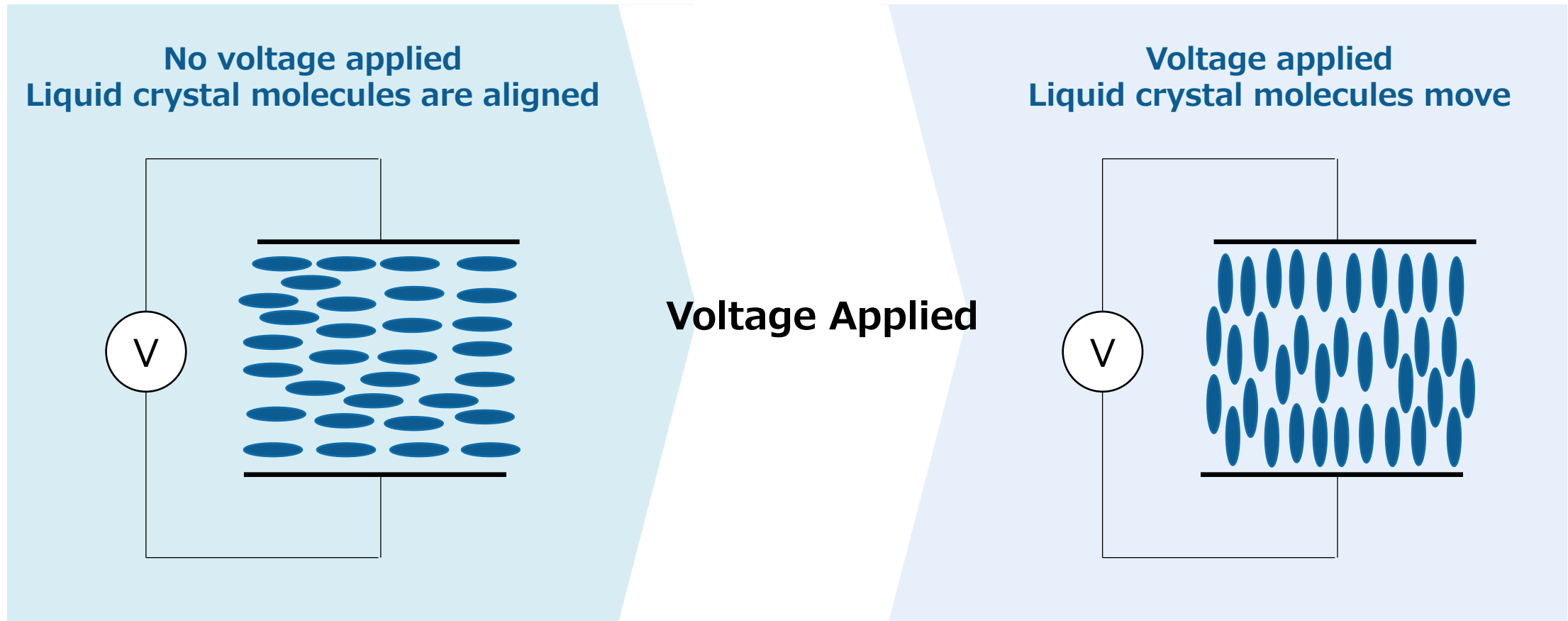
Image of LumiFree Control Light Distribution



A voltage is applied to the liquid crystal to control the amount of light transmitted and used as a display. The liquid crystal does not emit light, but the light source is controlled by the liquid crystal.



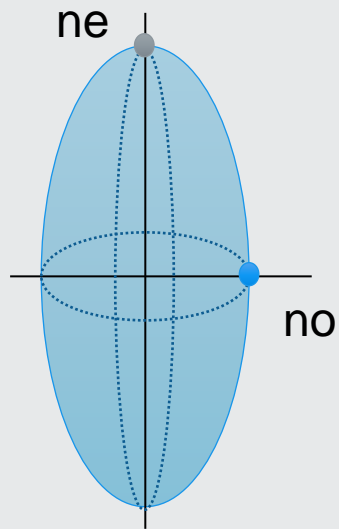
When voltage is applied to a liquid crystal panel,
the liquid crystal molecules have the property of rising gradually as the voltage increases.
The characteristics of the liquid crystal change depending on the degree of this rise.



Liquid crystal molecules have different refractive indices in different molecular directions.

By controlling these characteristics and the liquid crystal molecules, LumiFree controls the light distribution characteristics of the luminaire.

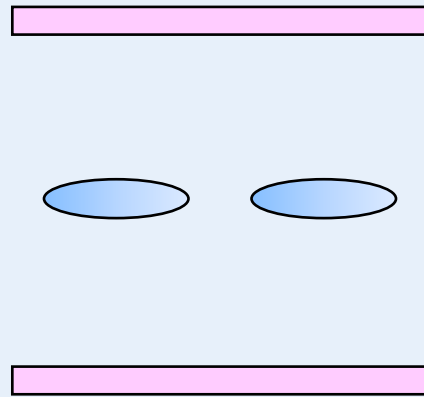
LC molecule



refractive index : $n_o < n_e$

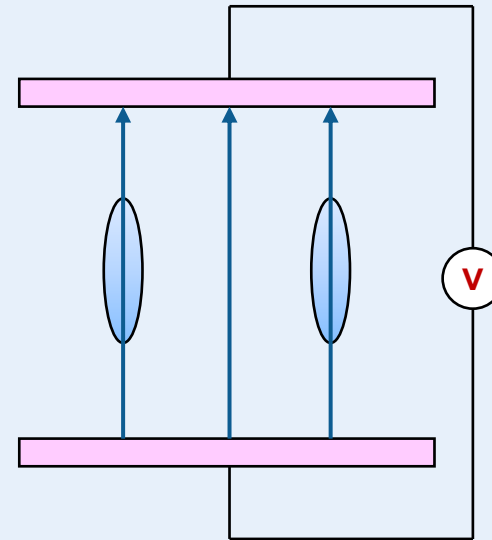
**Varies depending
on the direction of the molecule**

No voltage applied



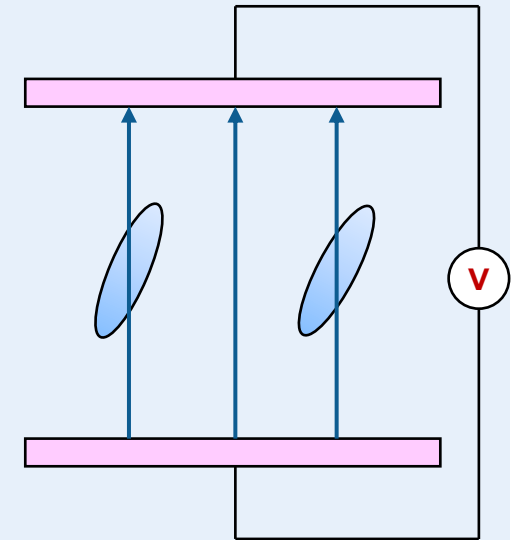
High

Voltage applied 100%



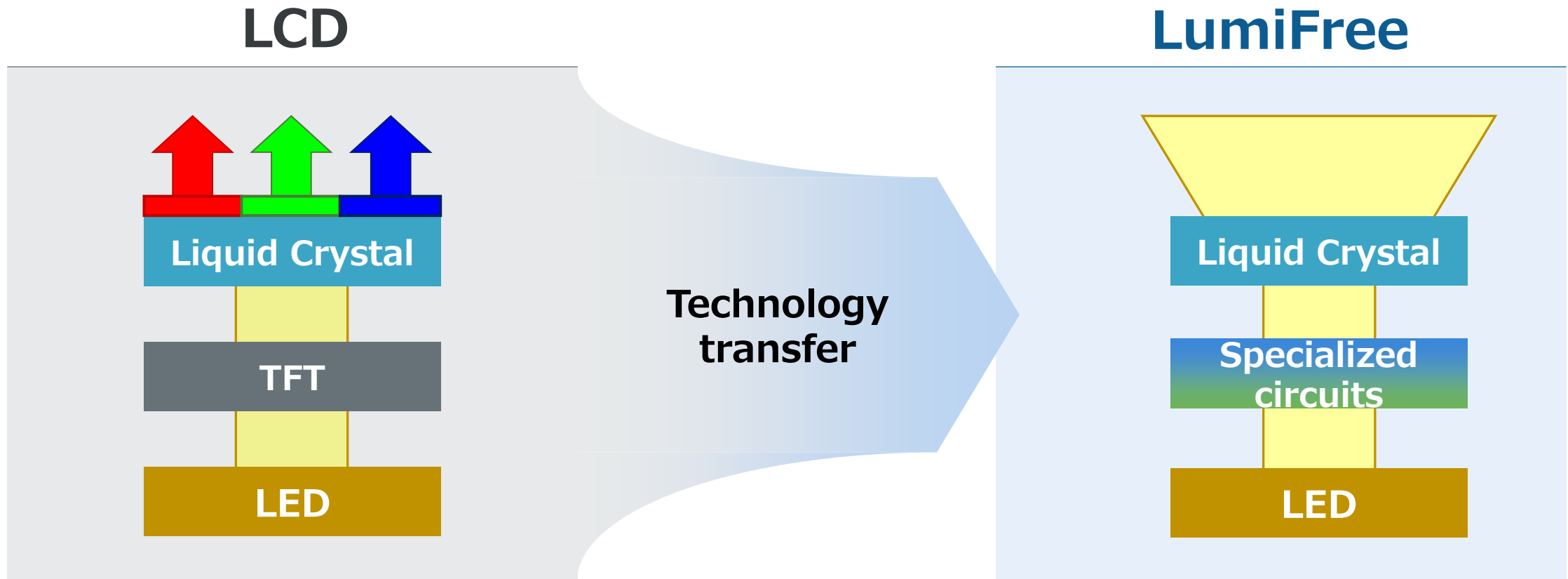
Low

Voltage applied 50%



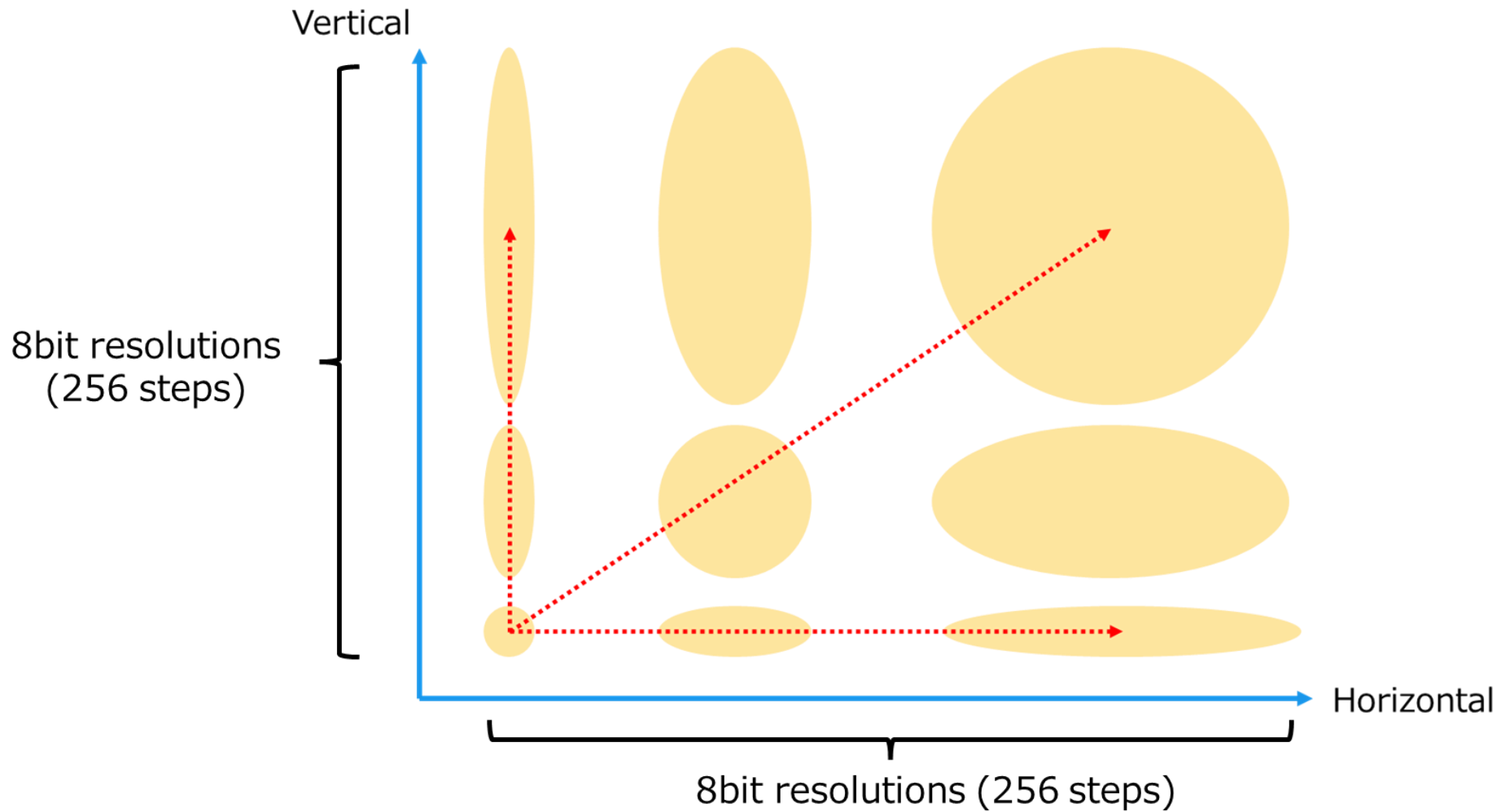
Middle

We developed LumiFree using LCD technology



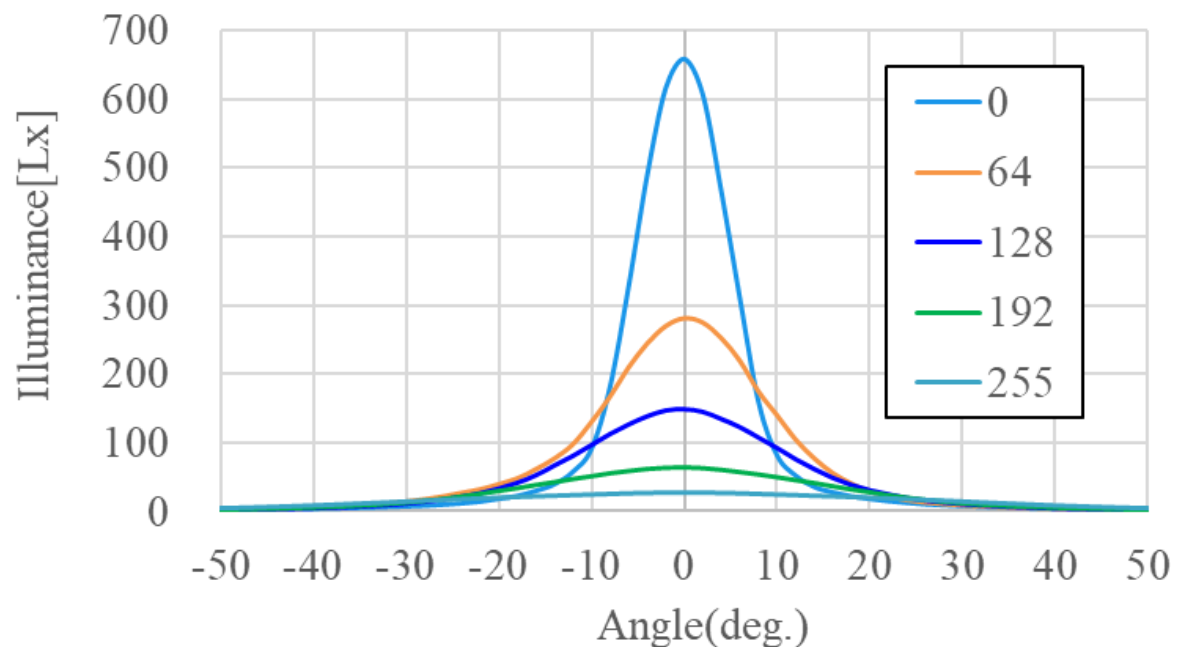
What LumiFree can do?

LumiFree enables light distribution control with 8-bit resolution (256 steps) on both the X & Y axes



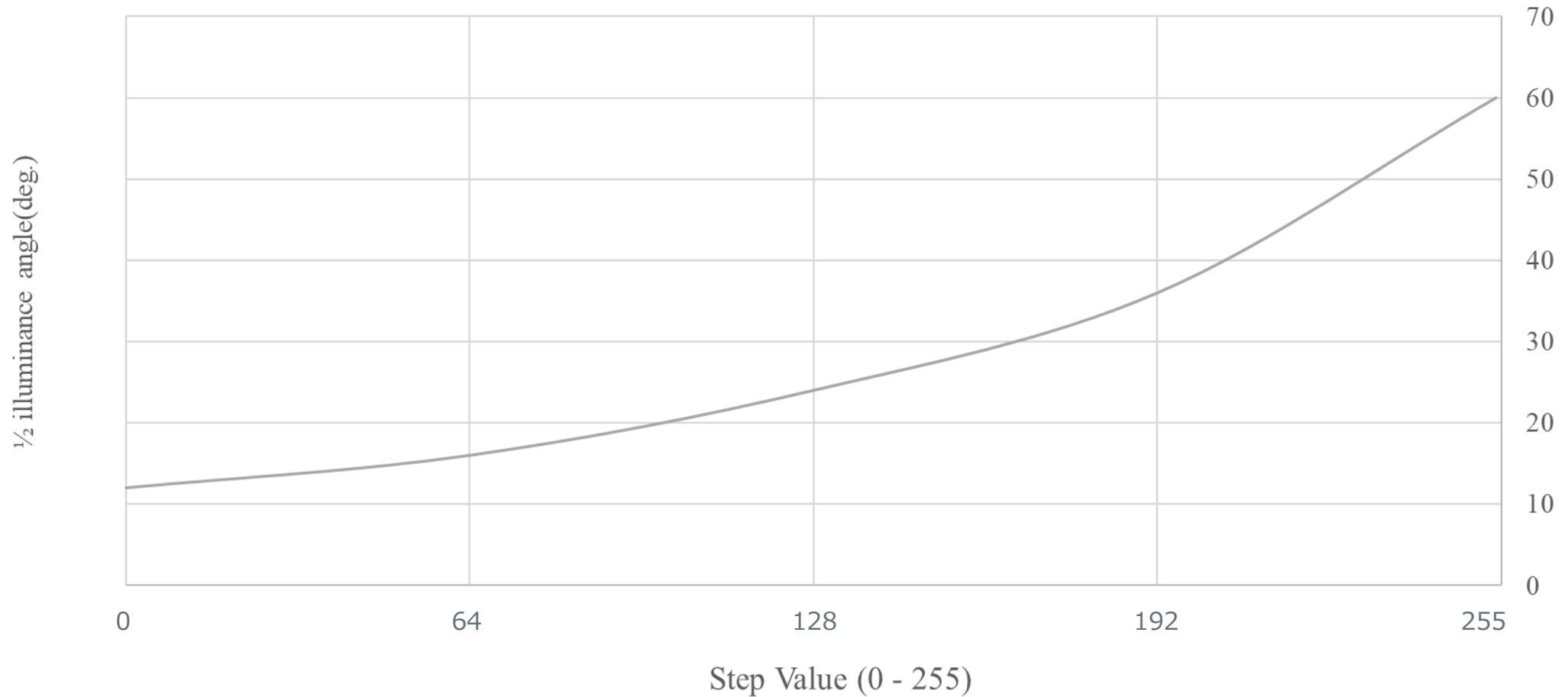
Characteristic Information

Below is optical data from a LumiFree-equipped light fixture.
It shows 1/2 and 1/10 Illuminance angle measurements at different step values.

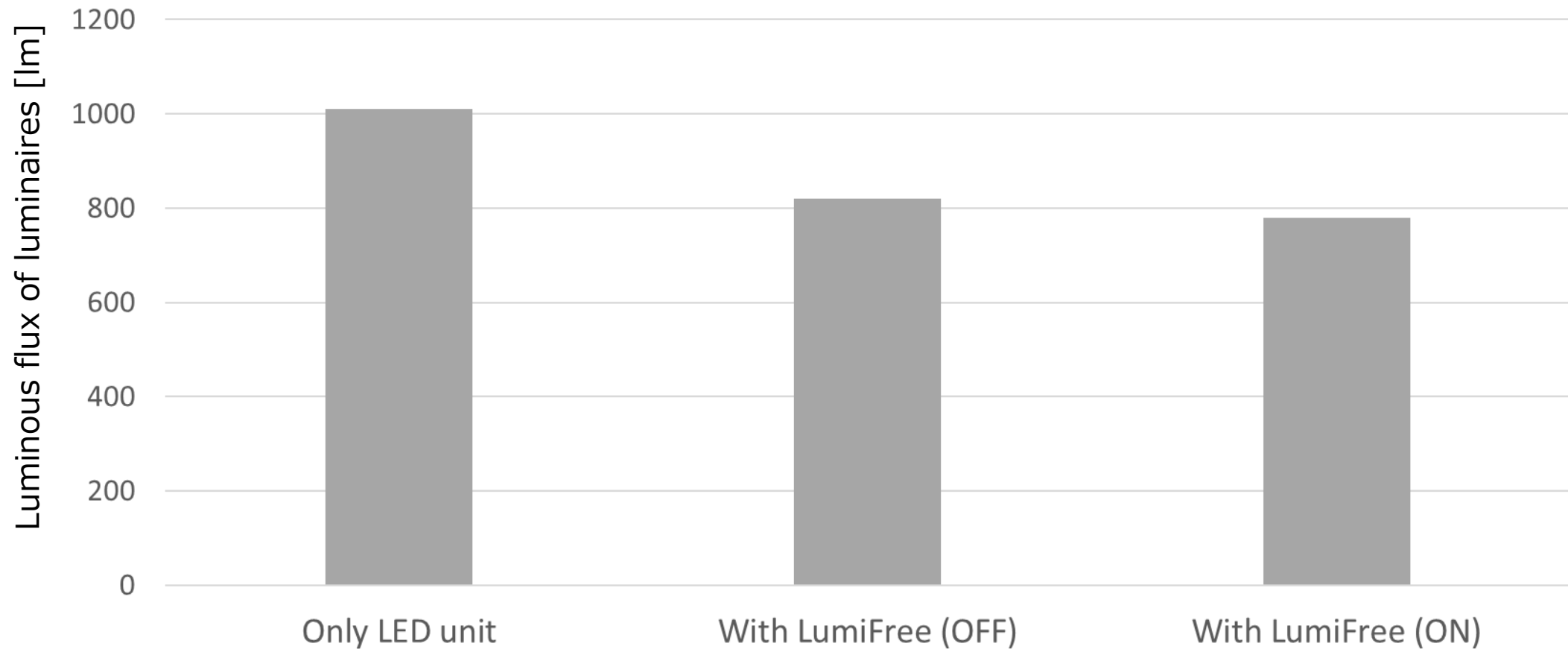


Step Value	1/2 Illuminance Angle [deg.]	1/10 Illuminance Angle [deg.]
0 step (Lumifree off)	12	22
64 step	19	43
128 step	25	53
192 step	37	76
255 step	60	106

LumiFree allows control of light distribution angle in 256 steps from 0-255.
LumiFree can be used at any illuminance angle.



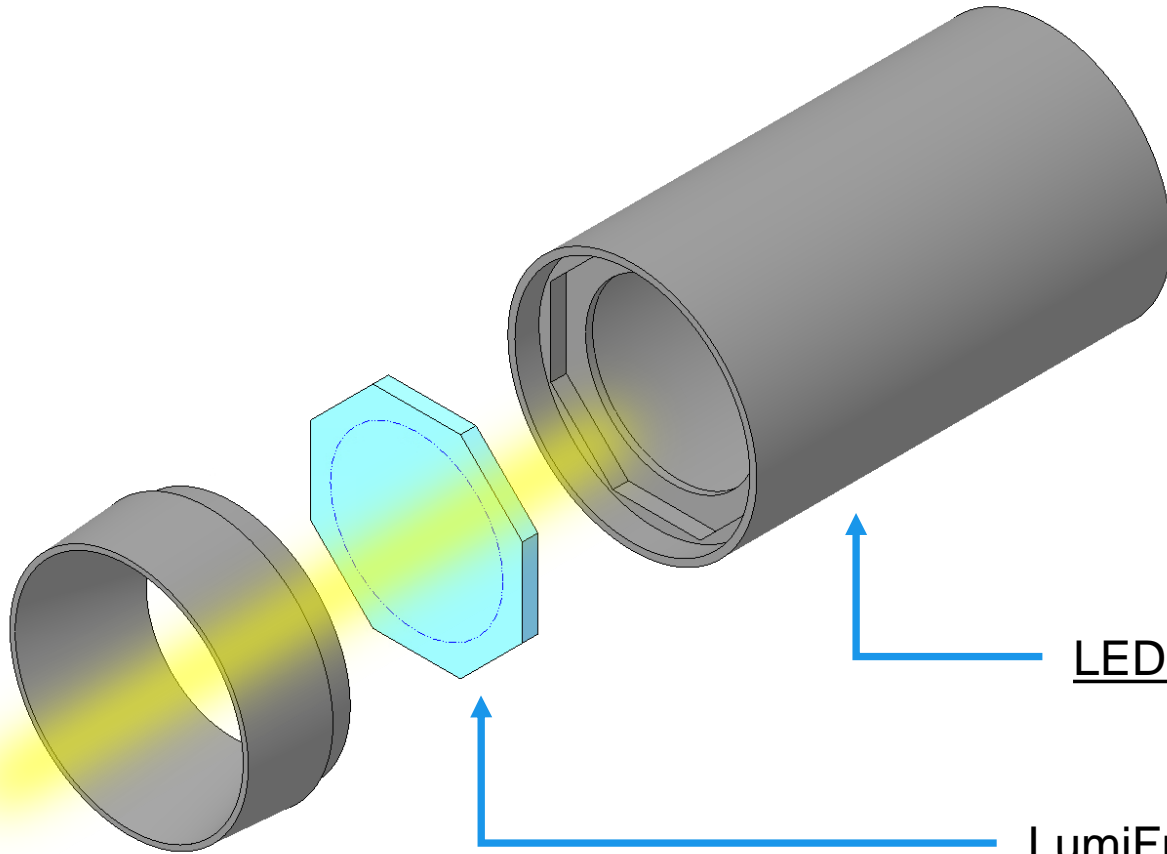
LumiFree generates a luminous flux reduction of approximately 20%.
However, no efficiency loss by diffusing light occurs.



Data measured using LumiFree in combination with high color-rendering light fixtures
 A slight decrease in Ra was observed.
 Please confirm the exact characteristics with your light source of choice.

	Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
only LED module	94.1	94.5	97.4	99.1	95.4	94.9	97.1	92.1	82.0	58.8	93.7	97.4	87.2	95.4	99.3	89.6
with LumiFree (OFF : 0 step)	93.3	93.3	96.6	99.5	94.6	93.6	97.2	91.7	80.2	55.1	92.2	96.9	87.0	94.3	99.2	87.8
with LumiFree (ON : 255 step)	93.2	93.2	96.8	99.5	94.4	93/5	97.5	91.2	79.4	54.3	92.5	96.9	87.9	94.2	99.3	87.5

LumiFree is usable if you can place it in front of the light source.
There are no restrictions.



LED Unit : Recommended beam angle is 8-12 degrees

LumiFree : Installed in front of light source, no restrictions

Other Useful Info

	Φ50mm	Φ105mm
Status	Under Mass Production	under Development
Samples	OK	Start June 2024
Mass Production	Continuing	Start Nov 2024
Active Area	50.0mm x 50.0mm	105.0mm x 105.0mm
Dimensions	61.2mm x 61.2mm	116.2mm x 116.2mm

Product Promotion video

https://www.youtube.com/watch?v=1nq1GF_Bq94

Product Demonstration with BLE Control

https://youtu.be/rl_U5ih38Wc

Product Demonstration with DMX Control

<https://youtu.be/j-ArfANg-I4>

Product Demonstration with DMX program @ Japan Lighting Fair 2023

<https://www.youtube.com/watch?v=Dcg9sUqjnYQ>

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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