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LG ELECTRONICS CO., LTD.

TEST REPORT

SCOPE OF WORKS
STERILIZATION PERFORMANCE TEST OF HYGIENE CYCLE

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TEST REPORT FOR LG ELECTRONICS CO., LTD.

Report No.: RT20E-S0008
Date: MAY. 26, 2020

OBJECTIVE

The purpose of the testing is:

Evaluation of sterilization rate of Hygiene Cycle of washer

HYPOTHESIS

The Hygiene Cycle of the washer can remove more than 99.9 % of bacteria from laundry.

CONCLUSION

Based on the data collected, the Hypothesis is accepted:

The Hygiene Cycle of the washer can remove more than 99.9% of bacteria from laundry.

Suyeon Park		Bo Park	
ENGINEER		**REVIEWER**	

SECTION 1
INDEX

SECTION 2
OBJECTIVE

The purpose of the testing is:

Evaluation of sterilization rate of Hygiene Cycle of washer

SECTION 3
PARAMETERS

The following parameters are controlled

VALUE	DESCRIPTION	UNITS	METHOD	MU
23 ± 5	Test room temperature	°C	Data logger	± 0.2 °C (Approx. 95 %, k=2)
65 ± 20	Test room humidity	% R.H.	Data logger	± 20 % (Approx. 95 %, k=2)
35-37	Incubated Temperature	°C	Data logger	± 2.0 °C (Approx. 95 %, k=2)

The following parameters are monitored

VALUE	DESCRIPTION	UNITS	METHOD	MU
23 ± 5	Test room temperature	°C	Data logger	± 0.2 °C (Approx. 95 %, k=2)
65 ± 20	Test room humidity	% R.H.	Data logger	± 20 % (Approx. 95 %, k=2)
35-37	Incubated Temperature	°C	Data logger	± 2.0 °C (Approx. 95 %, k=2)

SECTION 4
PRODUCT/MODEL DESCRIPTION

PRODUCT INFORMATION : Giant-C Washer

MODEL : FH069FD4M

Note :
1. The model FH069FD4M was selected as a representative tested model. Refer to the model similarity below.
2. In the model name F*069FD**, the suffix (*) is variable as below.
   - The 1st suffix "*" : motor type (1-Normal DD, H-Post DD)
   - The 2nd suffix "*" : payment type (blank or 1 to 7)
   - The 3rd suffix "*" : model type (blank or A to Z)
3. In the model name F13S**, the suffix (*) is variable as below.
   - The 1st suffix "*" : model type (A to Z)
   - The 2nd suffix "*" : payment type (A to Z)
4. In the model name CWG27***R*, the suffix (*) is variable as below.
   - The 1st suffix "*" : model type (A to Z)
   - The 2nd suffix "*" : layout (A to Z)
   - The 3rd suffix "*" : payment type (A to Z)
   - The 4th suffix "*" : product color (A to Z)

※ The test result can be applied to all of the Giant-C Washer models, by downloading the program containing "Hygiene Cycle".

SECTION 5
SAMPLE ACQUISITION

Sample(s) was supplied by the applicant:

SAMPLE #	DESCRIPTION	MODEL	PURCHASE LOCATION	DATE	CONDITION
1	Giant-C Washer	FH069FD4M	Prepared by LG	-	Packaged and undamaged

SECTION 6
HYPOTHESIS

The Hygiene Cycle of the washer can remove more than 99.9 % of bacteria from laundry.

SECTION 7
EQUIPMENT LIST

EQUIPMENT	MANUFACTURER	MODEL NO.	CALIBRATION DATE	CALIBRATION DUE
Auto clave	JEIOTECH	ST-105G	2020.04.24	2021.04.24
Incubator	JEIOTECH	1L-11	2019.08.29	2020.08.28
Thermometer	ELITECH	RC-4HC	2019.12.12	2020.12.12
hydrometer	ELITECH	RC-4HC	2019.12.12	2020.12.12
Pipet (1000)	Eppendorf	-	2020.03.02	2021.03.02
Balance	AND	CB-2000	2019.08.05	2020.08.04
Balance	AND	FX-5000i	2019.08.05	2020.08.05
Clean bench	SEOJIN	-	-	-
Colony counter	Hwashin	350CL	-	-

SECTION 8
TECHNICAL STAFF

#	Staff Name	Area of Expertise
1	Suyeon Park	Technical Manager / Intertek Testing Korea Ltd.
2	Bo Park	Laboratory Director / Intertek Testing Korea Ltd.
Note: Complete training records for staff are available upon request		

Testing was conducted at:

Intertek Testing Services Korea Ltd. 4/F, A-JU Digital Tower, 7, Achasan-ro 5 –gil, Seongdong-gu, Seoul, Korea

SECTION 9
TEST PROCEDURE

9.1 Test Set up :

Items		Requirement	Condition
Electrical Supply	Voltage	(240 ± 0.04) V	(240 ± 0.04) V
	Frequency	(50 ± 0.08) Hz	(50 ± 0.08) Hz
Ambient Temperature		(23 ± 2) °C	(23 ± 2) °C
Ambient humidity		(50 ± 5) % R.H.	(50 ± 5) % R.H.
Case 1	Hot water temperature	(15 ± 2) °C	(15 ± 2) °C
	Cold water temperature	(15 ± 2) °C	(15 ± 2) °C
Case 2	Hot water temperature	(60 ± 2) °C	(60 ± 2) °C
	Cold water temperature	(20 ± 2) °C	(20 ± 2) °C

9.2 Test method

9.2.1 Microorganisms

9.2.1.1 *Staphylococcus aureus* ATCC 6538

9.2.1.2 *Pseudomonas aeruginosa ATCC 9027*

9.2.1.3 *Escherichia coli ATCC 8739*

9.2.1.4 *Klebsiella pneumoniae ATCC 4352*

9.2.1.5 *Salmonella enteritidis KCCM 12021*

9.2.2 Preparation of test

9.2.2.1 Test load : IEC load, 3kg (Sheet 1ea, Pillowcases 4ea, Towels 12ea) Towel is used for weight correction.

9.2.2.2 Preparation of test piece : IEC load, Positive control 2ea, Negative control 2ea, Test 3ea
Five types of bacteria were incubated in TSB at 35 to 37 ° C for 24 hours, and the inoculation concentrations of 10^9 ~ 10^{10} CFU / mL were prepared by inoculating 2 mL of positive control and test.

9.2.2.3 Test detergent : IEC Standard detergent, A(Enzyme frill) 58.52g, B(Perborate) 15.2g, C(Bleach activator) 2.28g It was prepared by shaking before the test course so that the three components were thoroughly mixed.

9.2.3 Test progress

9.2.3.1 Bone dry test load and all specimens are sterilized under conditions of 121 ℃ and 15 psi for 15 minutes.

9.2.3.2 Positive control Specimen bacteria 2mL Immediately after inoculation, measure the number of microorganism.

9.2.3.3 After inoculation of 2mL of test specimens, the test load and the IEC standard detergent are put into the washer together to carry out the test course.

9.2.3.4 Measure the number of microorganism in the test specimen.

9.2.3.5 After the test course is conducted, a cold course is performed by introducing a test load and a negative specimen.

9.2.3.6 Measure the number of microorganism a negative specimen.

9.2.4 Evaluated the data as below Calculation.

9.2.4.1 Percent reduction = [(a-b)/a] × 100

a : the microorganism number of before Hygiene course
b : the microorganism number of after Hygiene course

SECTION 10
TEST RESULT

<Case 1>

1.Test

1.1 *Staphylococcus aureus* **(Unit : CFU/ml)**

	Repeat #1		Repeat #2		Repeat #3	
	Result	**Average**	**Result**	**Average**	**Result**	**Average**
Positive control	5.1×10^6	5.0×10^6	2.4×10^8	2.5×10^8	1.8×10^8	2.0×10^8
	4.9×10^6		2.5×10^8		2.1×10^8	
Test 1	0	0	5.0×10^0	2.0×10^0	5.0×10^0	3.0×10^0
Test 2	0		0		0	
Test 3	0		0		5.0×10^0	
Reduction rate (%)	99.9		99.9		99.9	

1.2 *Pseudomonas aeruginosa* **(Unit : CFU/ml)**

	Repeat #1		Repeat #2		Repeat #3	
	Result	**Average**	**Result**	**Average**	**Result**	**Average**
Positive control	2.6×10^7	6.8×10^8	2.3×10^9	2.0×10^9	1.4×10^8	1.9×10^8
	1.1×10^8		1.6×10^9		2.3×10^8	
Test 1	5.0×10^0	2.0×10^0	0	2.0×10^0	5.0×10^0	3.0×10^0
Test 2	0		0		5.0×10^0	
Test 3	0		5.0×10^0		0	
Reduction rate (%)	> 99.9		> 99.9		> 99.9	

1.3 *Escherichia coli* **(Unit : CFU/ml)**

	Repeat #1		Repeat #2		Repeat #3	
	Result	**Average**	**Result**	**Average**	**Result**	**Average**
Positive control	1.6×10^8	1.6×10^8	8.2×10^8	8.5×10^8	1.0×10^9	9.7×10^8
	1.5×10^8		8.7×10^8		9.3×10^8	
Test 1	0	2.0×10^0	0	0	0	0
Test 2	0		0		0	
Test 3	5.0×10^0		0		0	
Reduction rate (%)	> 99.9		> 99.9		> 99.9	

1.4 *Klebsiella pneumoniae* **(Unit : CFU/ml)**

	Repeat #1		Repeat #2		Repeat #3	
	Result	Average	Result	Average	Result	Average
Positive control	1.2×10^7	1.2×10^7	2.5×10^8	3.3×10^8	3.6×10^8	3.6×10^8
	1.2×10^7		4.1×10^8		3.6×10^8	
Test 1	5.0×10^0	3.0×10^0	0	0	0	3.0×10^0
Test 2	0		0		5.0×10^0	
Test 3	5.0×10^0		0		5.0×10^0	
Reduction rate (%)	> 99.9		> 99.9		> 99.9	

1.5 *Salmonella enteritidis* **(Unit : CFU/ml)**

	Repeat #1		Repeat #2		Repeat #3	
	Result	Average	Result	Average	Result	Average
Positive control	5.1×10^7	4.8×10^7	2.2×10^8	2.8×10^8	6.9×10^8	6.6×10^8
	4.5×10^7		3.3×10^8		6.2×10^8	
Test 1	5.0×10^0	3.0×10^0	5.0×10^0	2.0×10^0	0	2.0×10^0
Test 2	0		0		0	
Test 3	5.0×10^0		0		5.0×10^0	
Reduction rate (%)	> 99.9		> 99.9		> 99.9	

2. Negative control

2.1 *Staphylococcus aureus* **(Unit : CFU/ml)**

	Repeat #1		Repeat #2		Repeat #3	
	Result	Average	Result	Average	Result	Average
Negative control	1.0×10^1	8.0×10^0	0	0	0	0
	5.0×10^0		0		0	

2.2 *Pseudomonas aeruginosa* **(Unit : CFU/ml)**

	Repeat #1		Repeat #2		Repeat #3	
	Result	Average	Result	Average	Result	Average
Negative control	0	0	5.0×10^0	5.0×10^0	5.0×10^0	5.0×10^0
	0		5.0×10^0		5.0×10^0	

2.3 *Escherichia coli* **(Unit : CFU/ml)**

	Repeat #1		Repeat #2		Repeat #3	
	Result	Average	Result	Average	Result	Average
Negative control	0	0	5.0×10^0	3.0×10^0	0	3.0×10^0
	0		0		5.0×10^0	

2.4 *Klebsiella pneumoniae* **(Unit : CFU/ml)**

	Repeat #1		Repeat #2		Repeat #3	
	Result	Average	Result	Average	Result	Average
Negative control	0	3.0×10^0	5.0×10^0	3.0×10^0	0	3.0×10^0
	5.0×10^0		0		5.0×10^0	

2.5 *Salmonella enteritidis* **(Unit : CFU/mL)**

	Repeat #1		Repeat #2		Repeat #3	
	Result	Average	Result	Average	Result	Average
Negative control	0	3.0×10^0	0	0	0	5.0×10^0
	5.0×10^0		0		1.0×10^1	

<case 2>

1.Test

1.1 *Staphylococcus aureus* **(Unit : CFU/mL)**

	Repeat #4		Repeat #5		Repeat #6	
	Result	Average	Result	Average	Result	Average
Positive control	2.3×10^8	2.4×10^8	6.7×10^7	7.2×10^7	8.7×10^7	1.6×10^8
	2.5×10^8		8.1×10^7		2.3×10^8	
Test 1	5.0×10^0	2.0×10^0	5.0×10^0	3.0×10^0	5.0×10^0	3.0×10^0
Test 2	0		0		0	
Test 3	0		5.0×10^0		5.0×10^0	
Reduction rate (%)	> 99.9		> 99.9		> 99.9	

1.2 *Pseudomonas aeruginosa* **(Unit : CFU/mL)**

	Repeat #4		Repeat #5		Repeat #6	
	Result	Average	Result	Average	Result	Average
Positive control	1.4×10^8	1.4×10^8	1.1×10^8	8.5×10^7	5.1×10^8	5.2×10^8
	1.4×10^8		6.0×10^7		5.2×10^8	
Test 1	5.0×10^0	7.0×10^0	5.0×10^0	3.0×10^0	0	3.0×10^0
Test 2	1.0×10^1		5.0×10^0		5.0×10^0	
Test 3	5.0×10^0		0		5.0×10^0	
Reduction rate (%)	> 99.9		> 99.9		> 99.9	

1.3 *Escherichia coli* **(Unit : CFU/mL)**

	Repeat #4		Repeat #5		Repeat #6	
	Result	Average	Result	Average	Result	Average
Positive control	5.8×10^8	6.1×10^8	1.6×10^8	1.9×10^8	4.5×10^8	5.2×10^8
	6.3×10^8		2.1×10^8		5.9×10^8	
Test 1	5.0×10^0	3.0×10^0	0	3.0×10^0	5.0×10^0	2.0×10^0
Test 2	5.0×10^0		5.0×10^0		0	
Test 3	0		0		0	
Reduction rate (%)	>99.9		> 99.9		> 99.9	

1.4 *Klebsiella pneumoniae* **(Unit : CFU/mL)**

	Repeat #4		Repeat #5		Repeat #6	
	Result	Average	Result	Average	Result	Average
Positive control	7.6×10^8	6.6×10^8	1.8×10^8	1.9×10^8	5.4×10^8	7.1×10^8
	5.5×10^8		1.9×10^8		8.7×10^8	
Test 1	0	2.0×10^0	0	0	0	3.0×10^0
Test 2	5.0×10^0		0		1.0×10^1	
Test 3	0		0		0	
Reduction rate (%)	99.9		99.9		99.9	

1.5 *Salmonella enteritidis* **(Unit : CFU/mL)**

	Repeat #4		Repeat #5		Repeat #6	
	Result	Average	Result	Average	Result	Average
Positive control	9.3×10^8	9.7×10^8	5.8×10^8	5.6×10^8	4.8×10^8	6.8×10^8
	1.0×10^9		5.3×10^8		8.7×10^8	
Test 1	5.0×10^0	3.0×10^0	0	3.0×10^0	0	2.0×10^0
Test 2	5.0×10^0		1.0×10^1		0	
Test 3	0		0		5.0×10^0	
Reduction rate (%)	99.9		99.9		99.9	

2. Negative control

2.1 *Staphylococcus aureus* **(Unit : CFU/mL)**

	Repeat #4		Repeat #5		Repeat #6	
	Result	Average	Result	Average	Result	Average
Negative control	5.0×10^0	3.0×10^0	1.0×10^1	1.0×10^1	0	5.0×10^0
	0		1.0×10^1		1.0×10^1	

2.2 *Pseudomonas aeruginosa* **(Unit : CFU/mL)**

	Repeat #4		Repeat #5		Repeat #6	
	Result	Average	Result	Average	Result	Average
Negative control	5.0×10^0	3.0×10^0	0	0	0	0
	0		0		0	

2.3 *Escherichia coli* **(Unit : CFU/mL)**

	Repeat #4		Repeat #5		Repeat #6	
	Result	Average	Result	Average	Result	Average
Negative control	0	0	1.0×10^1	8.0×10^0	5.0×10^0	3.0×10^0
	0		5.0×10^0		0	

2.4 *Klebsiella pneumoniae* **(Unit : CFU/mL)**

	Repeat #4		Repeat #5		Repeat #6	
	Result	Average	Result	Average	Result	Average
Negative control	5.0×10^0	8.0×10^0	0	0	0	5.0×10^0
	1.0×10^1		0		1.0×10^1	

2.5 *Salmonella enteritidis* **(Unit : CFU/mL)**

	Repeat #4		Repeat #5		Repeat #6	
	Result	Average	Result	Average	Result	Average
Negative control	5.0×10^0	5.0×10^0	0	0	5.0×10^0	3.0×10^0
	5.0×10^0		0		0	

SECTION 11
Conclusion

Based on the data collected the Hypothesis is accepted:

The Hygiene Cycle of the washer can remove more than 99.9% of bacteria from laundry.

- End –

APPEXDIX I. PHOTOS OF SAMPLE

<Front view>

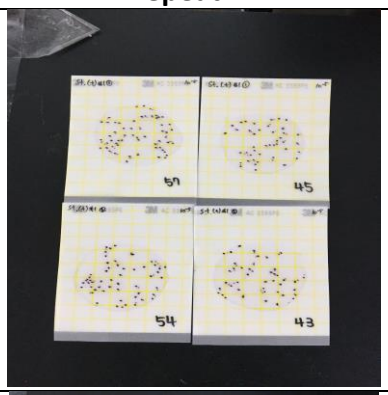
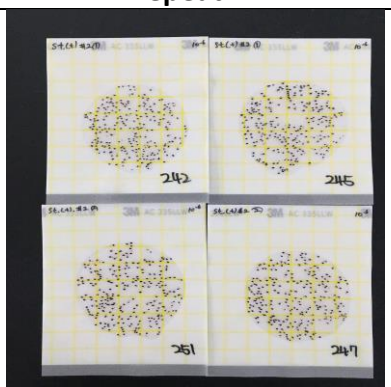
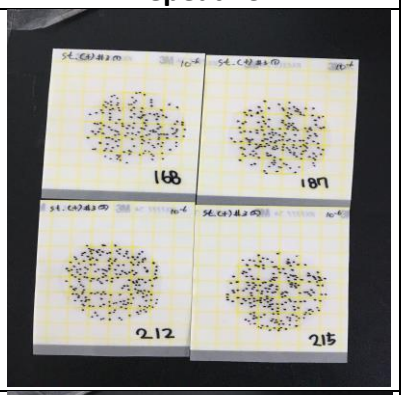
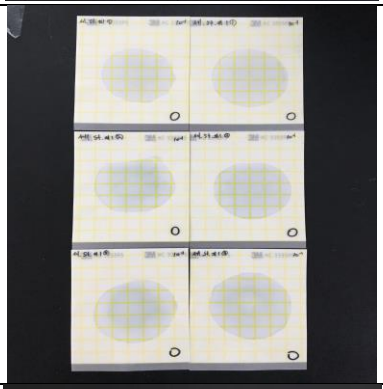
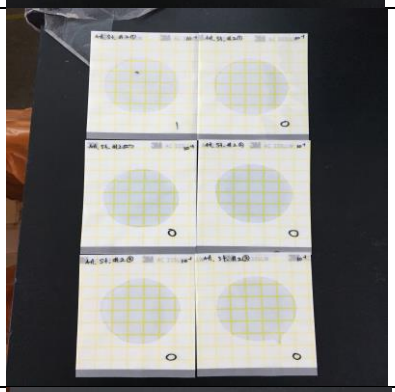
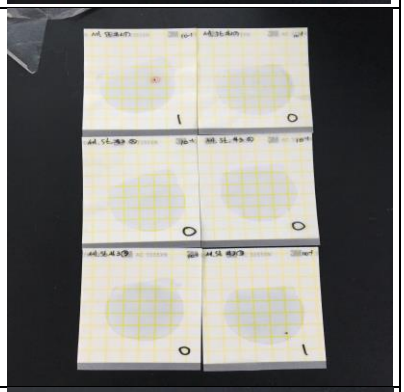
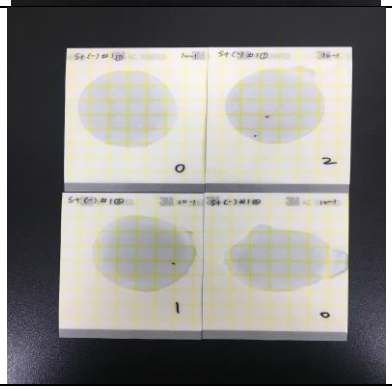
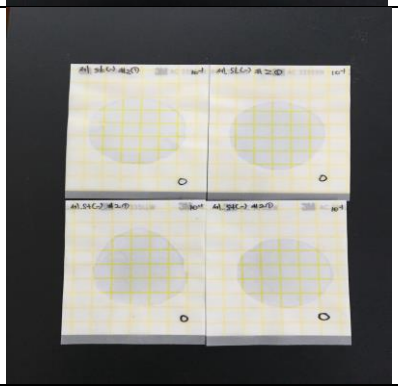
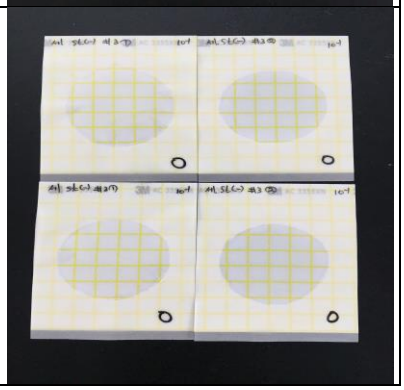
APPEXDIX II. Label

<Rating ravel>

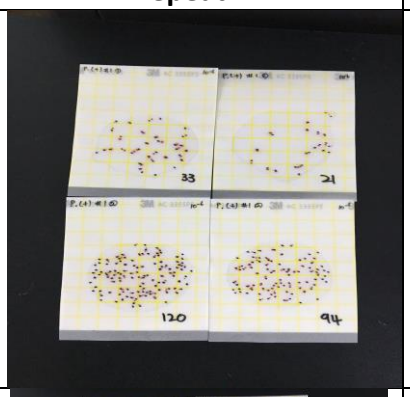
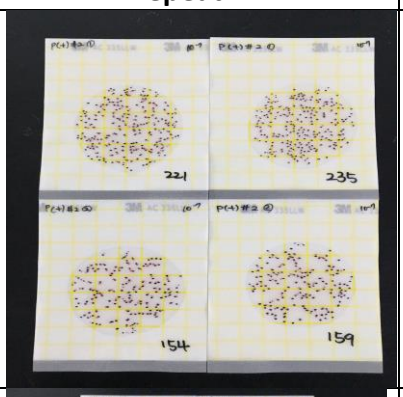
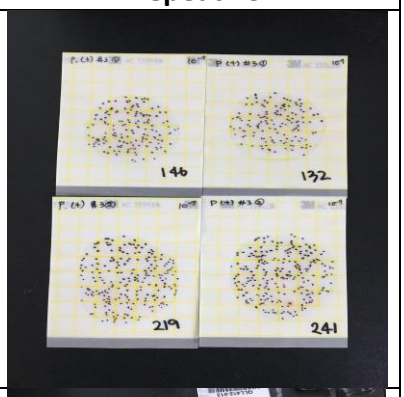
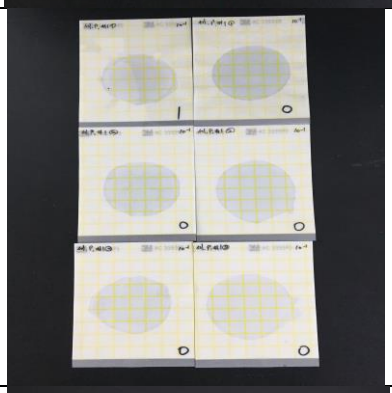
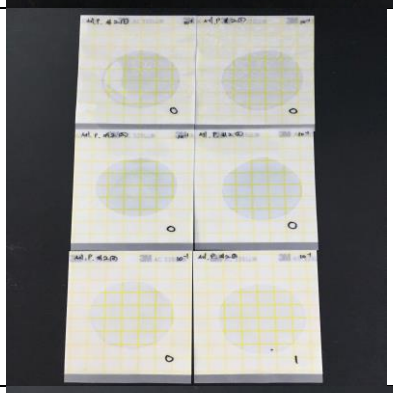
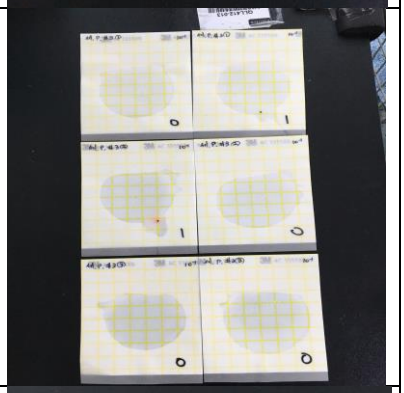
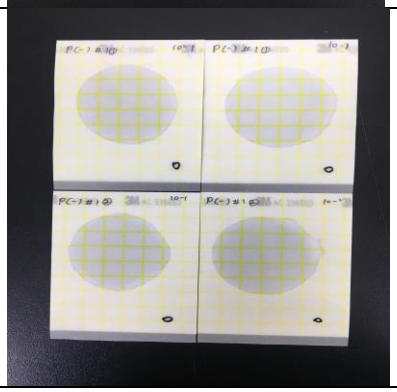
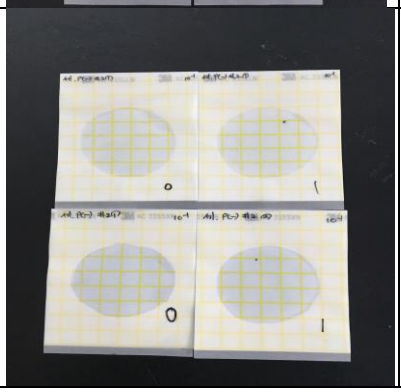
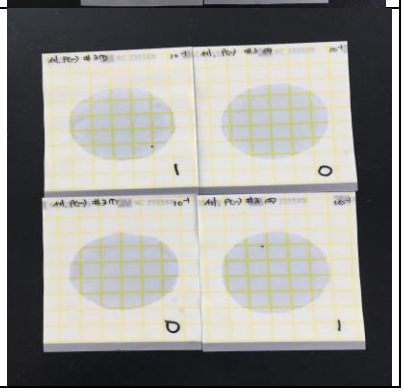
Appendix III. Photos of result

<Case 1>

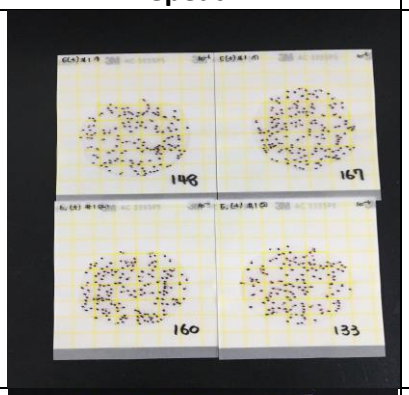
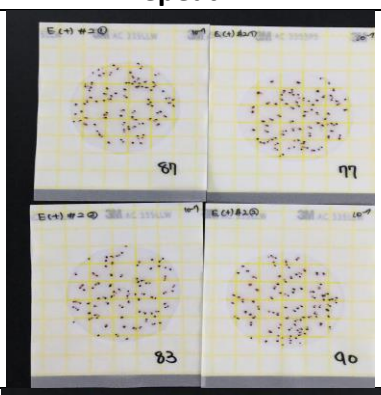
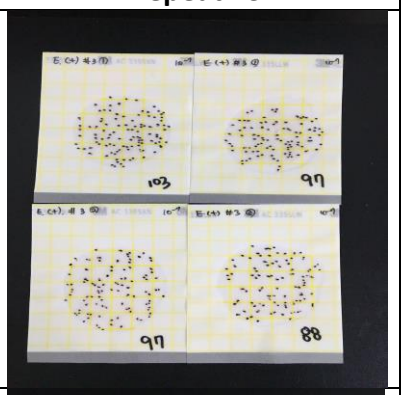
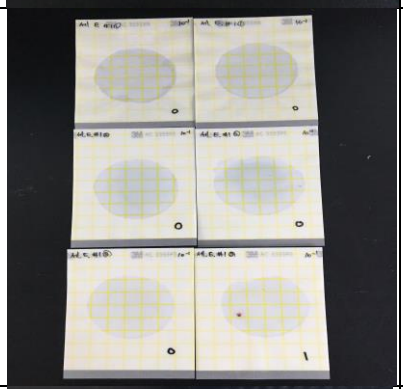
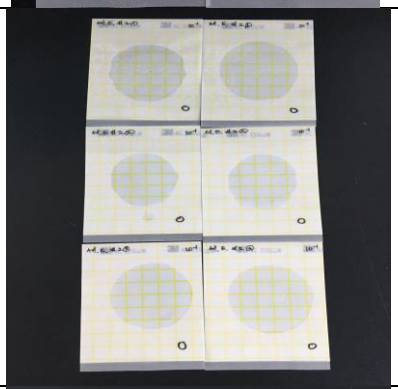
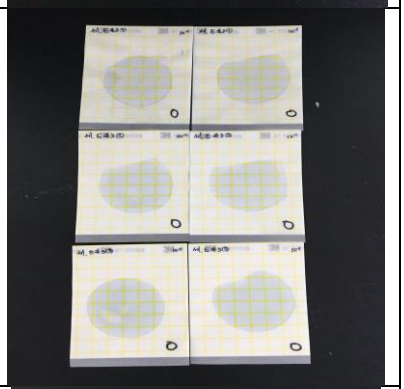
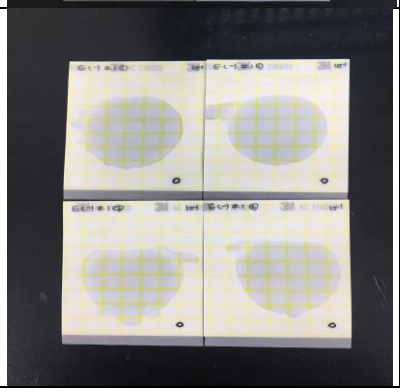
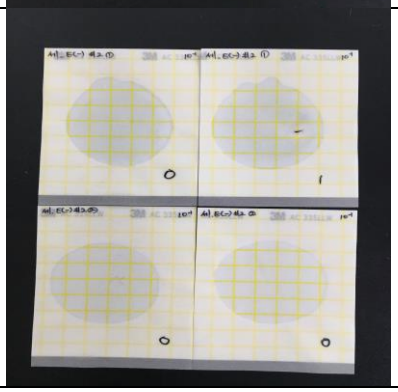
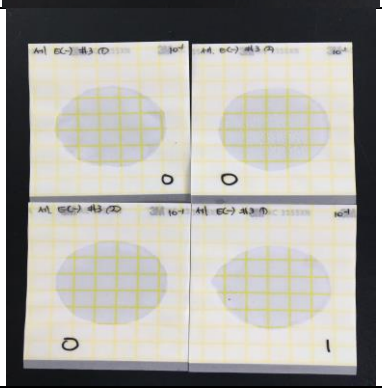
1. *Staphylococcus aureus*

	Repeat #1	Repeat #2	Repeat #3
Positive control			
test			
Negative control			

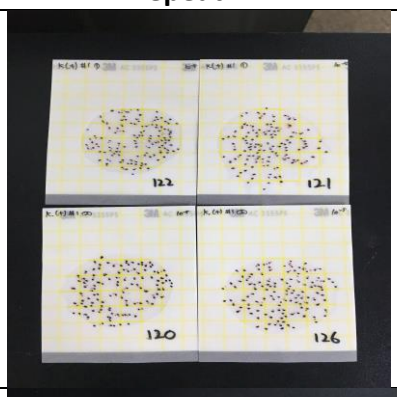
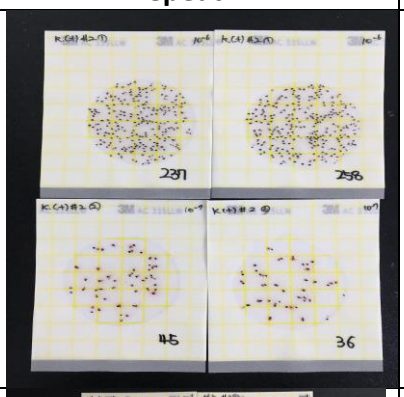
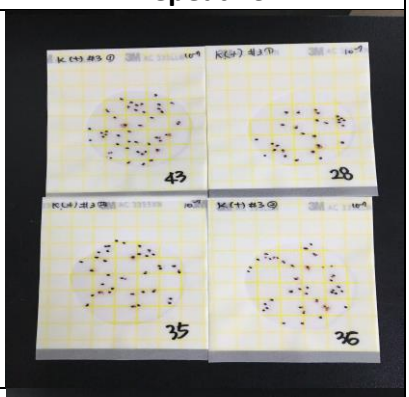
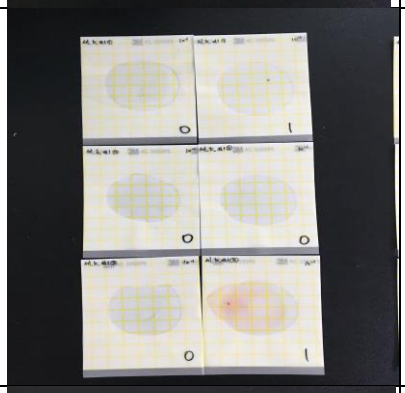
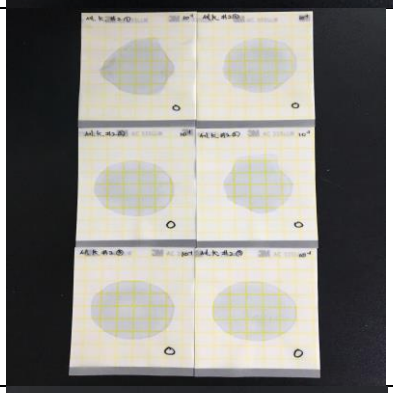
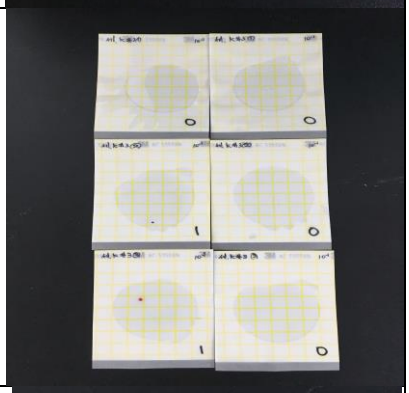
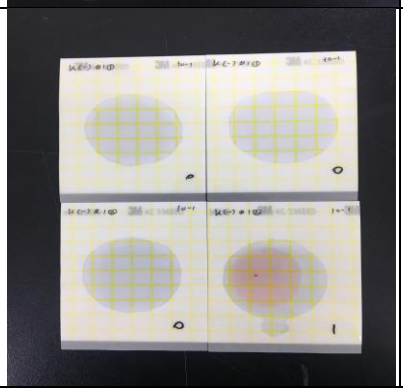
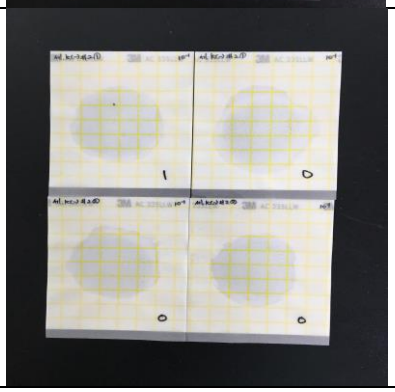
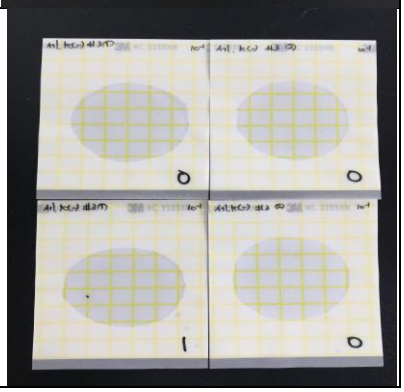
2. *Pseudomonas aeruginosa*

	Repeat #1	Repeat #2	Repeat #3
Positive control			
test			
Negative control			

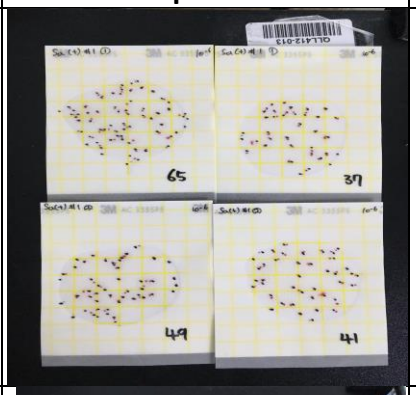
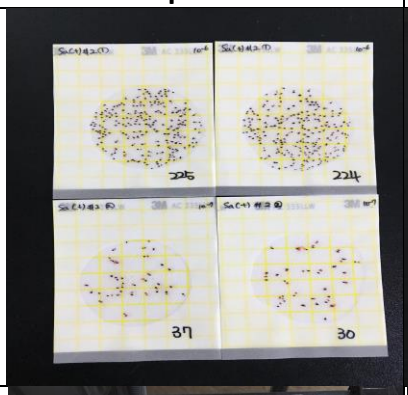
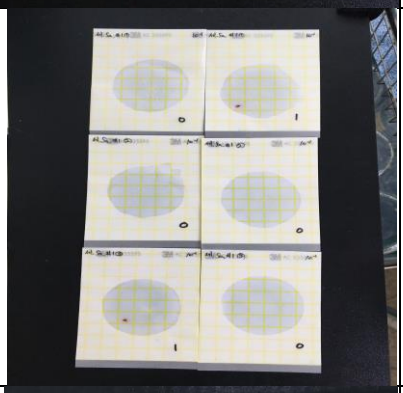
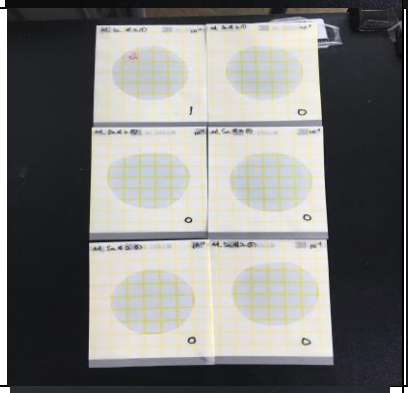
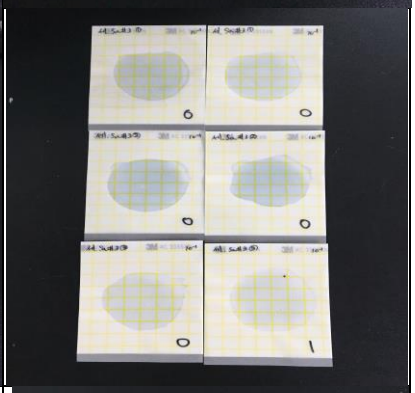
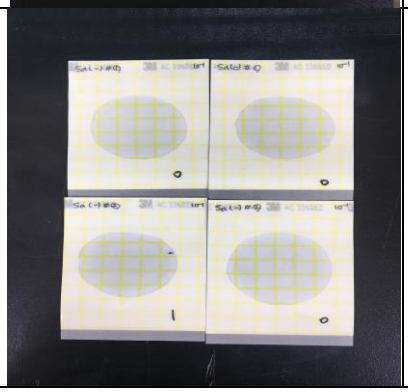
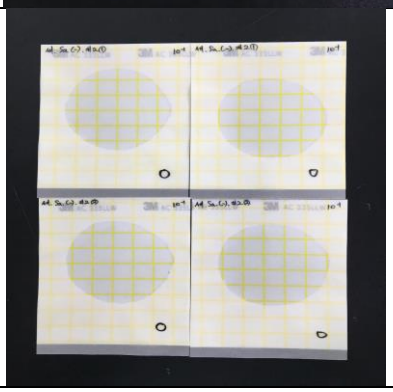
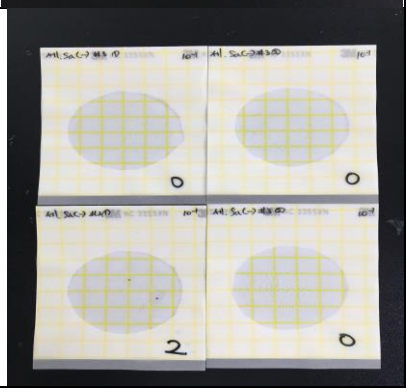
3. *Escherichia coli*

	Repeat #1	Repeat #2	Repeat #3
Positive control			
test			
Negative control			

4. *Klebsiella pneumoniae*

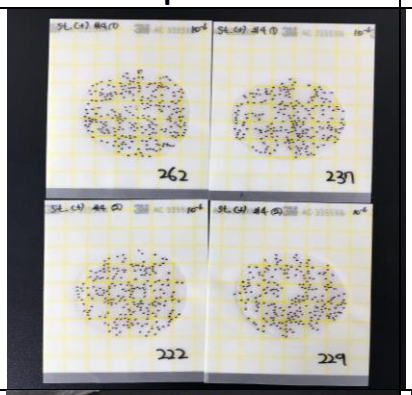
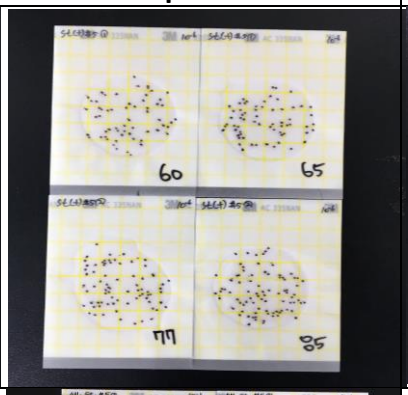
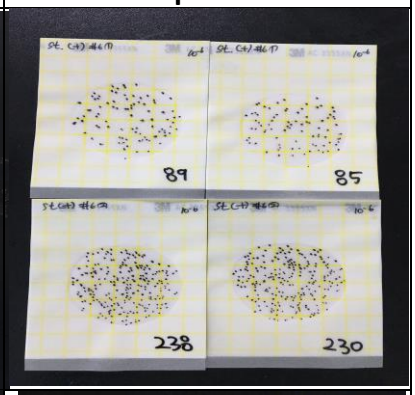
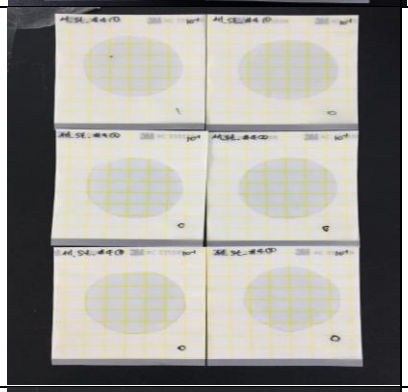
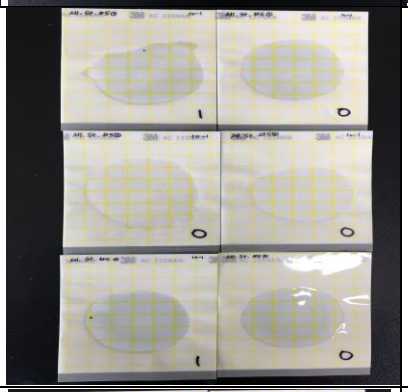
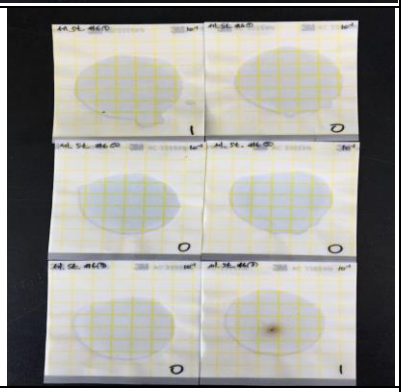
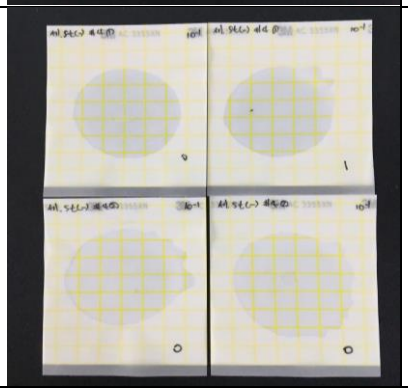
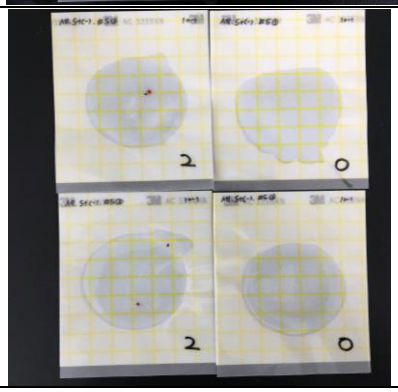
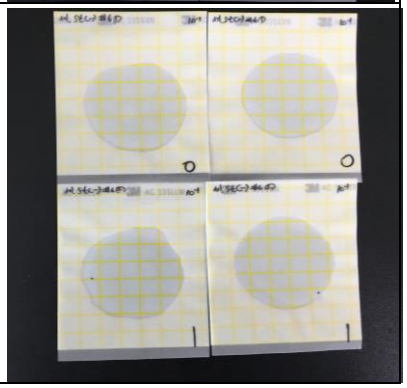
	Repeat #1	Repeat #2	Repeat #3
Positive control			
test			
Negative control			

5. *Salmonella enteritidis*

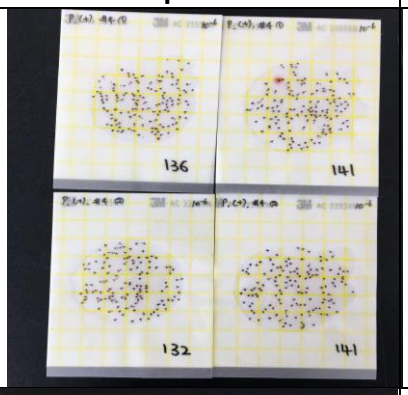
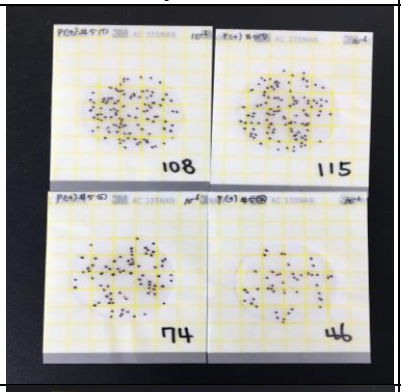
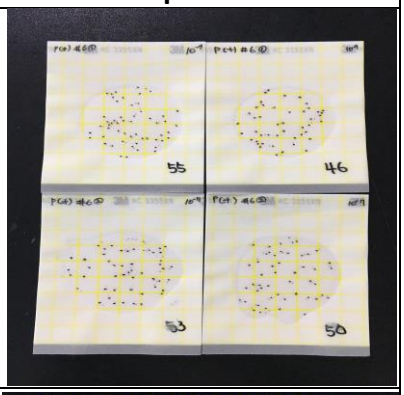
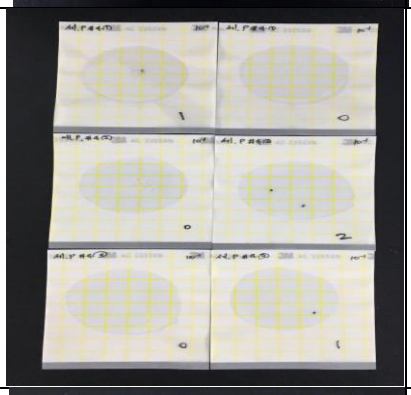
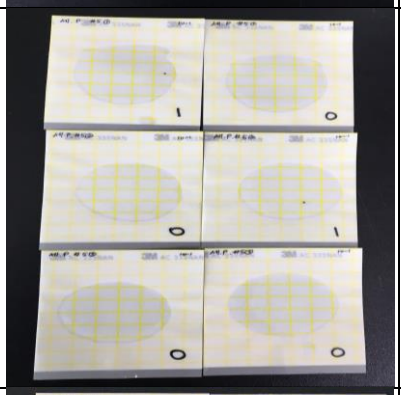
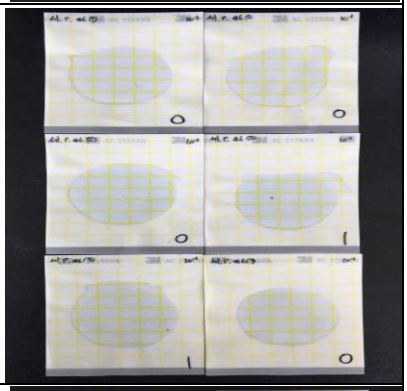
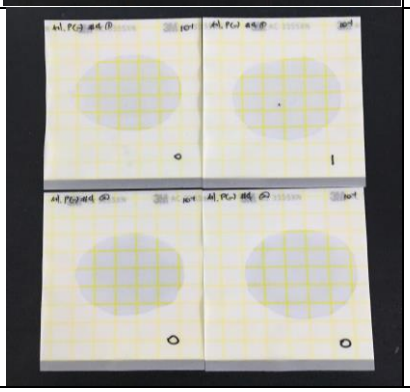
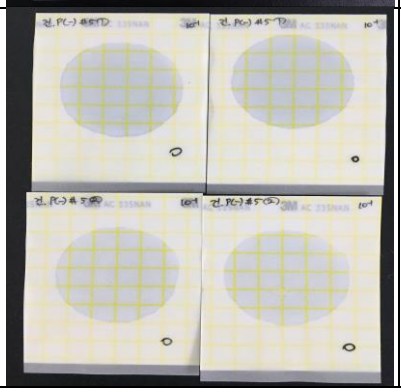
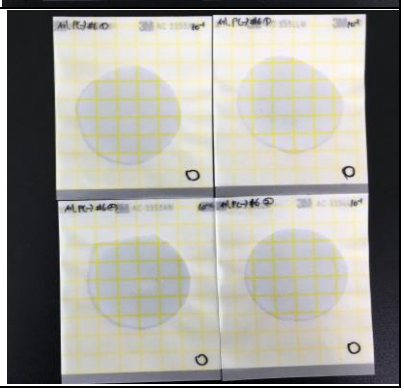
	Repeat #1	Repeat #2	Repeat #3
Positive control			
test			
Negative control			

<Case 2>

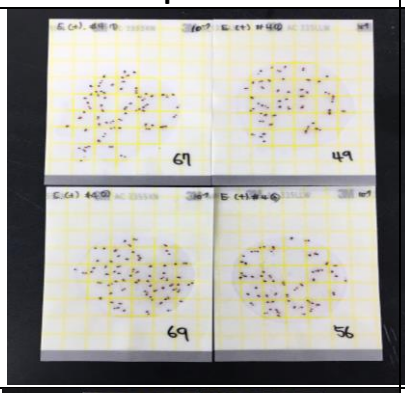
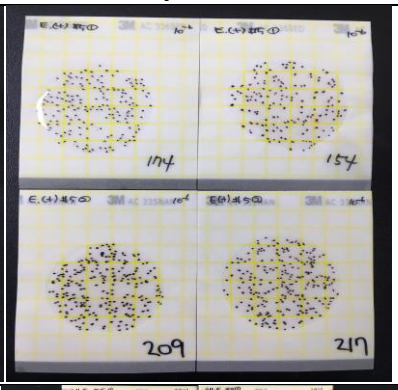
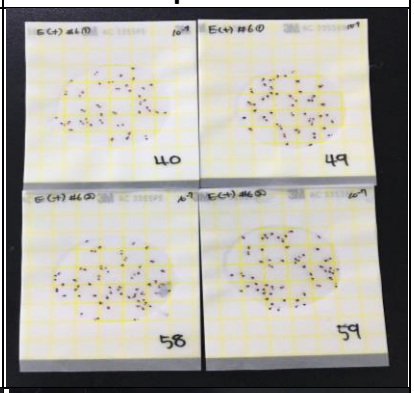
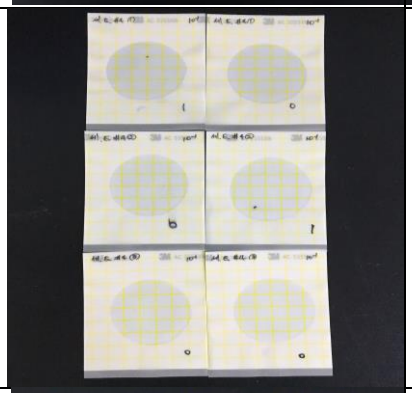
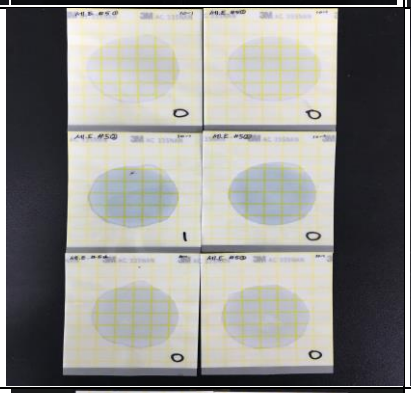
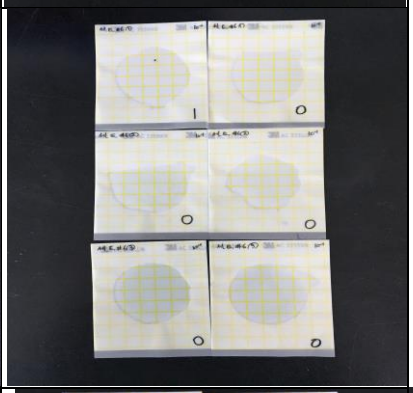
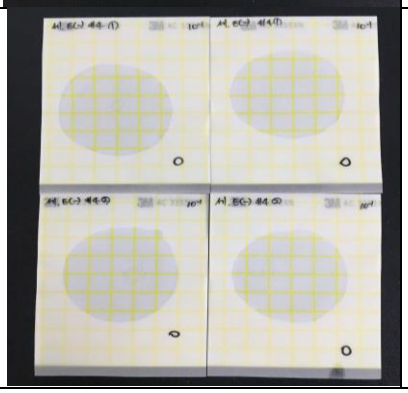
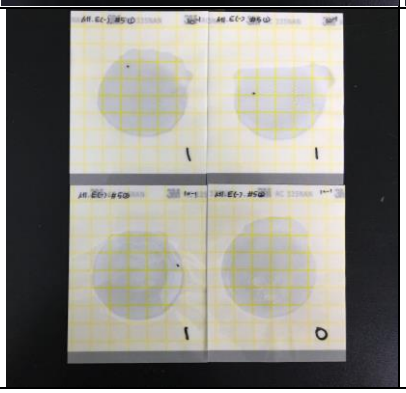
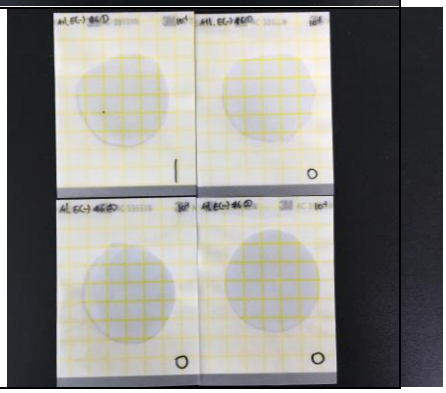
1. *Staphylococcus aureus*

	Repeat #4	Repeat #5	Repeat #6
Positive control			
test			
Negative control			

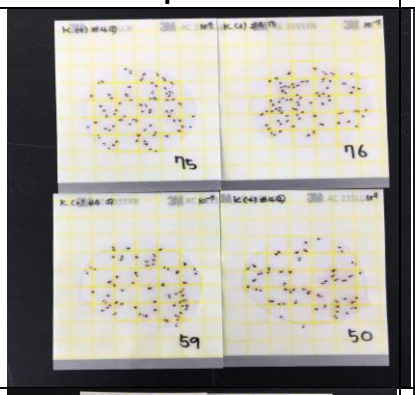
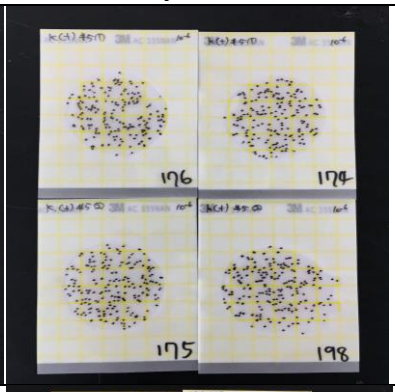
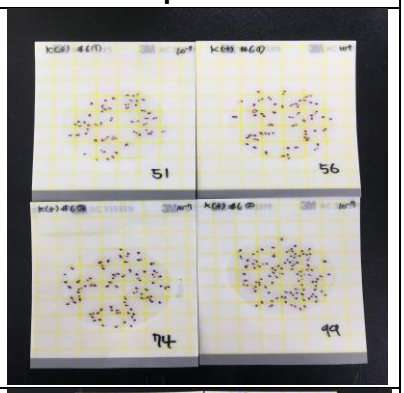
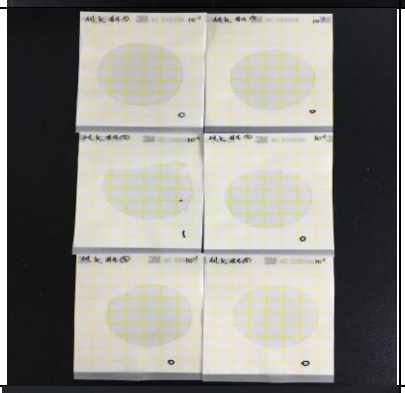
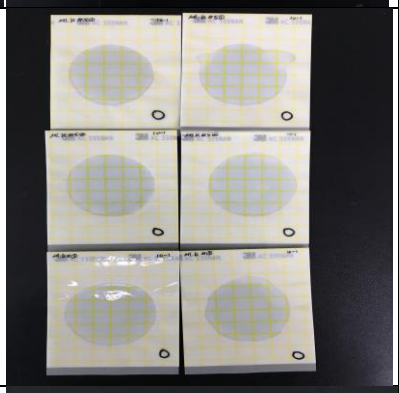
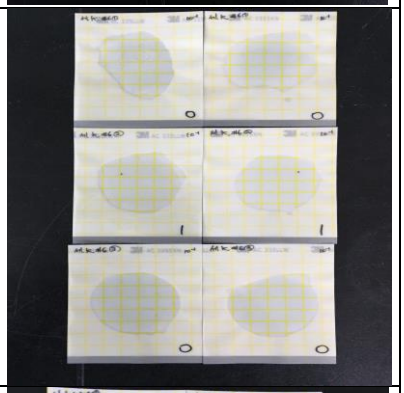
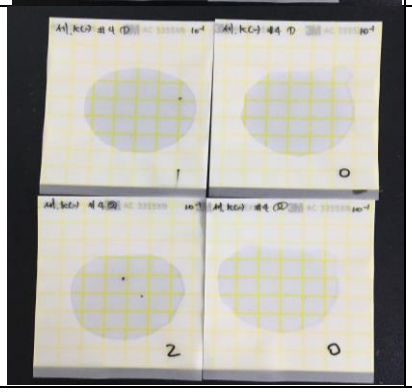
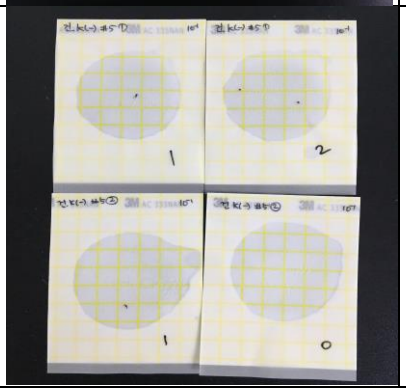
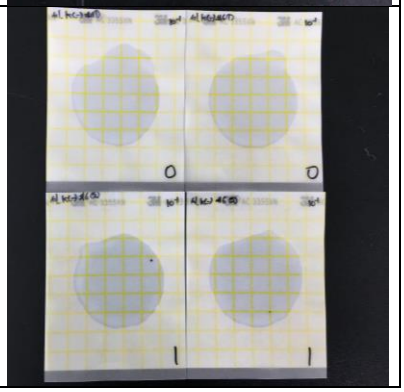
2. *Pseudomonas aeruginosa*

	Repeat #4	Repeat #5	Repeat #6
Positive control			
test			
Negative control			

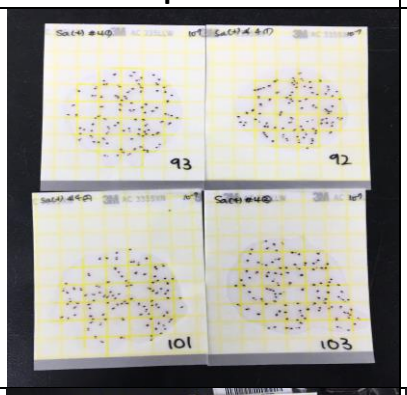
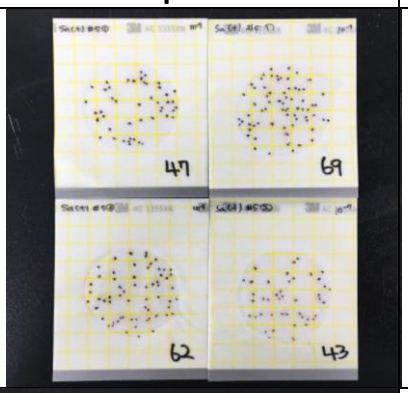
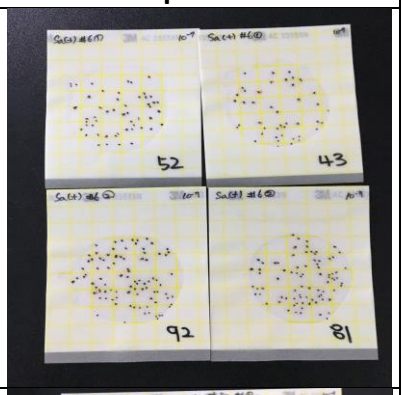
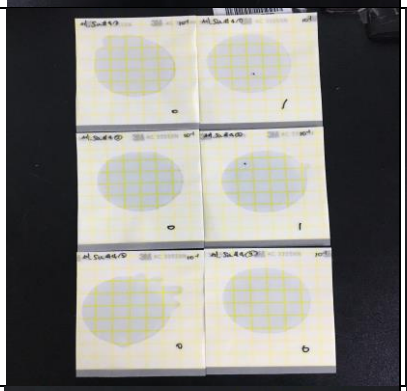
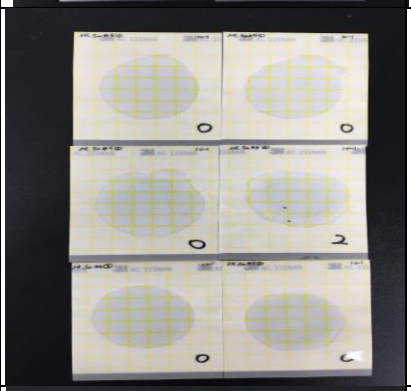
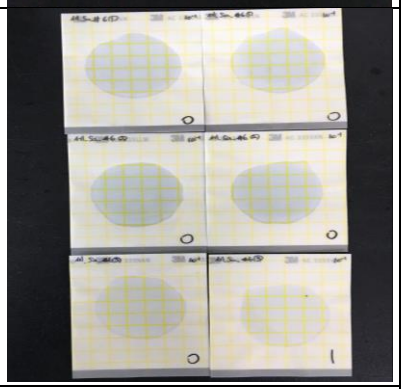
3. *Escherichia coli*

	Repeat #4	Repeat #5	Repeat #6
Positive control			
test			
Negative control			

4. *Klebsiella pneumoniae*

	Repeat #4	Repeat #5	Repeat #6
Positive control			
test			
Negative control			

5. *Salmonella enteritidis*

	Repeat #4	Repeat #5	Repeat #6
Positive control			
test			
Negative control