

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2023/0231082 A1 **SAKAI**

Jul. 20, 2023

(43) **Pub. Date:**

Publication Classification

(54) LIGHT EMITTING DEVICE

(71) Applicants: Citizen Electronics Co., Ltd., Fujiyoshida-shi, Yamanashi (JP); Citizen Watch Co., Ltd., Nishitokyo-shi, Tokyo (JP)

(72) Inventor: Keisuke SAKAI, Fujiyoshida-shi,

Yamanashi (JP)

(21) Appl. No.: 18/013,356

PCT Filed: Jun. 28, 2021 (22)

PCT/JP2021/024370 (86) PCT No.:

§ 371 (c)(1),

(2) Date: Dec. 28, 2022

(30)Foreign Application Priority Data

Jun. 29, 2020 (JP) 2020-111283

(51) Int. Cl. H01L 33/48 (2006.01)H01L 33/56 (2006.01)H01L 33/50 (2006.01)

(52)U.S. Cl.

H01L 33/486 (2013.01); H01L 33/56 CPC

(2013.01); H01L 33/502 (2013.01)

(57)ABSTRACT

A light emitting device includes a substrate, a plurality of first light emitting elements mounted on the substrate, including first LED dies, and emitting light having a first wavelength, and a light guide layer arranged so as to cover the plurality of first light emitting elements, and guiding the light from the plurality of first light emitting elements, wherein when LG1 is a distance between the first LED dies, and θc is a critical angle of the light emitted from the light guide layer to the air, and a thickness T between the upper surfaces of the first light emitting elements and the upper surface of the light guide layer is equal to or longer than T1 indicated by T1=LG1/(2tan θ c).

