

농도측정모듈 1차, 2차 설계 광효율 시뮬레이션

2021-09-09



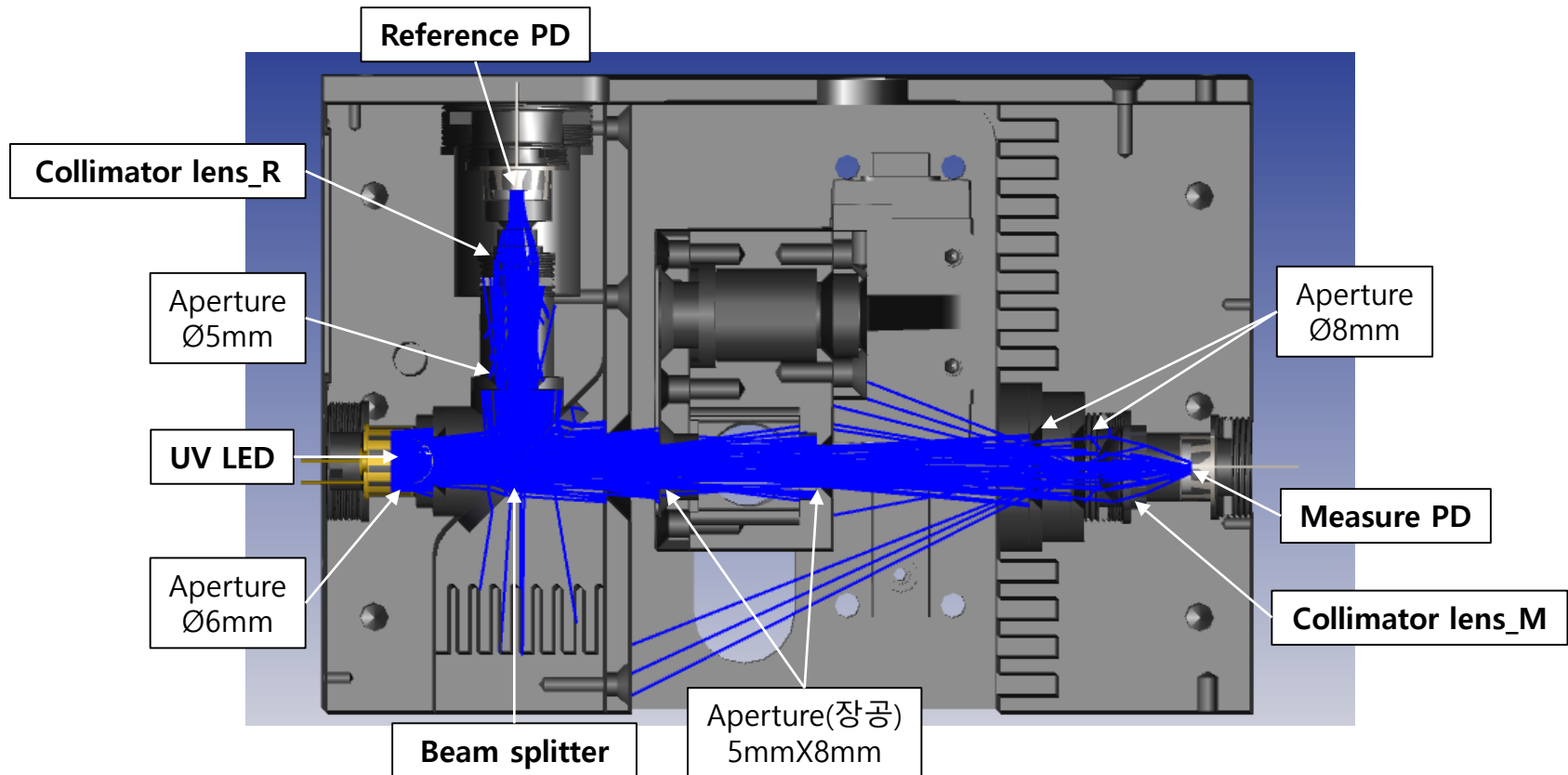
목차

Confidential

1. UV system 1차 설계
2. IR system 1차 설계
3. UV system 2차 설계
4. IR system 2차 설계

1. UV system 1차 설계

Confidential

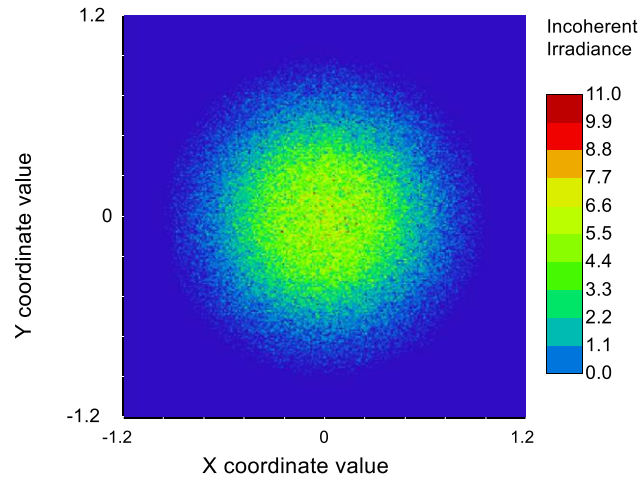


	UV LED	Beam splitter	Collimator lens_M	Collimator lens_R	Measure PD	Reference PD
사양	파장 275nm, Po 2mW (Max)	R30:T70 (±10%)	비구면, Ø10	구면, Ø6	Active area 2.4mmX2.4mm	Active area 2.4mmX2.4mm

1. UV system 1차 설계

Confidential

- Reference PD

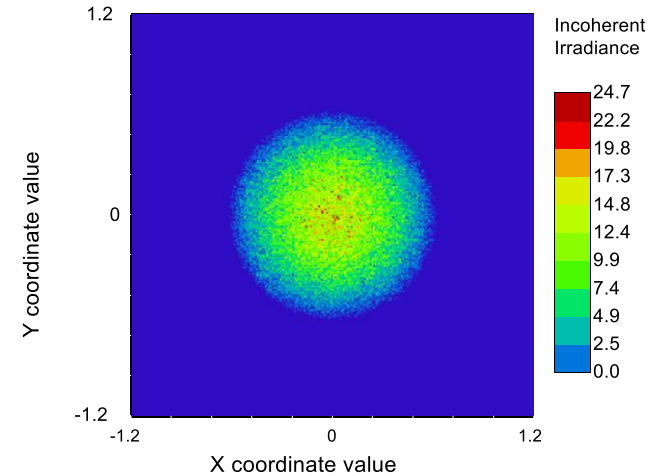


광학계 효율: 5.29%

- Reference PD voltage 계산
(PD voltage = LED 광량 X 광효율 X PD 감도 X IV amp)

20mA 광량(W)	광효율	PD 감도(A/W)	IV AMP (V/A)	Voltage (V)
0.000176 (측정값)	0.0529	0.1	510000	0.4748 (예상값)
				0.615 (측정값)

- Measure PD



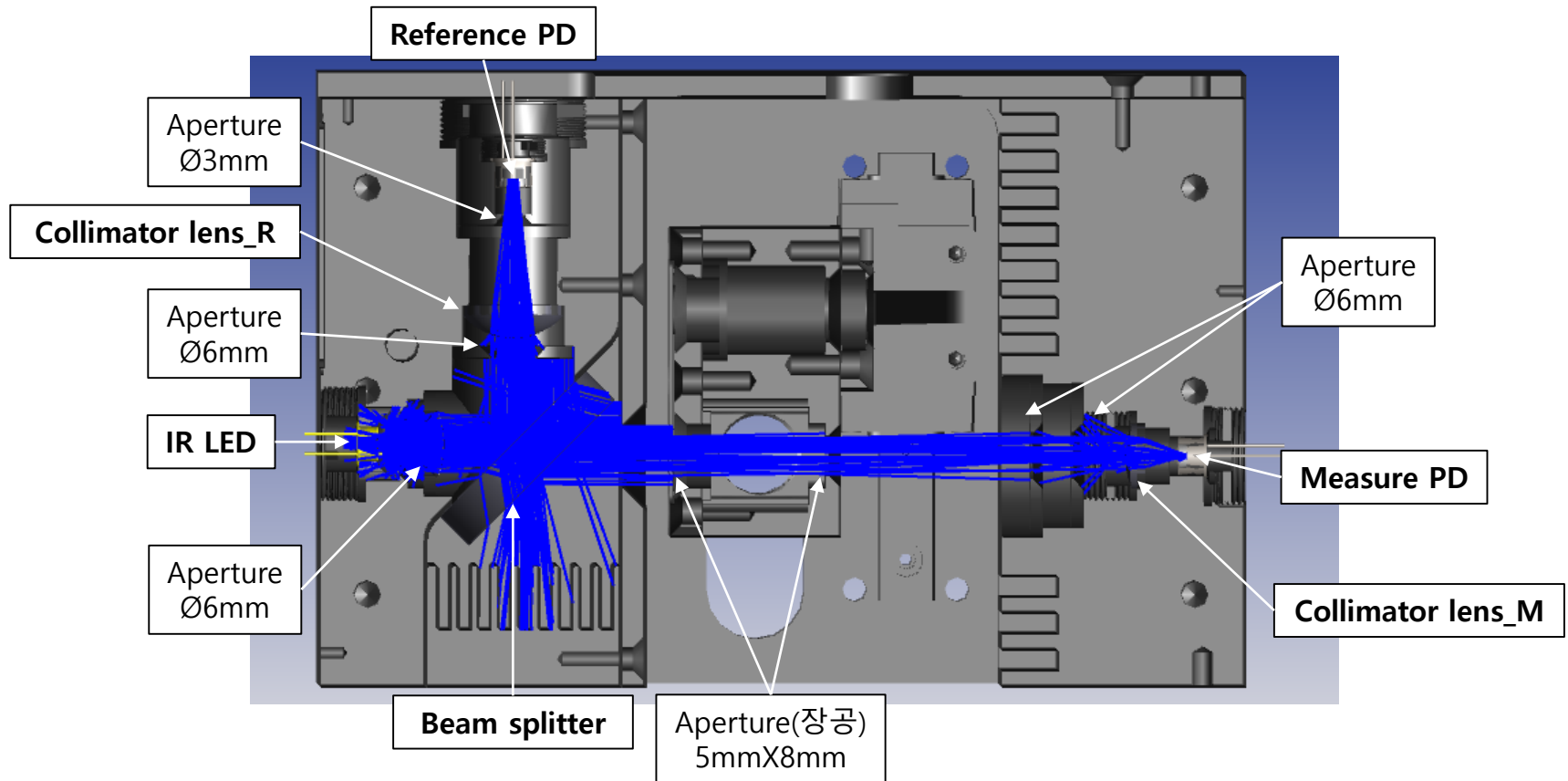
광학계 효율: 8.05%

- Measure PD voltage 계산
(PD voltage = LED 광량 X 광효율 X PD 감도 X IV amp)

20mA 광량(W)	광효율	PD 감도(A/W)	IV AMP (V/A)	Voltage (V)
0.000176 (측정값)	0.0805	0.1	510000	0.7226 (예상값)
				0.70 (측정값)

2. IR system 1차 설계

Confidential

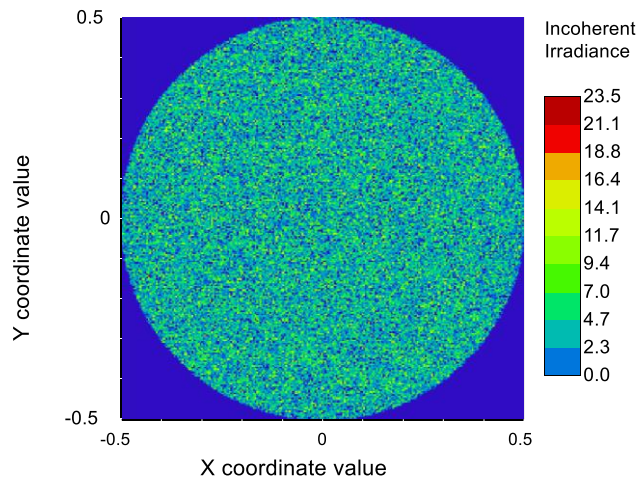


	IR LED	Beam splitter	Collimator lens_M	Collimator lens_R	Measure PD	Reference PD
사양	파장 2220nm, Po 1mW (QCW)	R50:T50($\pm 20\%$) 실측 R35:T65	비구면, Ø7.8	구면, Ø12.5	Active area Ø1.0mm	Active area Ø1.0mm

2. IR system 1차 설계

Confidential

- Reference PD



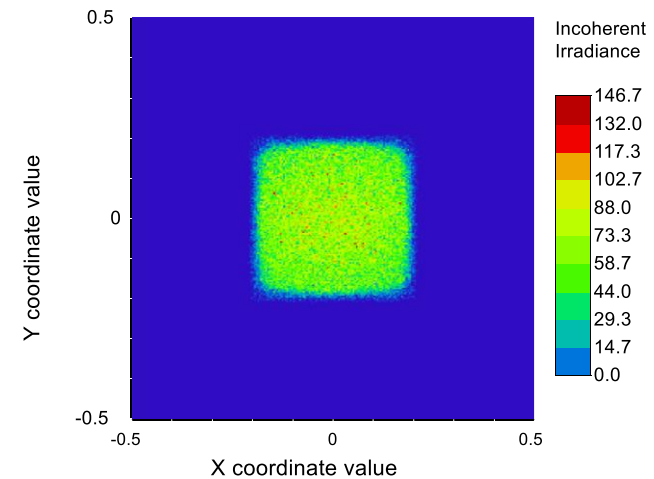
광학계 효율: 3.80%

- Reference PD voltage 계산
(PD voltage = LED 광량 X 광효율 X PD 감도 X IV amp)

40mA 광량(W)	광효율(%)	PD 감도(A/W)	IV AMP (V/A)	Voltage (V)
*0.000142(계산값)	3.8	1.3	200000	1.4049(예상값) 0.773(측정값)

* Power meter 측정값+aperture size에 따른 계산값 반영

- Measure PD



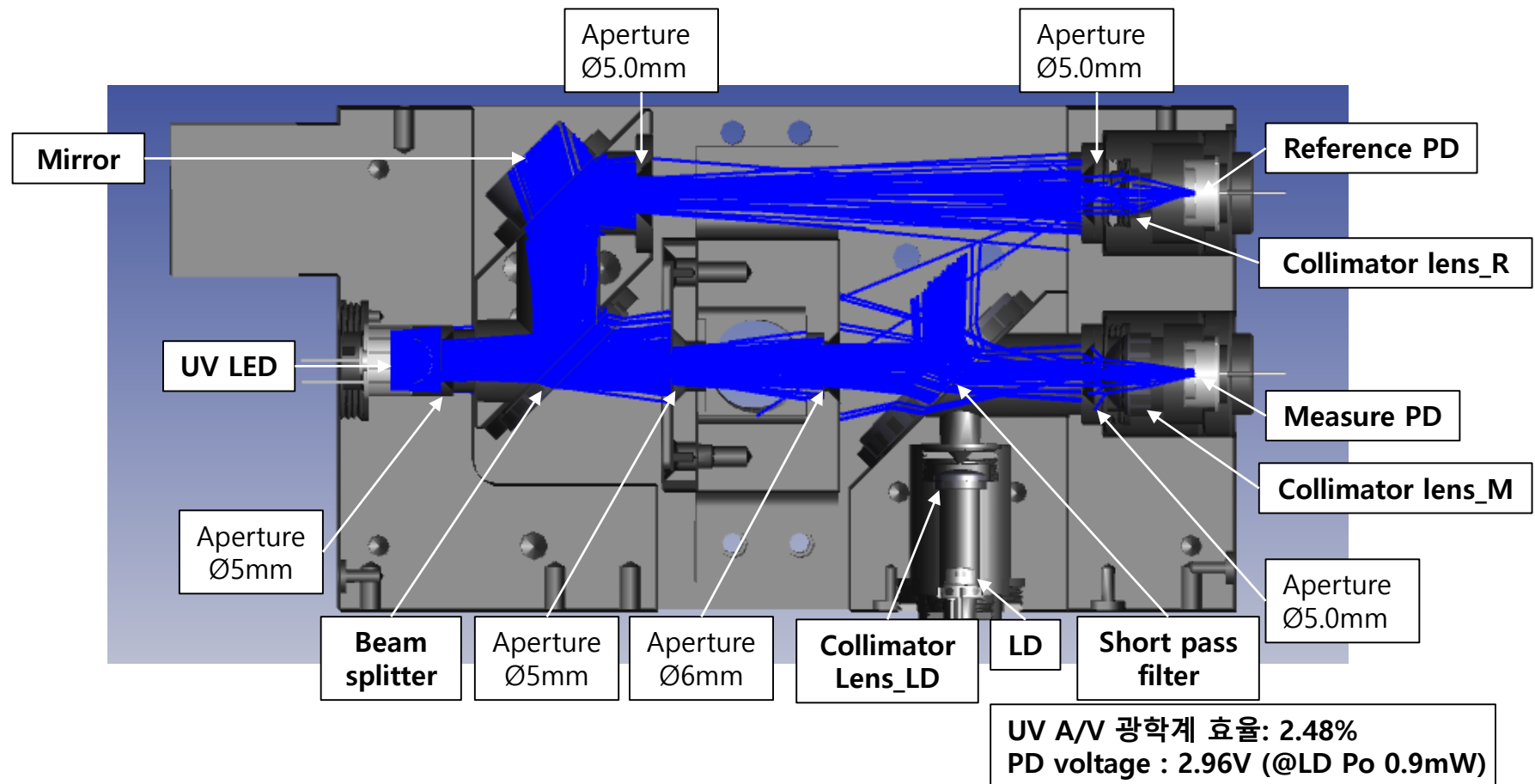
광학계 효율: 9.64%

- Measure PD voltage 계산
(PD voltage = LED 광량 X 광효율 X PD 감도 X IV amp)

40mA 광량(W)	광효율(%)	PD 감도(A/W)	IV AMP (V/A)	Voltage (V)
*0.000142(계산값)	9.64	1.3	200000	3.5641(예상값) 2.67(측정값)

3. UV system 2차 설계

Confidential

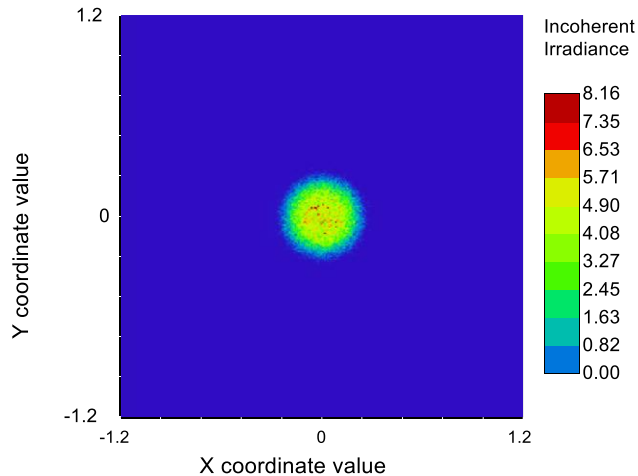


	UV LED	Beam splitter	Mirror	Short pass Filter	Collimator lens_M	Collimator lens_R	Laser Diode	Collimator lens_LD	Measure PD	Reference PD
사양	275nm, Po 2mW	R30:T70 (±10%)	R90% (@275nm)	T90% (@275nm)	비구면, Ø10	구면, Ø6	515nm, Po 10mW	비구면, Ø6.35	Active area 2.4X2.4mm	Active area 2.4X2.4mm

3. UV system 2차 설계

Confidential

- Reference PD



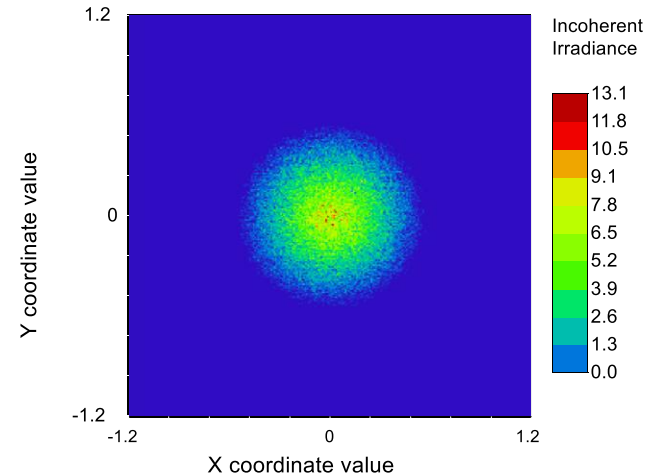
광학계 효율: 0.58%

- Reference PD voltage 계산
(PD voltage = LED 광량 X 광효율 X PD 감도 X IV amp)

20mA 광량(mW)	광효율(%)	PD 감도(A/W)	IV AMP (V/A)	Voltage (V)
0.176(측정값)	0.58	0.1	510000	0.0521(예상값)

* Voltage 예상값이 너무 낮음 : IV 증폭비 조정 시 noise와 함께 증폭 예상
→ LED 구동조건 변경 검토

- Measure PD



광학계 효율: 2.27%

- Measure PD voltage 계산
(PD voltage = LED 광량 X 광효율 X PD 감도 X IV amp)

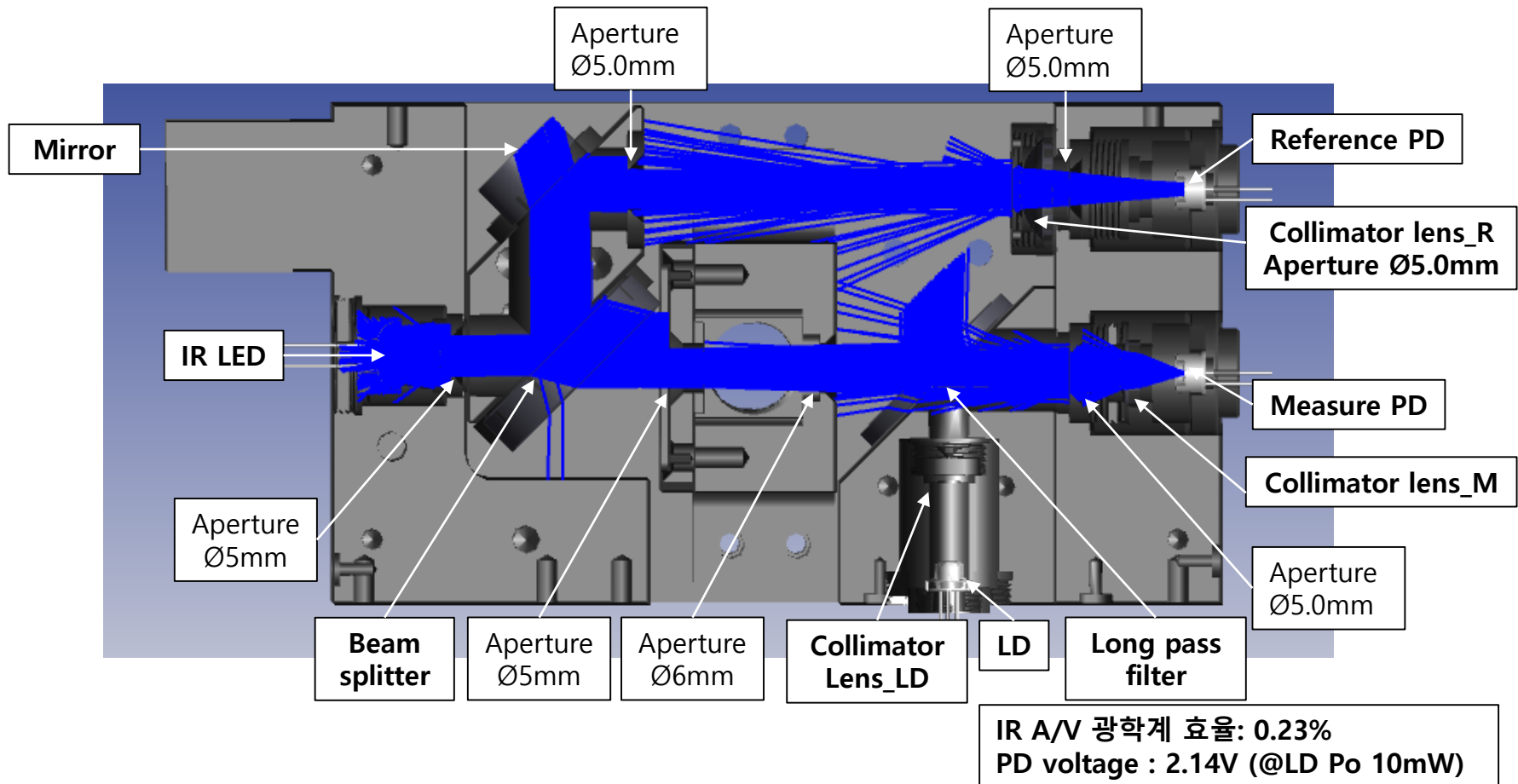
20mA 광량(mW)	광효율(%)	PD 감도(A/W)	IV AMP (V/A)	Voltage (V)
0.176(측정값)	2.27	0.1	510000	0.2029(예상값)

A/V laser 광량(mW)	광효율(%)	PD 감도(A/W)	IV AMP (V/A)	Voltage (V)
0.9(요구값)	2.477	0.26(@515nm)	510000	2.9560(예상값)

* A/V laser power 저감방안 : polarizer 추가 배치 → 증폭비 조정 시 saturation 발생 가능

4. IR system 2차 설계

Confidential

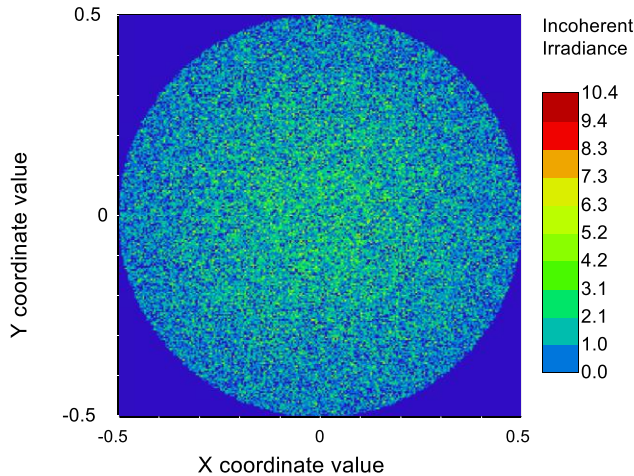


	IR LED	Beam splitter	Mirror	Long pass Filter	Collimator lens_M	Collimator lens_R	Laser Diode	Collimator lens_LD	Measure PD	Reference PD
사양	2220nm, Po 1mW	R50:T50(±20%) 실측 R35:T65	R97% (@2220nm)	T95% (@2220nm)	비구면, Ø7.8	구면, Ø12.5	1310nm, Po 10mW	비구면	Active area Ø1.0mm	Active area Ø1.0mm

4. IR system 2차 설계

Confidential

- Reference PD

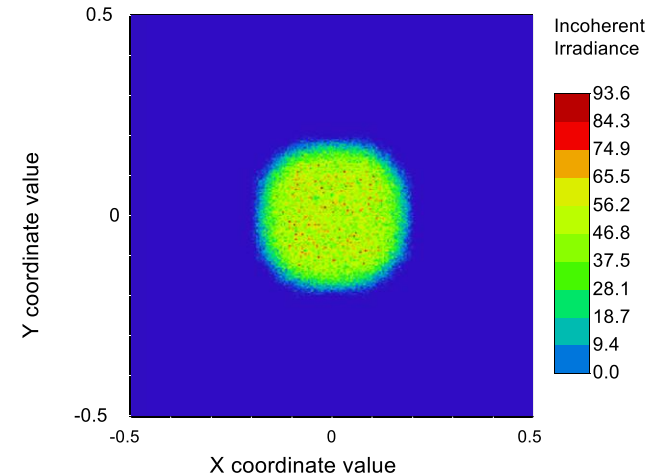


광학계 효율: 1.31%

- Reference PD voltage 계산
(PD voltage = LED 광량 X 광효율 X PD 감도 X IV amp)

40mA 광량(mW)	광효율(%)	PD 감도(A/W)	IV AMP (V/A)	Voltage (V)
0.142	1.31	1.3	200000	0.4843(예상값)

- Measure PD



광학계 효율: 5.16%

- Measure PD voltage 계산
(PD voltage = LED 광량 X 광효율 X PD 감도 X IV amp)

40mA 광량(mW)	광효율(%)	PD 감도(A/W)	IV AMP (V/A)	Voltage (V)
0.142	5.16	1.3	200000	1.9078(예상값)

A/V laser 광량(mW)	광효율(%)	PD 감도(A/W)	IV AMP (V/A)	Voltage (V)
10(요구값)	0.2322	0.46(@1310nm)	200000	2.136(예상값)