Testing Laboratory
3023

Test Report No:
2470877R-RFUSV07S-A

TEST REPORT
FCC Rules & Regulations

Product Name	Vehicle Mount Computer
Brand Name	RuggON
Main Model No.	VX-311
Series Model No.	VX-311YYZZZZ (X, Y, Z for marketing purpose X,Y,Z=10 characters Z can be 0 to 9, A to Z, a to z, “/”, “\”, “-”, “_” or blank for different marketing purpose)
FCC ID	2ABTU-VX311
Applicant´s Name / Address	RuggON Corporation 4F, No.298, Yang Guang St., NeiHu dDist., Taipei City, Taiwan, 11491
Manufacturer’s Name	RuggON Corporation
Test Method Requested, Standard	FCC CFR Title 47 Part 15 Subpart C Section 15.225 ANSI C63.10-2013
Verdict Summary	IN COMPLIANCE
Documented By April Chen	
Tested By Bill Lin	
Approved By Alan Chen	
Date of Receipt	2024/07/29
Date of Issue	2024/11/08
Report Version	V1.0

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Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

General Conditions

1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	2024/11/08

Summary of Test Result

Report Clause	Test Items	Result (PASS/FAIL)	Remark
3	AC Power Line Conducted Emission	--	-
4	Emission Bandwidth	PASS	-
6	Field Strength of Fundamental Emissions and Spectrum Mask	PASS	-
7	Radiated Emission	PASS	-
5	Frequency Stability	PASS	-

Comments and Explanations
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1. General Information

1.1. EUT Description

Frequency Range	13.553 ~ 13.567 MHz
Operation Frequency	13.56 MHz
Channel Number	1 Channel
Type of Modulation	ASK

The difference for each model is shown as below:

Model No.	Description
VX-311	It's declared by manufacture about all models are electrically identical, different model names for marketing purpose.
VX-311YYZZZZ (X, Y, Z for marketing purpose X,Y,Z=10 characters Z can be 0 to 9, A to Z, a to z, "/", "\", "-", "_" or blank for different marketing purpose)	

From the above models, model: VX-311 was selected as representative model for the test and its data was recorded in this report.

Antenna Information			
Item.	Brand Name	Model No.	Type
1	Anjie	AJNP9Q-Q0002	Coil

1.2. EUT Information

EUT Power Type	From DC 12V by battery

1.3. Testing Location Information

USA	FCC Designation Number: TW0033
Canada	CAB Identifier Number: TW3023 / Company Number: 26930

Site Description	Accredited by TAF
	Accredited Number: 3023

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
	Linkou Laboratory
Address	No.5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan, R.O.C.
Performed Location	No. 26, Huaya 1st Rd., Guishan Dist.,Taoyuan City 333411, Taiwan, R.O.C.
Phone Number	+886-3-275-7255
Fax Number	+886-3-327-8031

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual	Test Date
Radiated Emission	Temperature (°C)	10~40 °C	24.2° C	2024/10/06~2024/10/07
	Humidity (%RH)	10~90 %	62.3 %	
Conducted Emission	Temperature (°C)	10~40 °C	23.3 °C	2024/10/08
	Humidity (%RH)	10~90 %	68.8 %	

1.4. Measurement Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

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

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty
Emission Bandwidth	±1580.61 Hz
Field Strength of Fundamental Emissions and Spectrum Mask	± 3.88 dB
Radiated Emission	9 kHz~30 MHz: ±3.30 dB 30 MHz~1 GHz: ±4.79 dB 1 GHz~18 GHz: ±3.32 dB
Frequency Stability	±1580.61 Hz

1.5. List of Test Equipment

For Radiated Measurements /HY-CB02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
V	Loop Antenna	TESEQ	HLA6121	49611	2024/02/23	2025/02/22
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-0675	2023/08/09	2025/08/08
	Horn Antenna	RF SPIN	DRH18-E	210503A18ES	2024/02/29	2025/02/28
	Horn Antenna	Com-Power	AH-840	101101	2023/12/04	2025/12/03
V	Pre-Amplifier	SGH	SGH0301-9	20211007-8	2024/01/10	2025/01/09
	Pre-Amplifier	SGH	SGH118-HS	20211102-1	2024/01/10	2025/01/09
	Pre-Amplifier	EMCI	EMC05820SE	980285	2024/01/10	2025/01/09
	Pre-Amplifier	MICZEN	MZLNA1850GAC40	WB0103001	2024/01/10	2025/01/09
	Pre-Amplifier	EMCI	EMC184045SE	980369	2024/01/10	2025/01/09
	Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314	2024/01/10	2025/01/09
	Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242	2024/01/10	2025/01/09
	Filter	MICRO TRONICS	BRM50702	G249	2024/01/05	2025/01/04
	Filter	MICRO TRONICS	BRM50716	G067	2024/01/05	2025/01/04
	WIFI 6E Filter	Marvelous Microwave Inc.	MFN-5925.7125.S1	C50002N	2024/01/05	2025/01/04
	Filter	MICRO TRONICS	HPM50110	G116	2024/01/05	2025/01/04
	Filter	MICRO TRONICS	HPM50115	G069	2024/01/05	2025/01/04
V	EMI Test Receiver	R&S	ESR3	102793	2023/12/11	2024/12/10
V	Spectrum Analyzer	R&S	FSV3044	101113	2024/02/05	2025/02/04
V	Coaxial Cable	SGH	HA800	GD20110223-2	2024/01/10	2025/01/09
V	Coaxial Cable	SGH	HA800	GD20110222-4		
V	Coaxial Cable	SGH	SGH18	202108-5		
	Coaxial Cable	SGH	SGH18	202212-2	2023/11/27	2024/11/26

Note:

1. Bi-Log Antenna and Horn Antenna(AH-840) is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with “V” are used to measure the final test results.
3. Test Software Version: e3 230303 dekra V9.

2. Test Configuration of EUT

2.1. Test Condition

EUT Operational Condition			
Testing Voltage	V_{nom} (DC 12V)	V_{min} (DC 10.2V)	V_{max} (DC 13.8V)

2.2. Test Frequency Mode

Test Software Version	N/A

Modulation	Frequency (MHz)	Power Setting
ASK	13.56	N/A

2.3. Measurement Configuration

Test Mode	Mode 1	Transmit-1 Mbps
		Transmit-3 Mbps

Note:

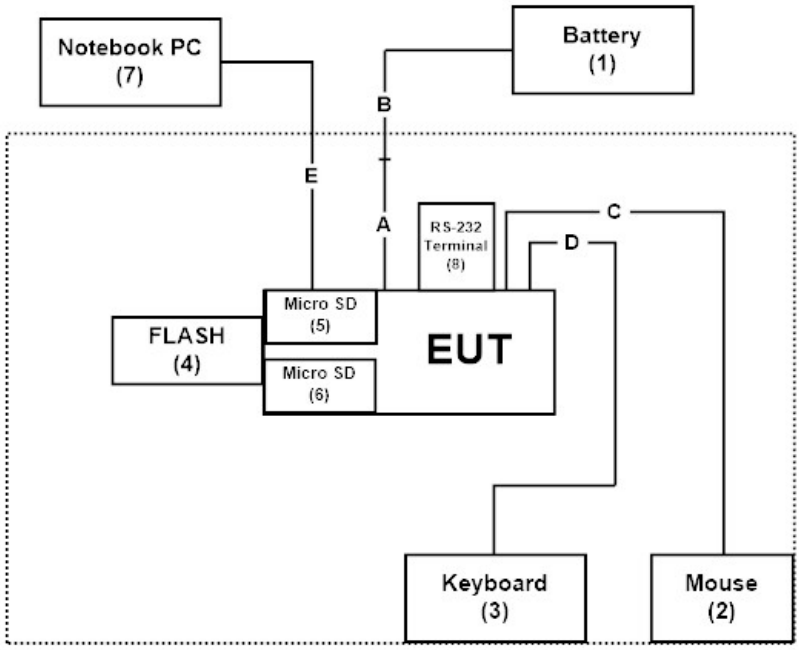
1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. For radiated emission below 1 GHz and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

2.4. Tested System Details

No.	Equipment	Brand Name	Model No.	Serial No.	Power Cord
1	Battery	BOSCH	60044	N/A	N/A
2	Mouse	Logitech	U0026	N/A	N/A
3	Keyboard	Logitech	K120	N/A	N/A
4	FLASH	Transcend	JetFlash 790C/64GB	N/A	N/A
5	Micro SD Card 4GB	SanDisk	SanDisk 4GB	N/A	N/A
6	SIM Card	R&S	CMW-Z06	N/A	N/A
7	Notebook PC	Lenovo	TP00067C	PF-0EW26J	N/A
8	RS-232 Terminal	DEKRA	RS-232 Terminal	N/A	N/A

2.5. Configuration of tested System

Connection Diagram



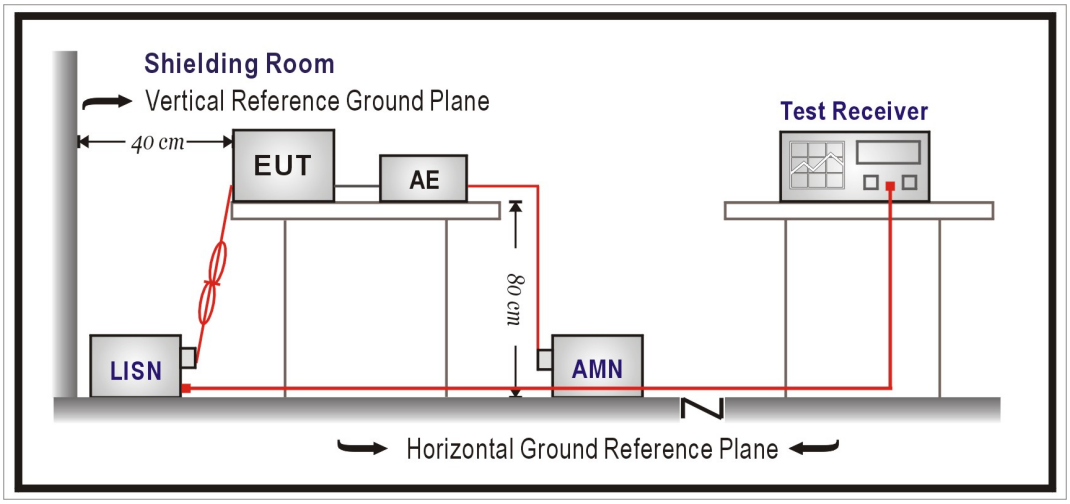
Signal Cable Type		Signal cable Description
A	Power Cable	Shielded, 2m
B	Power Cable	Non-shielded, 1.8m
C	USB Cable	Non-shielded, 1.8m
D	USB Cable	Non-shielded, 1.5m
E	LAN Cable	Non-shielded, 10m

2.6. EUT Operating Procedures

1	Setup the EUT as shown in Section 2.6.
2	Configure the test mode.
3	Verify that the EUT works properly.

3. AC Power Line Conducted Emission

3.1. Test Setup



3.2. Test Limit

Frequency (MHz)	QP (dBµV)	AV (dBµV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

3.3. Test Procedure

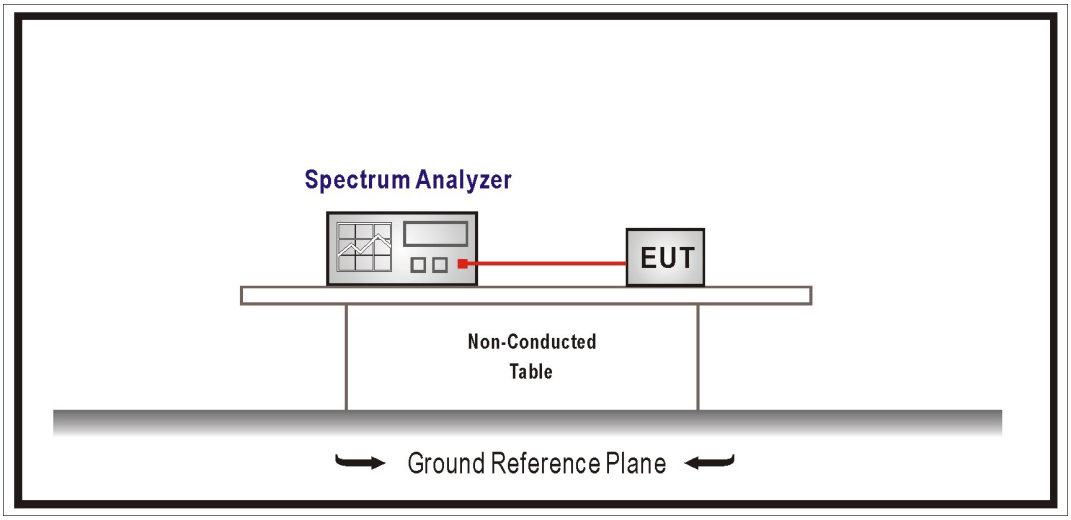
The EUT was setup according to ANSI C63.10: 2013 for AC Power Line Conducted Emissions.

3.4. Test Result of AC Power Line Conducted Emission

Refer as Appendix A

4. Emission Bandwidth

4.1. Test Setup



4.2. Test Limit

Intentional radiators must be designed to ensure that the 20dB emission bandwidth in the specific band 13.553 ~ 13.567 MHz.

4.3. Test Procedures

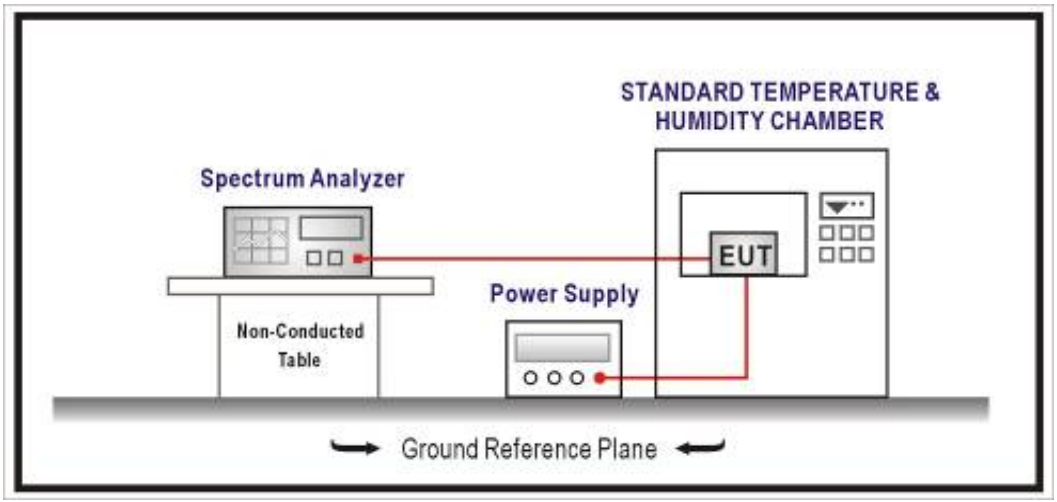
1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. Because the measured signal is CW or CW-like adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

4.4. Test Result of Emission Bandwidth

Refer as Appendix B

5. Frequency Stability

5.1. Test Setup



5.2. Test Limit

Carrier frequency stability shall be maintained to ±0.01% (±100 ppm).

5.3. Test Procedures

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

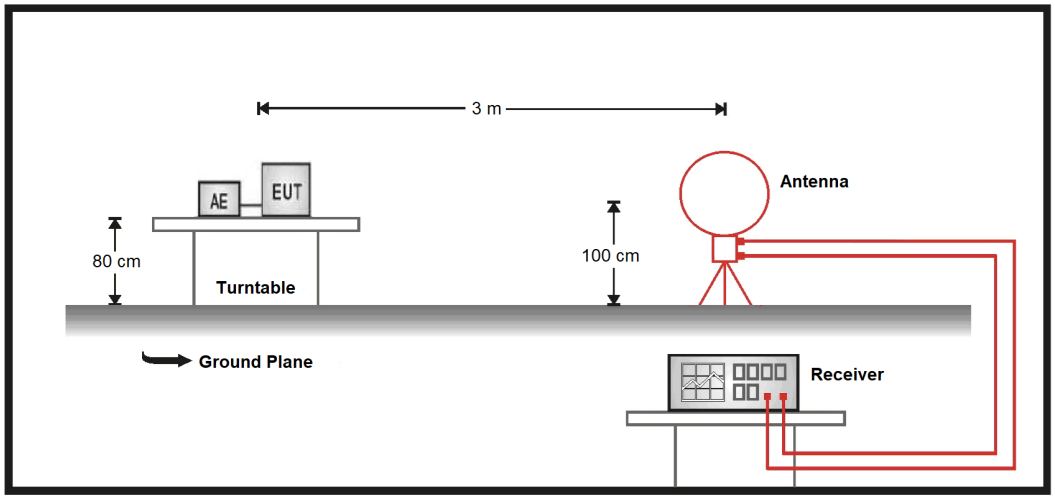
For battery operated equipment, the equipment tests shall be performed using a new battery.

5.4. Test Result of Frequency Stability

Refer as Appendix C

6. Field Strength of Fundamental Emissions and Spectrum Mask

6.1. Test Setup



6.2. Test Limit

Field Strength of Fundamental Emissions			
Frequencies (MHz)	Field Strength (microvolts/meter) at 30m	Field Strength (dBµV/m) at 10m	Field Strength (dBµV/m) at 3m
13.553 – 13.567 MHz	15848	103.08 (QP)	124 (QP)
Quasi peak measurement of the fundamental.			

Spectrum Mask					
Description	Compliance with the spectrum mask is tested using a spectrum analyzer with RBW set to a 9kHz for the band 13.553 – 13.567 MHz.				
Limit	Freq. of Emission (MHz)	Field Strength			
		(µV/m)@30m	(dBµV/m)@30m	(dBµV/m)@10m	(dBµV/m)@3m
	1.705~13.110	30	29.5	48.6	69.5
	13.110~13.410	106	40.5	59.6	80.5
	13.410~13.553	334	50.5	69.6	90.5
	13.553~13.567	15848	84.0	103.1	124.0
	13.567~13.710	334	50.5	69.6	90.5
	13.710~14.010	106	40.5	59.6	80.5
	14.010~30.000	30	29.5	48.6	69.5

6.3. Test Procedure

1. Configure the EUT according to ANSI C63.10: 2013. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure QP reading.
5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
6. Compliance with the spectrum mask is tested using a spectrum analyzer with RBW set to a 9 kHz for the band 13.553 – 13.567 MHz.

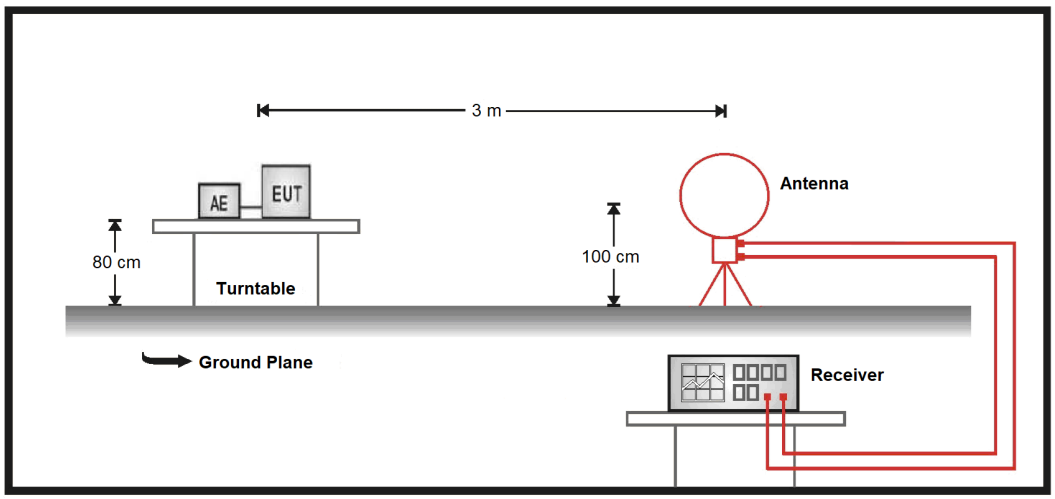
6.4. Test Result of Field Strength of Fundamental Emissions and Spectrum Mask

Refer as Appendix D

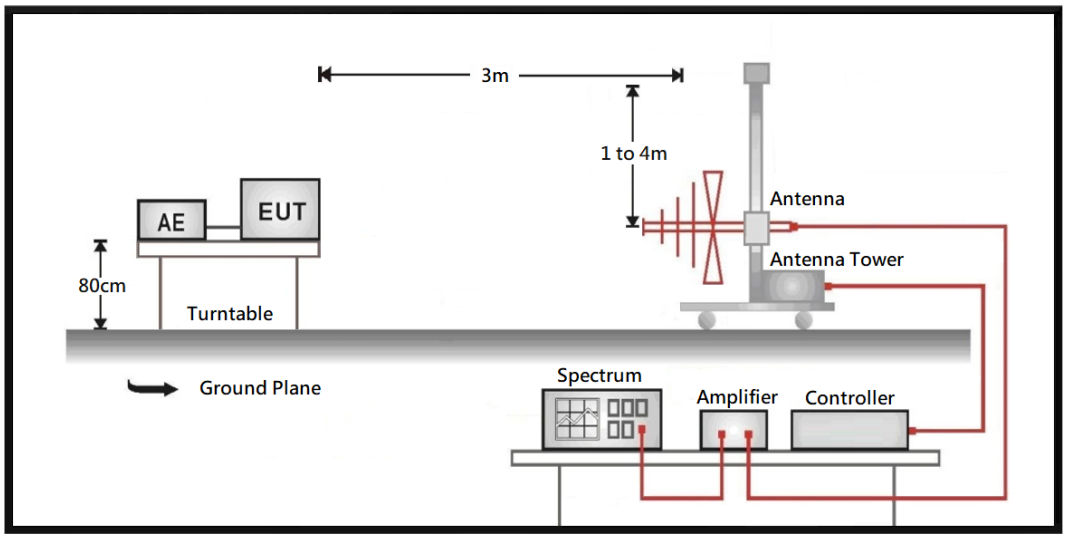
7. Radiated Emission

7.1. Test Setup

9 kHz ~ 30 MHz



30 MHz ~ 1 GHz



7.2. Test Limit

The field strength of any emissions which appear outside of 13.553 ~ 13.567MHz band shall not exceed the general radiated emissions limits.

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	20 log (2400/F(kHz))	300
0.490 – 1.705	24000/F(kHz)	20 log (24000/F(kHz))	30
1.705 - 30	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

Remarks:

1. Field strength (dBμV/m) = 20 log Field strength (μV/m)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

7.3. Test Procedure

1. Configure the EUT according to ANSI C63.10: 2013. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
7. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

7.4. Test Result of Radiated Emission

Refer as Appendix E