

White-LED Lightguide scanner

Illumination system utilizing light-guide and white LED for document scanner application

DM

1 Lab.2

k.r.kim@samsung.com

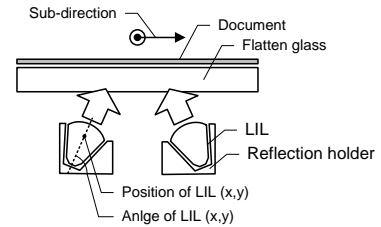
Abstract

A configuration of illumination for high-speed color document scanner has been proposed utilizing white light emitting diode and transparent plastic lightguide. The design of illumination system including lightguide for high optical efficiency and uniform image quality is performed based on a simulation using ray-tracing method. The device characteristics are also experimentally evaluated in terms of illumination distribution against longitudinal and transverse direction on document plane. Uniform illumination distribution about 85% of in longitudinal and transverse direction is realized by control of mechanical dimension and position of lightguide.

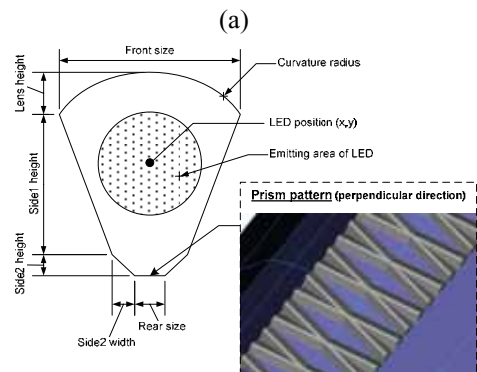
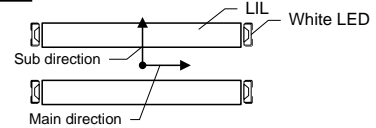
1. INTRODUCTION

array contact image micro lens
 focusing field depth가
 filed depth
 Fluorescent Lamp, 30 가 warm-up time,
 (Hg) (1-4)
 CCFL
 LED(Light emitting diode)

Side view



Top view



2. DESIGN AND FABRICATION OF ILLUMINATION SYSTEM

1. (a) Lightguide Lightguide

(b)

1. LED lightguide

5400 cell linear CCD sensor가

lightguide

cell voltage scan CCD sensor CCD sensor

micro prism

scan

lightguide

3.

88.7%

uniformity가

91%

uniformity가

社 ray-tracing simulation

simulation

96%

Ray-wiz™가 parameter가

12

2.

± 108mm, ± 2.5mm 가

lightguide 4 18 lumen yellow-phosphor type white LED가

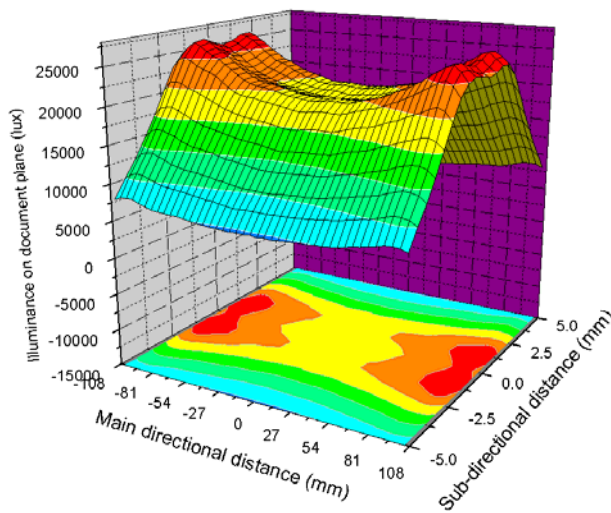
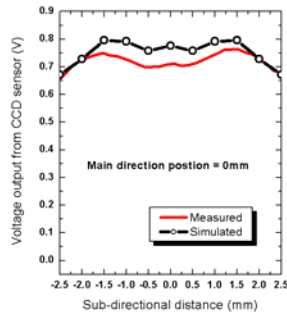
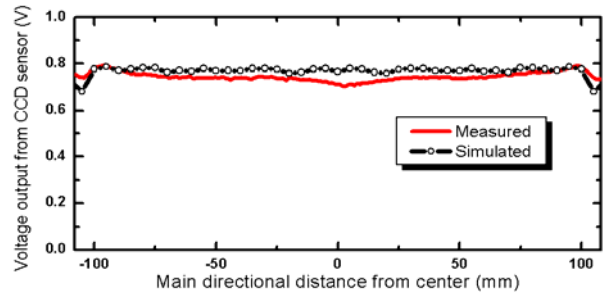
lightguide PMMA(Polymethyl methacrylate)가 234mm, 4.4mm

prism

100um

33.5%

85%



3. sensor

. Linear CCD

3. CONCLUSION

white LED

Lightguide

Lightguide

tolerance

가 85%

96%

2.

2-D

simulation 33.5%

85%

Lightguide

가

Lightguide 3.2×2.8mm

top emission

white LED

CCD

4. REFERENCE

1. M. R. Krames et al., *J. of Dis. Tech.*, Vol. 3, No. 2, 2007
2. C. Chien et al., *J. of Microlith.*, Vol. 5, No. 4, 2006
3. T. Okumura et al., *Appl. Phys. Lett.*, 83, 2003
4. W. Folkers et al., *SID symposium digest*, 35, 2004