

TEST REPORT



CTK Co., Ltd.
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Report No.:
CTK-2017-02225
Page (1) / (28) Pages

1. Client

- Name : CNSLink Co., Ltd.
- Address : #3F,11, Banga-ro 16, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
- Date of Receipt : 2017-10-18

2. Manufacturer

- Name : CNSLink Co., Ltd.
- Address : #3F,11, Banga-ro 16, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea

3. Use of Report : For FCC Verification Report

4. Test Sample / Model: CAR DVR / 250-8950 and E200

5. Date of Test : 2017-10-24

6. FCC ID : 2AOD7-X52FH

7. Test Standard(method) used : FCC Part 15 Subpart B

8. Testing Environment: refer to 12 pages

9. Test Results : refer to 12 pages

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by	Approved by
	Park Sunggeun: (Signature) EMC Test Engineer	Lee Eunwon: (Signature) Technical Manager

2017-11-27

Republic of KOREA **CTK Co., Ltd.**



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REPORT REVISION HISTORY

Date	Revision	Page No
2017-11-27	Issued (CTK-2017-02225)	All

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1.0 General Product Description

No.	ITEM	APPLICATION	
1	Test Sample	CAR DVR	
2	Model	250-8950	
3	Variant Model	E200	
4	Dimensions (W x L x H)	111 mm × 70 mm × 21 mm	
5	Mobility	☐ Table-top ☐ Floor-standing ☒ Built-in ☐ Portable	
6	Maximum Clock Frequency	27 MHz	
7	Electrical Ratings	Input:	DC 12 V, DC 24 V
		Output:	-
8	Test Voltage / Frequency	Voltage:	DC 12 V, DC 24 V
		Frequency:	-

1.1 Model Differences

250-8950 and E200 are no technical difference from each model only except for model name because of marketing purposes.

1.2 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

Device	Model No.	Serial No.	Manufacturer
FRONT CAM	-	-	CNSLink Co., Ltd
REAR CAM	-	-	CNSLink Co., Ltd
Button	-	-	CNSLink Co., Ltd
MIC	-	-	CNSLink Co., Ltd
Dual-Tracking DC Power Supply	6303D	997931	Topward Electric Instruments Co.,Ltd.
Micro SD	-	-	MYDEAN

☒ Cable Description

No.	From		To		Type of Cable		
	Device	I/O Port	Device	I/O Port	Length (m)	Shielded or Unshielded	Ferrite Core [Y/N]
1	EUT	DC IN	Dual-Tracking DC Power Supply	DC OUT	1.5	U	N
2		CAM FRONT	FRONT CAM	-	2.0	U	N
3		CAM REAR	REAR CAM	-	3.0	U	Y
4		GPS	CABLE	-	1.0	U	N
5		SD	Micro SD	-	-	-	-
6		S.O.S	Button	-	1.2	U	N
7		MIC	MIC	-	1.2	U	N
8	Dual-Tracking DC Power Supply	AC POWER	AC MAINS	-	1.8	U	N

* Shielded or Unshielded : Unshielded=U, Shielded=S

1.4 Test Software

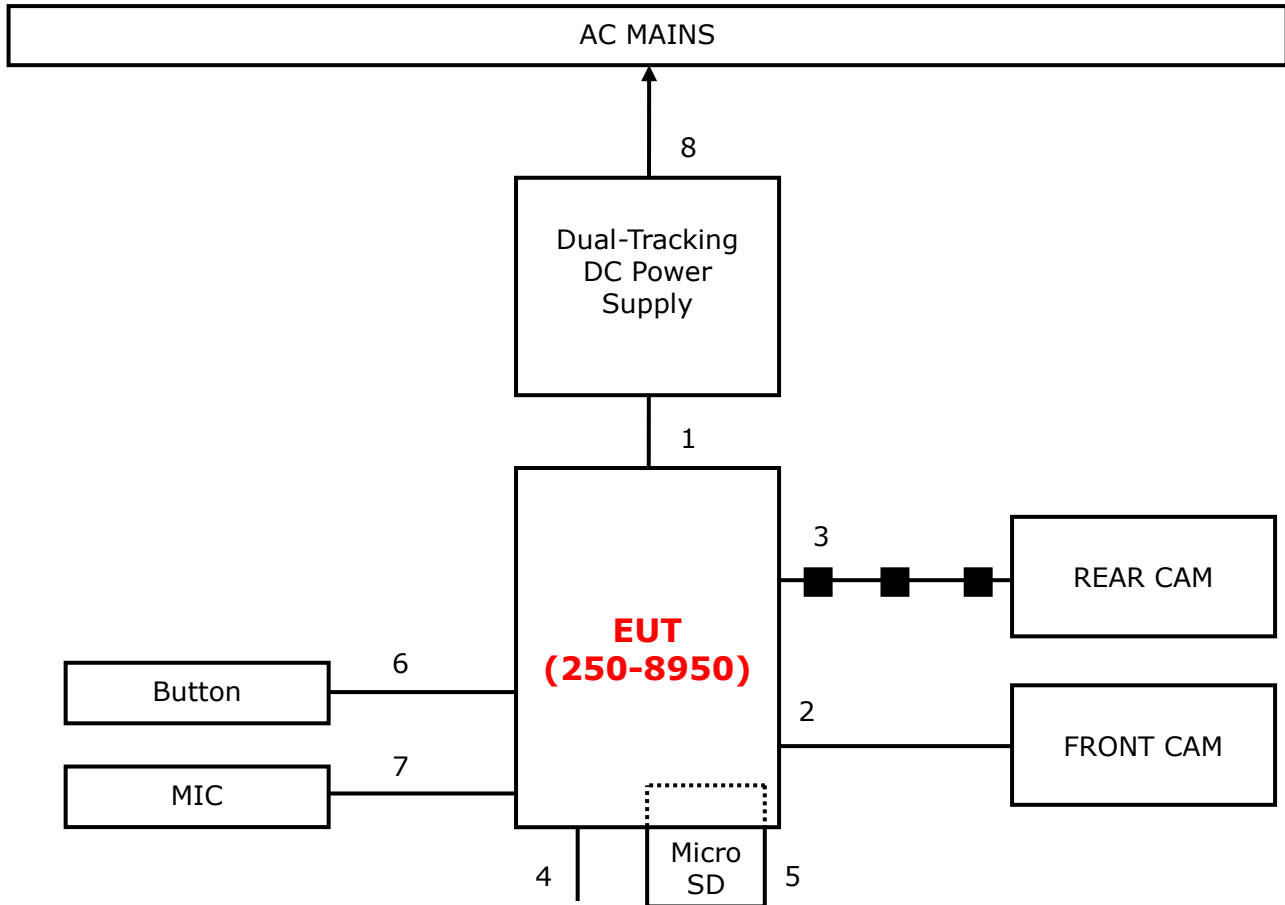
- ☐ EMC Test V 1.0
☐ Display Test Patterns – V1.5
☐ Ping.exe
☒ Not applicable

1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following condition s:

☒ Recording Mode (DC 12 V, DC 24 V)

1.6 Configuration



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1.7 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.8 Test Facility

The measurement facility is located at (Ho-dong) 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.9 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested.

Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)

Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed Semi-Anechoic Chamber or anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Semi-Anechoic Chamber.

Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

* Measurement procedures was In accordance with ANSI C63.4-2014 7.3.3, 7.3.4, 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2

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1.10 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Registration Number	Logo
USA	FCC	FCC Part 15 & 18 EMI (Electromagnetic Interference / Emission)	805871	
JAPAN	VCCI	VCCI V-3 EMI (Electromagnetic Interference / Emission)	C-10986 T-1843 R-3627 G-10387	
KOREA	MSIP	EMI (Electromagnetic Interference / Emission) EMS (Electromagnetic Susceptibility / Immunity)	KR0025	

1.11 Measurement Uncertainty

Compliance of the product is based on the measured value.

However, the measurement uncertainty is included for information purposes.

The measurement uncertainties given below are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Measurement Type	Frequency Range	Expanded Uncertainty
Conducted Emission of Mains Ports	150 kHz to 30 MHz	2.62 dB (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	30 MHz to 1 000 MHz	4.54 dB (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	1 GHz Above	4.98 dB (C.L.: Approx. 95 %, $k=2$)

2.0 EMC Test Regulations/Standards

The tests were performed according to following regulations:

Applied standard	Title	Applied	Test Result
FCC Part 15 Subpart B ☒ Class A ☐ Class B	Conducted Voltage Emissions	☐	☐ MET ☐ NOT MET
	Radiated Electric Field Emissions	☒	☒ MET ☐ NOT MET

3.0 Results of Individual Test

3.1 Conducted Voltage Emissions of Mains ports

Test Date

Not applicable

Test Location

Shielded Room

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Cal Date	Due Date	Applied
EMI Test Receiver	ESCI3	Rohde & Schwarz	100032	2017-02-02	2018-02-02	☐
LISN	ENV216	Rohde & Schwarz	101235	2017-05-09	2018-05-09	☐
LISN	ENV216	Rohde & Schwarz	101236	2017-08-02	2018-08-02	☐
EMI Test Receiver	ESR7	Rohde & Schwarz	101088	2017-05-10	2018-05-10	☐
LISN	ENV216	Rohde & Schwarz	101151	2016-11-01	2017-11-01	☐
LISN	ESH3-Z5	Rohde & Schwarz	100207	2016-11-01	2017-11-01	☐
EMI Test Receiver	ESU40	Rohde & Schwarz	100336	2017-05-12	2018-05-12	☐
LISN	ENV216	Rohde & Schwarz	101760	2017-02-03	2018-02-03	☐
LISN	NNLK 8121	SCHWARZBECK	8121-644	2017-05-09	2018-05-09	☐
Pulse Limiter	VTSD 9561-F	SCHWARZBECK	9561-F064	2017-05-08	2018-05-08	☐
LISN	ENV216	Rohde & Schwarz	101150	2017-02-03	2018-02-03	☐

Test Software

ESCI7, ESCI3 : EMC32 Ver. 8.50.0

ESR7 : EMC32 Ver. 8.53.0

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Setting

IF Band Width: 9 kHz

Climate Condition

Temperature:

Relative Humidity:

Atmospheric Pressure:

Test Result

The requirements are: ☐ MET ☐ NOT MET

Test Mode	Frequency (MHz)	Measured Data (dBμV)	Margin (dB)	Remark

The Result is calculated by using the following formula;

* Result = Limit – Margin (Result included the correction factor)

* Correction factor = Cable Loss + Insertion loss of LISN

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Test Data

Because the EUT does not have any ac power ports, this test is not applicable.

3.2 Radiated Electric Field Emissions (Below 1 GHz)

Test Date

2017-10-24

Test Location

10 m SAC (test distance : ☒ 10 m, ☐ 3 m)

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Cal Date	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100814	2016-11-01	2017-11-01	☒
Bilog Antenna	CBL6111C	Schaffner	2551	2016-05-13	2018-05-13	☒
6dB Attenuator	DNF	Rohde & Schwarz	272.4110.50-2	2016-11-01	2017-11-01	☒
Amplifier	310	Sonoma Instrument Co.	291721	2017-02-02	2018-02-02	☒

Test Software

TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Setting

IF Band Width: 120 kHz

Climate Condition

Temperature: (22 ± 1) °C

Relative Humidity: (39 ± 1) %

Atmospheric Pressure: 99 kPa

Test Result

The requirements are: ☒ MET ☐ NOT MET

Test Mode	Frequency (MHz)	Measured Data (dBμV/m)	Margin (dB)	Remark
DC 12 V	199.993	36.7	6.8	Quasi-peak
DC 24 V	199.983	33.1	10.4	Quasi-peak

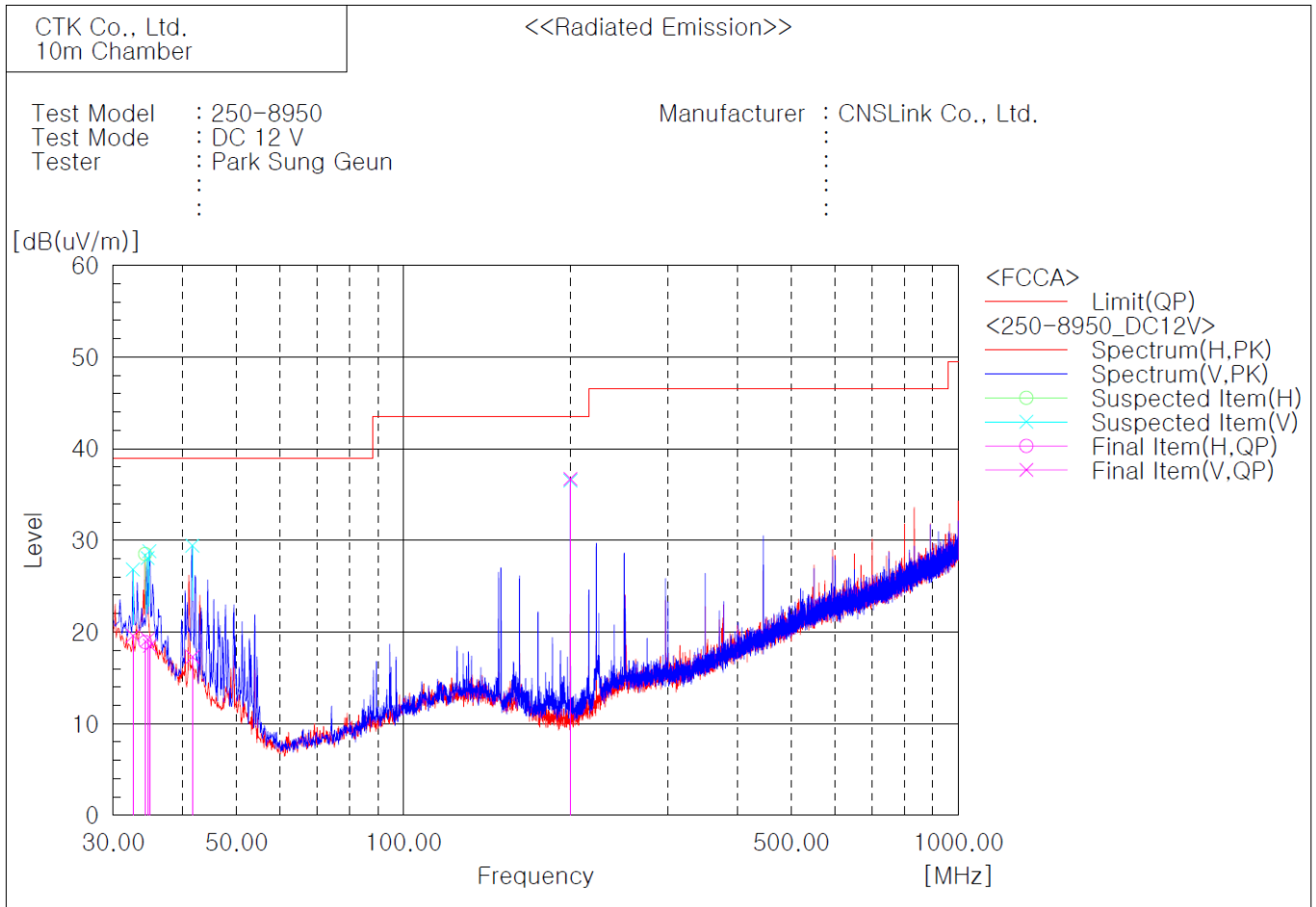
The Result is calculated by using the following formula;

* Result = Reading + Correction factor

* Correction factor = Antenna Factor + Cable Loss + 6 dB attenuator – Amp Gain

Test Data

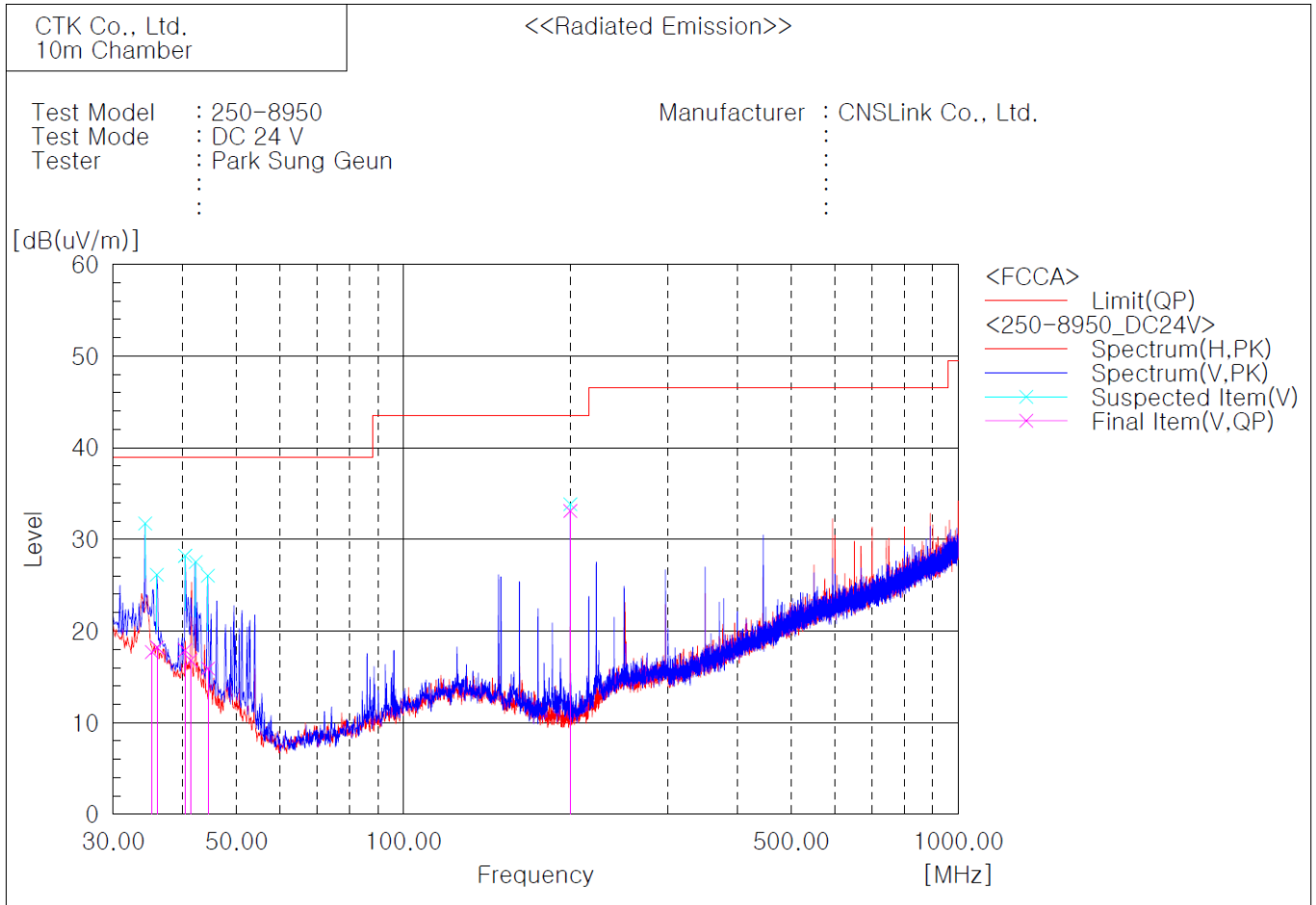
[DC 12 V]



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	32.546	V	26.6	-7.0	19.6	39.0	19.4	200.0	137.0
2	34.244	H	26.6	-7.7	18.9	39.0	20.1	300.0	59.0
3	34.608	V	27.0	-7.8	19.2	39.0	19.8	101.0	249.0
4	34.936	V	26.4	-7.9	18.5	39.0	20.5	101.0	249.0
5	41.689	V	28.6	-11.3	17.3	39.0	21.7	100.0	144.0
6	199.993	V	49.9	-13.2	36.7	43.5	6.8	101.0	197.0

[DC 24 V]



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	35.216	V	25.8	-8.1	17.7	39.0	21.3	200.0	248.0
2	36.009	V	26.6	-8.4	18.2	39.0	20.8	100.0	242.0
3	40.428	V	28.5	-10.6	17.9	39.0	21.1	200.0	275.0
4	41.351	V	27.9	-11.1	16.8	39.0	22.2	200.0	196.0
5	44.471	V	28.6	-12.7	15.9	39.0	23.1	200.0	9.0
6	199.983	V	46.3	-13.2	33.1	43.5	10.4	100.0	320.0

3.3 Radiated Electric Field Emissions (Above 1 GHz)

Test Date

Not applicable

Test Location

3 m SAC

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Cal Date	Due Date	Applied
EMI Test Receiver	ESU40	Rohde & Schwarz	100336	2018-05-12	2017-10-31	☐
Double Ridged Guide Antenna	3115	ETS-Lindgren	00078895	2017-04-25	2019-04-25	☐
Preamplifier	8449B	Agilent Technologies	3008A02011	2017-12-01	2017-12-01	☐

Test Software

TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Setting

IF Band Width: 1 MHz

Climate Condition

Temperature:

Relative Humidity:

Atmospheric Pressure:

Test Result

The requirements are: ☐ MET ☐ NOT MET

Test Mode	Frequency (MHz)	Measured Data (dBμV/m)	Margin (dB)	Remark

The Result is calculated by using the following formula;

* Result = Reading + Correction factor

* Correction factor = Antenna Factor + Cable Loss- Amp Gain

Test Data

Because the maximum clock frequency is less than 108 MHz, this test is not applicable.

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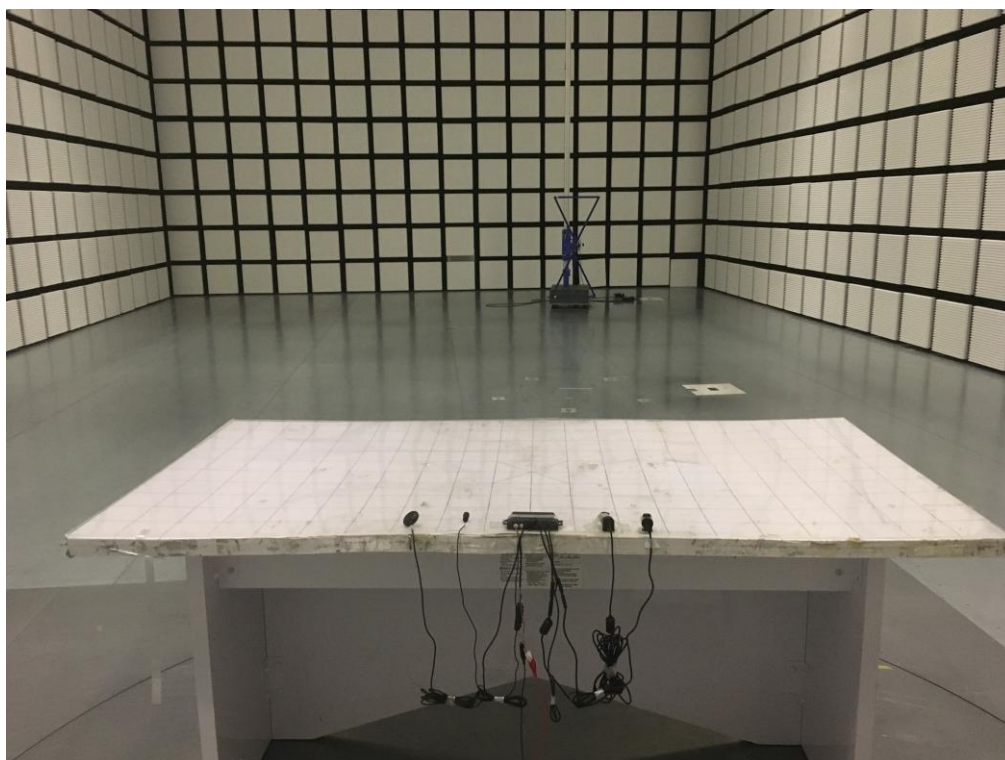
APPENDIX A - Test Setup Photos and Configuration

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Conducted Voltage Emissions of Mains Ports

Not Applicable

Radiated Electric Field Emissions (Below 1 GHz)



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Radiated Electric Field Emissions (Above 1 GHz)

Not Applicable

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APPENDIX B – EUT Photographs

EUT External Photographs







EUT Internal Photographs



PCB

