

# 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

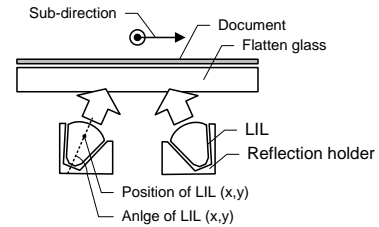
### Abstract

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.

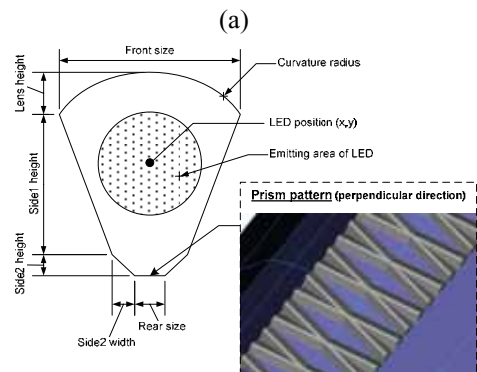
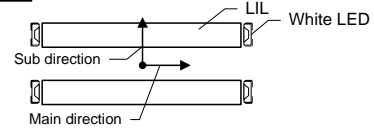
### 1. INTRODUCTION

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 uniformity가

91%

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

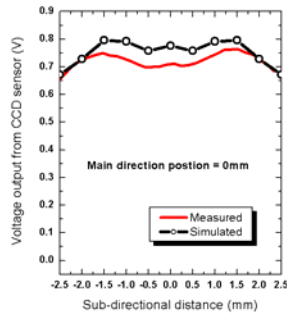
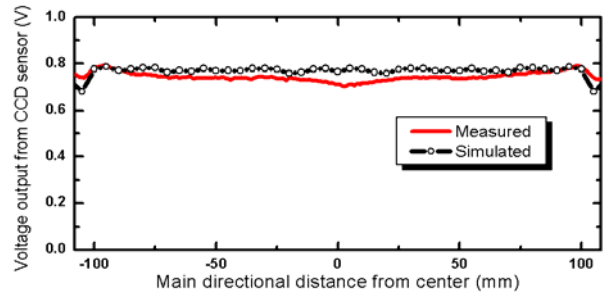
lightguide PMMA(Polymethyl methacrylate)가 234mm, 4.4mm

prism

100um

33.5%

85%



3. sensor

. Linear CCD

3. CONCLUSION

white LED

Lightguide

Lightguide

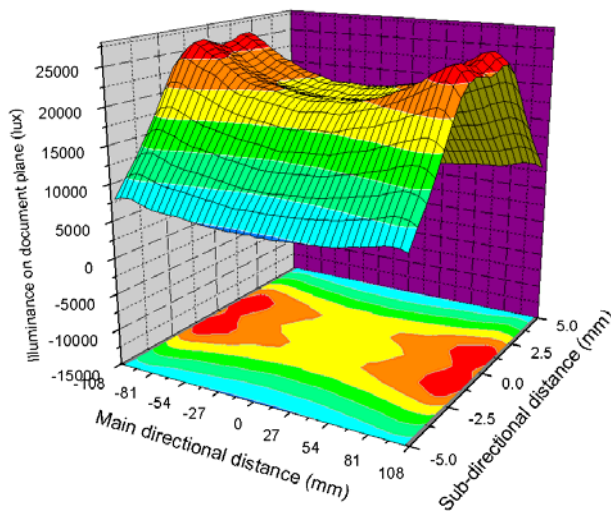
tolerance

가 85%

96%

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



2.

2-D

simulation 33.5%

85%

Lightguide

가

Lightguide 3.2×2.8mm

top emission

white LED

CCD