



FCC/IC TEST REPORT

Job No. : GPEM2303000164EC
Applicant : Master Lock Company
Equipment Under Test (EUT) :
 Product Name : Smart Lock
 Model Name : YRD510-MT1
FCC Authorization Type : Certification
Applied Standards : FCC Part 15 Subpart B, Class B
 ICES-003 Issue 7:2020
FCC ID : MZR-YRD510
IC Certification : 2676A-YRD510
Date of Receipt : March 2, 2023
Date of Test : April 6, 2023
Date of Issue : December 19, 2023
Test Results : Complied

Tested by	:		 ----- Jaehyeok Lee
Reviewed by	:		 ----- Julia Choi

This test report does not assure KOLAS accreditation.

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.

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Revision History

Revision	Report number	Description
0	F690501-RF-EMC001333	Initial
1	F690501-RF-EMC001333_1	Product name revised.

1. General Information

1.1 Client Information

Applicant	Master Lock Company
Applicant Address	6744 South Howell Avenue, Oak Creek, WI 53154, Milwaukee, Wisconsin, United States
Manufacturer	Master Lock Company
Manufacturer Address	Lot A10 Ba Thien II Industrial Park Thien Ke Ward Vinh Phuc Province, Vietnam

1.2 Test Laboratory

Name and Address	SGS Korea Co., Ltd.
- Giheung Laboratory	35, Giheungdanji-ro 121beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
- Gunpo Laboratory	4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, 15807, Republic of Korea
- Dongtan Laboratory	12, Dongtansandan 10-gil, Hwaseong-si, Gyeonggi-do, 18487, Republic of Korea
FCC Registration No.	KR0150
IC Registration No.	7837B
Phone	+ 82 31 428 5719
Fax	+ 82 31 427 2371
e-mail	paul.kang@sgs.com

1.3 General Information of E.U.T.

Classification	Specification
Product Name	Smart Lock
Model Name	YRD510-MT1
Serial No.	-
EMI Classification	Class B
Internal Clock Frequency	2 480 MHz
Rated Power	6 Vd.c.(Battery)
Test Voltage	6 Vd.c.(Battery)
H/W Version	V3.0
S/W Version	V1.2
Port	-
Components	-
Function	Digital Door Lock

1.4 Operating Modes and Conditions

Operating mode	Operating Condition
1) Dial	Unlock to press a number repeatedly.

1.5 Peripheral Equipments

Description	Model	Serial No.	Manufacturer	Note.
-	-	-	-	-

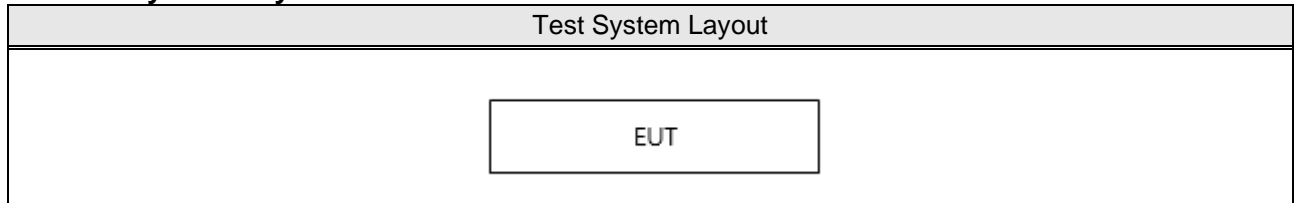
1.6 Cable List

Start		END		Cable Spec.		Used core
Name	I/O Port	Name	I/O Port	Length (m)	Shield	
EUT	-	-	-	-	-	-

1.7 System Configurations

Description	Model	Serial No.	Manufacturer	Note
Main Board	YRD510 MAIN PV03 230526	PC4M-D211W-E3	-	-
Front Board	YRD510 PB FRONT PV03 230829	PC2F-D211W-E3	-	-
Speaker	-	-	-	-

1.8 Test System Layout



1.9 Modifications/Notes

- There was no modified item during the test.

1.10 Applicable Standards for Testing

Standards	Status	Deviation
FCC Part 15 : Subpart B ICES-003 Issue 7:2020	Applicable	No Deviation

1.11 Summary of Test Results

Test Item	Standards	Results
Conducted Emission	FCC Part 15 Subpart B Section 15.107 ICES-003 Issue 7:2020 ANSI C63.4a:2017	N/A
Radiated Emission	FCC Part 15 Subpart B Section 15.109 ICES-003 Issue 7:2020 ANSI C63.4a:2017	Complied

Note : Test methods of all test items are performed according to the basic standards in this table.

EMISSION

2.1 Test Results

Test Items	Standards	Test Results
Conducted Emission	FCC Part 15 Subpart B Section 15.107 ICES-003 Issue 7:2020 ANSI C63.4a:2017	N/A
Radiated Emission	FCC Part 15 Subpart B Section 15.109 ICES-003 Issue 7:2020 ANSI C63.4a:2017	Complied

2.2 Test Method and Limits

2.2.1 Test Method

Test Items	Measuring Frequency Range	RBW	Measuring Distance
Conducted Emission	0.15 MHz ~ 30 MHz	9 kHz	-
Radiated Emission	30 MHz ~ 1 GHz	120 kHz	10 m & 3 m
	Above 1 GHz	1 MHz	3 m

Note : 10 m method of radiated emission measurement is only applied to Class A equipment over the frequency range of 30 MHz ~ 1 GHz. Except this, 3 m method is applied to Class B equipment over the frequency range of 30 MHz ~ 1 GHz and Class A and Class B equipment above 1 GHz.

2.2.2 Test Limits

-Conducted Emission Limits

Frequency Range	Limits(dB μ V)		Class
	Quasi-peak	Average	
0.15 MHz ~ 0.5 MHz	79	66	Class A
0.5 MHz ~ 30 MHz	73	60	
0.15 MHz ~ 0.5 MHz	66 to 56	56 to 46	Class B
0.5 MHz ~ 5 MHz	56	46	
5 MHz ~ 30 MHz	60	50	

Note : The lower limit shall apply at the transition frequencies. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

-Radiated Emission Limits below 1 GHz

[FCC Part 15 Subpart B]

Frequency Range	Limits(dB μ V/m)	Class
	Quasi-peak	
30 MHz ~ 88 MHz	39.0	Class A (10 m method)
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 960 MHz	46.4	
960 MHz ~ 1 GHz	49.5	
30 MHz ~ 88 MHz	40.0	Class B (3 m method)
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 960 MHz	46.0	
960 MHz ~ 1 GHz	54.0	

[ICES-003 Issue 7 : 2020]

Frequency Range	Limits(dB μ V/m)		Class
	Quasi-peak		
30 MHz ~ 88 MHz	40.0		Class A (10 m method)
88 MHz ~ 216 MHz	43.5		
216 MHz ~ 230 MHz	46.4		
230 MHz ~ 960 MHz	47.0		
960 MHz ~ 1 GHz	49.5		
30 MHz ~ 88 MHz	50.0		Class A (3 m method)
88 MHz ~ 216 MHz	54.0		
216 MHz ~ 230 MHz	56.9		
230 MHz ~ 960 MHz	57.0		
960 MHz ~ 1 GHz	60.0		
30 MHz ~ 88 MHz	30.0		Class B (10 m method)
88 MHz ~ 216 MHz	33.1		
216 MHz ~ 230 MHz	35.6		
230 MHz ~ 960 MHz	37.0		
960 MHz ~ 1 GHz	43.5		
30 MHz ~ 88 MHz	40.0		Class B (3 m method)
88 MHz ~ 216 MHz	43.5		
216 MHz ~ 230 MHz	46.0		
230 MHz ~ 960 MHz	47.0		
960 MHz ~ 1 GHz	54.0		

-Radiated Emission Limits above 1 GHz (3 m method)

[FCC Part 15 Subpart B]

Frequency Range	Limits(dB μ V/m)		Class
	Average	Peak	
Above 1 GHz	59.5	79.5	Class A
	54.0	74.0	Class B

Note : The limits of class A equipment is extrapolated using an extrapolation factor of 20 dB/decade because it was measured at 3 m distance not 10 m distance.

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Frequency Range	Limits(dB μ V/m)		Class
	Average	Peak	
Above 1 GHz	60.0	80.0	Class A
	54.0	74.0	Class B

2.3 Radiated Emission

The initial preliminary exploratory scans were performed over the measuring frequency range (30 MHz to 13 GHz) using a max hold mode incorporating a Peak detector by using the EMI measuring software. The final test data was measured using a Quasi-Peak detector below 1 GHz, Peak and CISPR Average detector above 1 GHz. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

Note. Measuring software

- Giheung Lab.: EMC32(V10.40.10) from R&S
- Gunpo Lab.: EP5RE(V5.3.70) from TOYO
- Dongtan Lab.: EMC32(V10.40.10) from R&S

2.3.1 Test Equipments

Equipment	Model	Manufacturer	Serial No	Cal Due. Date
Horn Antenna	HF906	R & S	100326	2024.02.28
Signal Conditioning Unit	SCU 18	R & S	10117	2023.06.13
Test Receiver	ESU26	R & S	100109	2024.01.18
Hybrid Antenna	VULB9163	SCHWARZBECK	01126	2024.02.09
Amplifier	8447F	HP	2944A03909	2023.08.04

Note: The calibration period of every equipment is 1 year.

2.3.2 Test Site

3 m SEMI-ANECHOIC CHAMBER in Gunpo Laboratory

2.3.3 Environment Conditions

Below 1 GHz

Temperature	(Minimum 20.7, Maximum 20.8) °C
Humidity	(Minimum 38.0, Maximum 38.0) % R.H.
Atmospheric Pressure	(Minimum 100.6, Maximum 100.6) kPa
Test Date	April 6, 2023

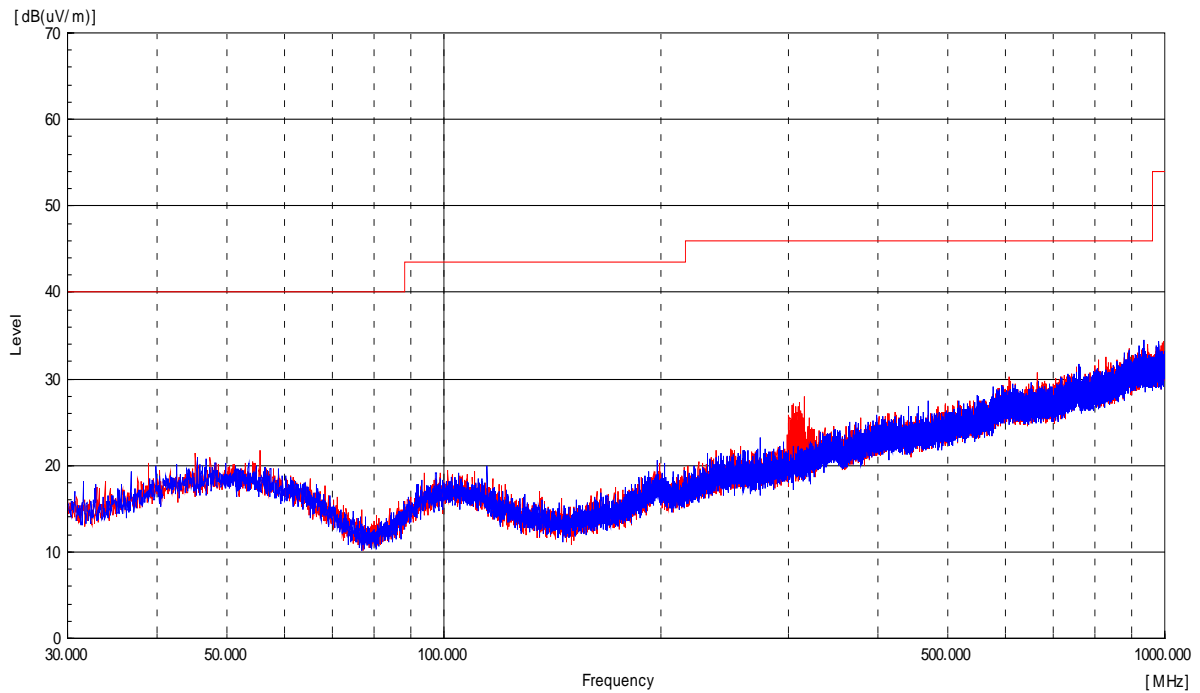
Above 1 GHz

Temperature	(Minimum 20.7, Maximum 20.8) °C
Humidity	(Minimum 38.0, Maximum 38.0) % R.H.
Atmospheric Pressure	(Minimum 100.6, Maximum 100.6) kPa
Test Date	April 6, 2023

2.3.4 Test Results

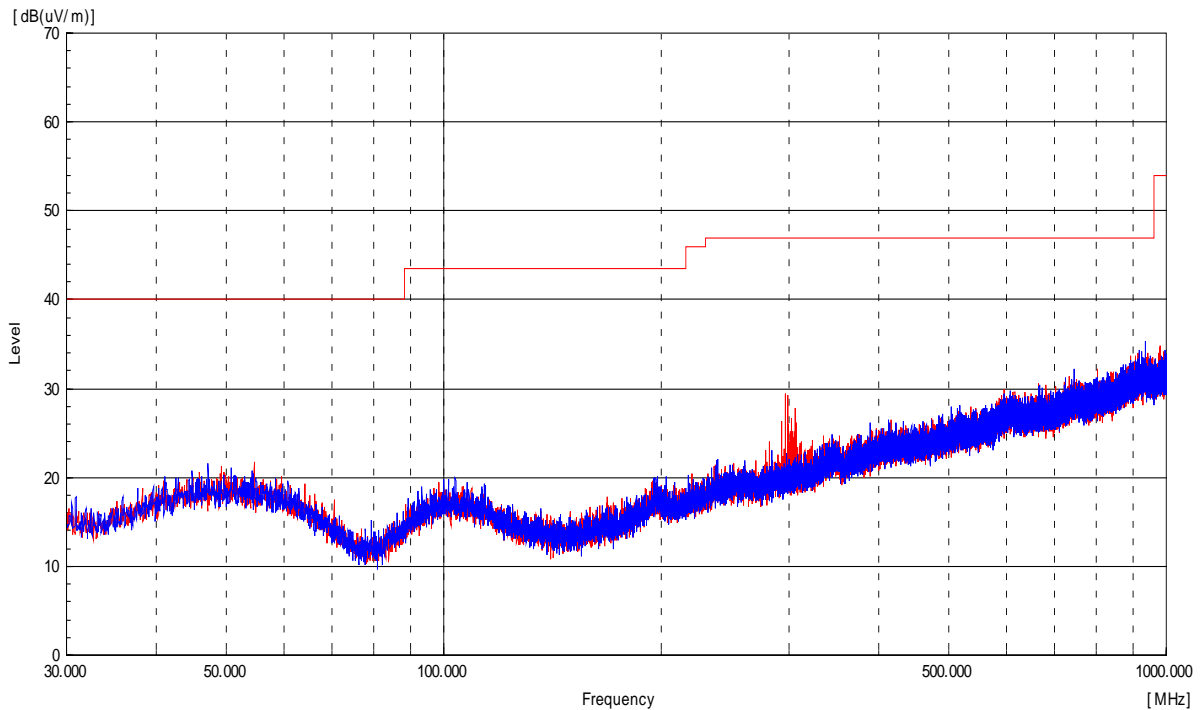
Below 1 GHz (3 m method)

[FCC Part 15 Subpart B]



Freq. (MHz)	Reading (dB μ V/m)	Pol. (H/V)	A ($^{\circ}$)	H (cm)	AF (dB/m)	CL (dB)	Amp. (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
45.40	28.00	V	75	105	19.48	0.81	28.20	20.09	40.00	19.91
55.46	28.40	H	350	204	19.15	0.96	28.20	20.31	40.00	19.69
114.75	28.60	V	180	110	16.75	1.44	28.17	18.62	43.50	24.88
316.25	30.10	H	230	100	19.30	2.19	27.57	24.02	46.00	21.98
664.95	29.50	H	0	200	25.20	3.30	28.89	29.11	46.00	16.89
760.17	29.10	V	225	198	26.60	3.79	28.94	30.55	46.00	15.45

[ICES-003 Issue 7: 2020]



Freq. (MHz)	Reading (dB μ V/m)	Pol. (H/V)	A ($^{\circ}$)	H (cm)	AF (dB/m)	CL (dB)	Amp. (dB)	F/R (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
47.10	23.40	V	360	102	19.61	0.83	28.20	15.64	40.00	24.36
54.53	23.70	H	320	190	19.29	0.94	28.20	15.73	40.00	24.27
296.14	29.30	H	185	100	19.00	2.17	27.61	22.86	46.00	23.14
665.67	26.20	H	200	204	25.20	3.32	28.90	25.82	46.00	20.18
745.78	26.10	V	140	200	26.69	3.53	28.95	27.37	46.00	18.63
935.78	26.30	V	345	100	28.10	4.26	28.63	30.03	46.00	15.97

Measurement Uncertainty: See the Appendix A

Note: • AF = Antenna Factor

• Pol.(H) = Horizontal

• Margin = Limit – F/S

• A: Angle

• CL = Cable Loss

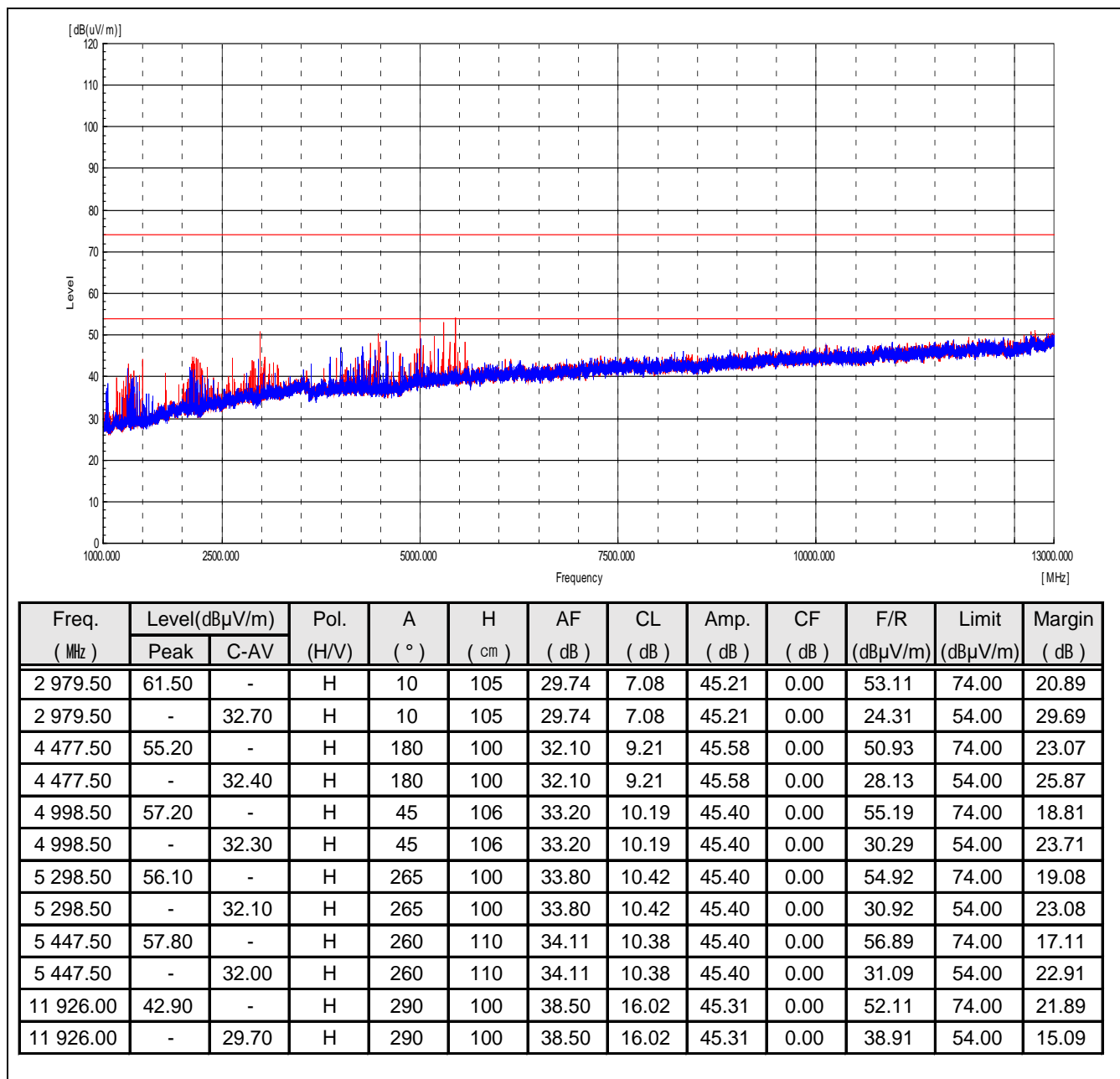
• Pol.(V) = Vertical

• F/R = Reading + AF + CL – Amp.

• H: Height

• F/R = Final Result

• Amp. = Amplifier Gain

Above 1 GHz (3 m method)


Measurement Uncertainty : See Appendix A

- Note:
- AF = Antenna Factor
 - CL = Cable Loss
 - F/R = Final Result
 - Pol.(H) = Horizontal
 - Pol.(V) = Vertical
 - Amp. = Amplifier Gain
 - Margin = Limit – F/S
 - F/R = Level + AF + CL – Amp.
 - A: Angle
 - H: Height

Ex) In case

Freq ; 100 MHz, level ; 30 dB(μV/m), AF ; 10 dB/m, CL ; 4 dB, Amp ; 25 dB

$$\begin{aligned} \text{Result} &= \text{Level} + \text{AF} + \text{CL} - \text{Amp} \\ &= 30 + 10 + 4 - 25 \\ &= 19 \end{aligned}$$

$$\begin{aligned} \text{Margin} &= \text{Limit} - \text{Result} \\ &= 43.5 - 19 \\ &= 24.5 \end{aligned}$$

Appendix A : Measurement Uncertainty

- Giheung Laboratory

Test Method		Measurement Uncertainty	
Conducted Emission		ENV216	3.7 dB (The confidential level is 95 %, $k=2$)
		ESH2-Z5	3.2 dB (The confidential level is 95 %, $k=2$)
		ESH3-Z6	3.2 dB (The confidential level is 95 %, $k=2$)
		NNLK8129	3.1 dB (The confidential level is 95 %, $k=2$)
Conducted Emission - Signal		ISN T800	5.4 dB (The confidential level is 95 %, $k=2$)
		ISN ST08	6.6 dB (The confidential level is 95 %, $k=2$)
Discontinuous		2.7 dB (The confidential level is 95 %, $k=2$)	
Radiated Emission	9 kHz ~30 MHz	Horizontal	3.3 dB (The confidential level is 95 %, $k=2$)
		Vertical	3.3 dB (The confidential level is 95 %, $k=2$)
	30 MHz ~ 1 000 MHz	Horizontal	4.3 dB (The confidential level is 95 %, $k=2$)
		Vertical	4.6 dB (The confidential level is 95 %, $k=2$)
	1 GHz ~ 18 GHz	Horizontal	3.9 dB (The confidential level is 95 %, $k=2$)
		Vertical	4.0 dB (The confidential level is 95 %, $k=2$)

- Gunpo Laboratory

Test Method		Measurement Uncertainty	
Conducted Emission		ENV216	4.0 dB (The confidential level is 95 %, $k=2$)
		ESH2-Z5	3.6 dB (The confidential level is 95 %, $k=2$)
		ESH3-Z6	3.8 dB (The confidential level is 95 %, $k=2$)
Conducted Emission - Signal		ISN T800	5.8 dB (The confidential level is 95 %, $k=2$)
		ISNT8-Cat6	5.8 dB (The confidential level is 95 %, $k=2$)
		ISN S751	7.5 dB (The confidential level is 95 %, $k=2$)
Disturbance Voltage at Antenna Terminal		2.9 dB (The confidential level is 95 %, $k=2$)	
Radiated Emission	9 kHz ~30 MHz	Horizontal	3.4 dB (The confidential level is 95 %, $k=2$)
		Vertical	3.4 dB (The confidential level is 95 %, $k=2$)
	30 MHz ~ 1 000 MHz	Horizontal	4.5 dB (The confidential level is 95 %, $k=2$)
		Vertical	5.1 dB (The confidential level is 95 %, $k=2$)
	1 GHz ~ 18 GHz	Horizontal	3.7 dB (The confidential level is 95 %, $k=2$)
		Vertical	3.9 dB (The confidential level is 95 %, $k=2$)

- Dongtan Laboratory

Test Method		Measurement Uncertainty	
Conducted Emission	ENV216	3.5 dB (The confidential level is 95 %, $k=2$)	
	ESH2-Z5	3.3 dB (The confidential level is 95 %, $k=2$)	
	ESH3-Z6	3.3 dB (The confidential level is 95 %, $k=2$)	
	NNLK8129	3.4 dB (The confidential level is 95 %, $k=2$)	
Conducted Emission - Signal	ISN T800	5.7 dB (The confidential level is 95 %, $k=2$)	
	ISN ST08	5.5 dB (The confidential level is 95 %, $k=2$)	
Discontinuous		2.9 dB (The confidential level is 95 %, $k=2$)	
disturbance Power		3.9 dB (The confidential level is 95 %, $k=2$)	
Radiated Emission	9 kHz ~30 MHz (Triple Loop Ant.)	3.4 dB (The confidential level is 95 %, $k=2$)	
	9 kHz ~30 MHz (Loop Ant.)	Horizontal	3.8 dB (The confidential level is 95 %, $k=2$)
		Vertical	3.8 dB (The confidential level is 95 %, $k=2$)
	30 MHz ~ 1 000 MHz	Horizontal	4.8 dB (The confidential level is 95 %, $k=2$)
		Vertical	5.4 dB (The confidential level is 95 %, $k=2$)
	1 GHz ~ 18 GHz	Horizontal	4.1 dB (The confidential level is 95 %, $k=2$)
		Vertical	4.2 dB (The confidential level is 95 %, $k=2$)

- End of Test Report -