




Test Report No:
2460131R-RFUSV01S-A

Test Result for Inspection (Class II Permissive Change)

Product Name	UHF RFID RAIN MODULE
Brand Name	TSC
Model No.	M7E-MEGA
FCC ID	VTV-M7EMEGA
Applicant's Name / Address	TSC Auto ID Technology Co., Ltd. No. 35, Sec. 2, Ligong 1st Rd., Wujie Town, I Lan Hsien 268, Taiwan
Manufacturer's Name	JADAK, a business unit of Novanta Corporation
Test Method Requested, Standard	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10-2013
Verdict Summary	IN COMPLIANCE
Documented by Genie Chang	
Tested by Ivan Chuang	
Approved by Alan Chen	
Date of Receipt	2024/06/05
Date of Issue	2024/06/28
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.

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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	2024/06/28

Permissive Change

Report No.	Version	Description	Issued Date
BLYK08-U13	Rev A	Original application.	2023/12/18
2460131R-RFUSV01S-A	V1.0	This is to request a Class II permissive change. The major change filed under this application is: Change #1: Three new antennas have been added; the antenna types are different, and the antenna gains are lower than those in the original application.	2024/06/28

Summary of Test Result

Report Clause	Test Items	Result (PASS/FAIL)	Remark
3	AC Power Line Conducted Emission	PASS	-
4	Maximum Conducted Output Power	PASS	-
5	Radiated Emission	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	902 ~ 928 MHz
Operation Frequency	902.75 MHz ~ 927.25 MHz
Channel Number	50 Channels
Type of Modulation	PR-ASK (FHSS)

Antenna Information				
Item.	Brand Name	Model No.	Type	Antenna Gain (dBi)
1	TSC	RFID PCB antenna 1 (ANT0)	PCB	1.68
		RFID PCB antenna 1 (ANT1)		
2	TSC	RFID PCB antenna 2 (ANT0)	PCB	-5.48
		RFID PCB antenna 2 (ANT1)		
3	TSC	RFID PCB antenna 3 (ANT0)	PCB	0.2
		RFID PCB antenna 3 (ANT1)		

Note:

1. The above EUT information is declared by the manufacturer.
2. The antenna of EUT conforms to FCC 15.203.

For PR-ASK (FHSS) Mode: (1TX, 1RX)

Both ANT0 and ANT1 can be used as transmitting/receiving antennas (diversity).

Working Frequency of Each Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
902750	902.75	909250	909.25	915750	915.75	922250	922.25
903250	903.25	909750	909.75	916250	916.25	922750	922.75
903750	903.75	910250	910.25	916750	916.75	923250	923.25
904250	904.25	910750	910.75	917250	917.25	923750	923.75
904750	904.75	911250	911.25	917750	917.75	924250	924.25
905250	905.25	911750	911.75	918250	918.25	924750	924.75
905750	905.75	912250	912.25	918750	918.75	925250	925.25
906250	906.25	912750	912.75	919250	919.25	925750	925.75
906750	906.75	913250	913.25	919750	919.75	926250	926.25
907250	907.25	913750	913.75	920250	920.25	926750	926.75
907750	907.75	914250	914.25	920750	920.75	927250	927.25
908250	908.25	914750	914.75	921250	921.25	--	--
908750	908.75	915250	915.25	921750	921.75	--	--

1.2. EUT Information

EUT Power Type	From Test Fixture
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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
AC Power Line Conducted Emission	Temperature (°C)	10~40 °C	22.6 °C	2024/06/20
	Humidity (%RH)	10~90 %	58.2 %	
Radiated Emission	Temperature (°C)	10~40 °C	24.8 °C	2024/06/18~2024/06/19
	Humidity (%RH)	10~90 %	64.0 %	
RF Conducted Emission	Temperature (°C)	10~40 °C	25.2 °C	2024/06/18
	Humidity (%RH)	10~90 %	54.6 %	

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
AC Power Line Conducted Emission	± 3.50 dB
Maximum Conducted Output Power	Spectrum Analyzer: ± 2.13 dB Power Meter: ± 1.07 dB
Radiated Emission	9 kHz~30 MHz: ± 3.30 dB 30 MHz~1 GHz: ± 4.79 dB 1 GHz~18 GHz: ± 4.17 dB 18 GHz~40 GHz: ± 3.32 dB
Duty Cycle	± 0.51 %

1.5. List of Test Equipment

For Conduction Measurements / HY-SR01

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	EMI Test Receiver	R&S	ESR7	102254	2023/12/07	2024/12/06
V	Two-Line V-Network	R&S	ENV216	101306	2024/04/01	2025/03/31
V	Two-Line V-Network	R&S	ENV216	101307	2023/08/17	2024/08/16
V	Coaxial Cable	SUHNER	RG400_BNC	RF001	2024/01/10	2025/01/09

Note:

1. All 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.

For Conducted Measurements / HY-SR02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Spectrum Analyzer	R&S	FSV30	103466	2024/01/05	2025/01/04
V	Spectrum Analyzer	KEYSIGHT	N9010A	MY53470892	2023/11/09	2024/11/08
V	Peak Power Analyzer	KEYSIGHT	8990B	MY51000539	2024/05/07	2025/05/06
V	Wideband Power Sensor	KEYSIGHT	N1923A	MY59240002	2024/05/08	2025/05/07
V	Wideband Power Sensor	KEYSIGHT	N1923A	MY59240003	2024/05/08	2025/05/07

Note:

1. All 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: RF Conducted Test Tools R3 V3.0.1.14.

For Radiated Measurements /HY-CB03

	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	Com-Power	AH-840	101101	2023/12/04	2025/12/03
V	Horn Antenna	RF SPIN	DRH18-E	210507A18ES	2024/05/15	2025/05/14
V	Pre-Amplifier	SGH	SGH0301-9	20211007-11	2024/01/10	2025/01/09
V	Pre-Amplifier	SGH	PRAMP118	20200701	2024/01/10	2025/01/09
	Pre-Amplifier	EMCI	EMC05820SE	980310	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
V	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	101114	2024/02/21	2025/02/20
V	Coaxial Cable	SGH	SGH18	2021005-1	2024/01/10	2025/01/09
V	Coaxial Cable	SGH	SGH18	202108-4	2024/01/10	2025/01/09
V	Coaxial Cable	SGH	HA800	GD20110223-1	2024/01/10	2025/01/09
V	Coaxial Cable	SGH	HA800	GD20110222-3	2024/01/10	2025/01/09

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	DC 5V by Test Fixture

2.2. Test Frequency Mode

Test Software Version	Universal Reader Assistant / Version 6.1
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ANT0

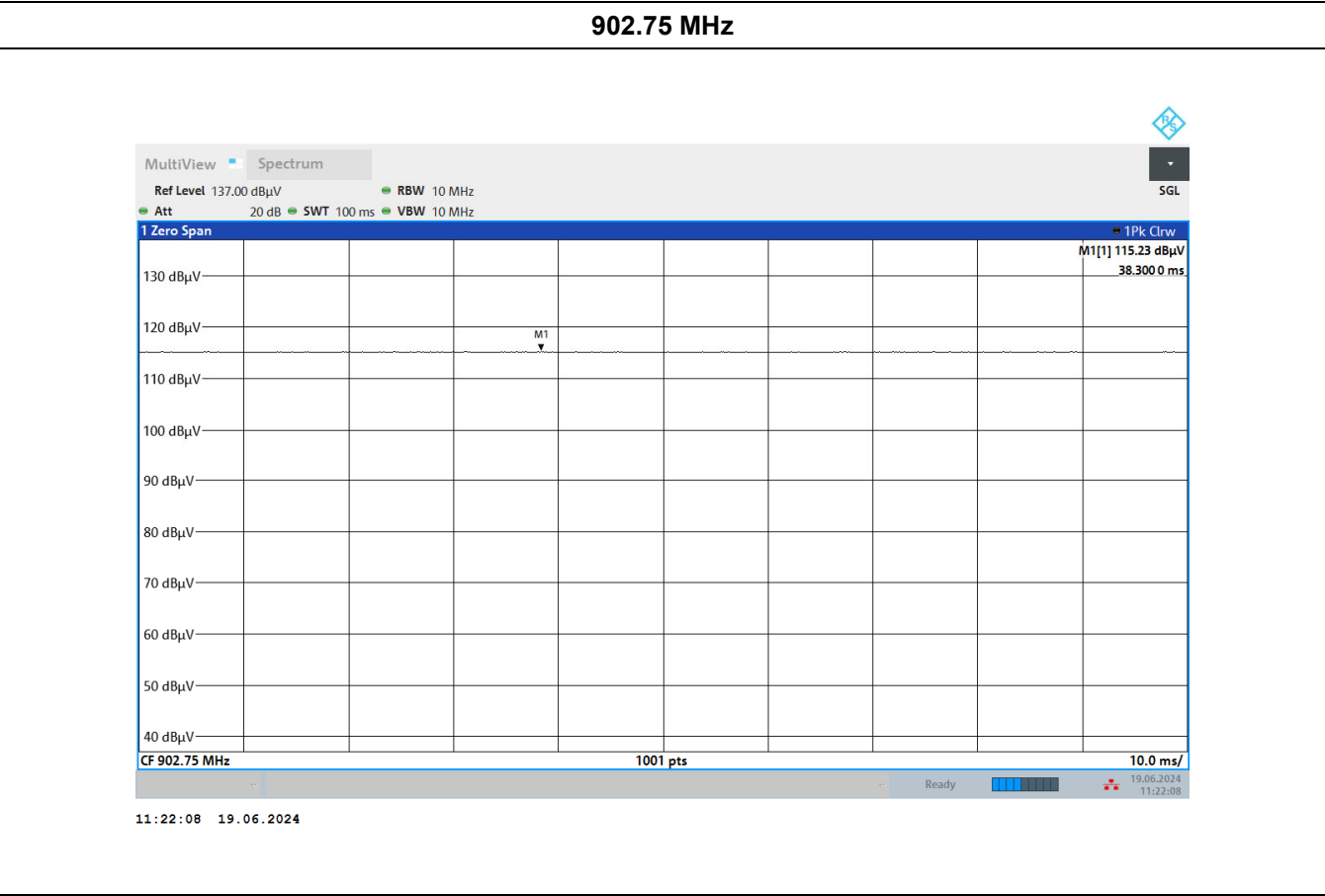
Modulation	Frequency (MHz)	Power Setting
PR-ASK	902.75	N/A
	914.75	N/A
	927.25	N/A

ANT1

Modulation	Frequency (MHz)	Power Setting
PR-ASK	902.75	N/A
	914.75	N/A
	927.25	N/A

2.3. Duty Cycle

Modulation	On Times (ms)	On+Off Times (ms)	Duty Cycle (%)	Duty Factor (dB)	VBW (Hz)
PR-ASK	--	--	100%	0	10



2.4. Measurement Configuration

Test Mode	Mode 1	Transmit
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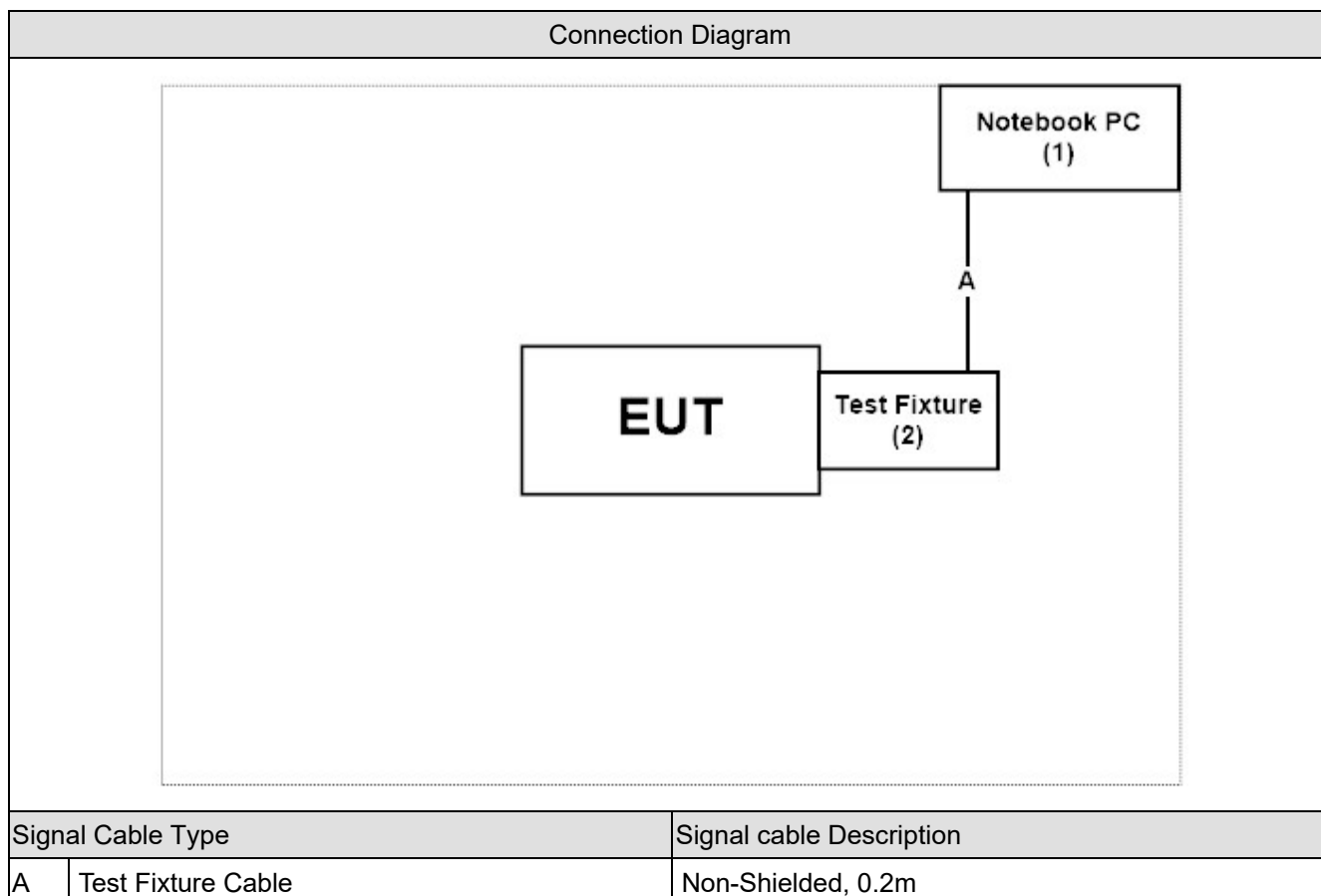
Note:

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 spectrum plot against conducted item only shows the worst case.

2.5. Tested System Details

No.	Equipment	Brand Name	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	Latitude 5501	4H94P13	N/A
2	Test Fixture	TSC	CP2102	N/A	N/A

2.6. Configuration of Tested System

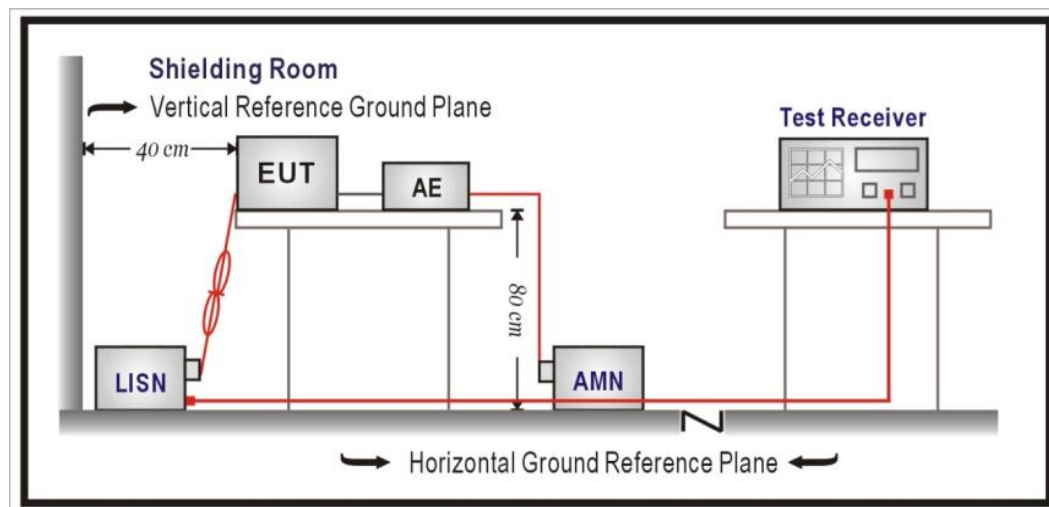


2.7. EUT Operating Procedures

1	Setup the EUT as shown in Section 2.6.
2	Execute software “Universal Reader Assistant / Version 6.1” on the Notebook PC.
3	Configure the test mode and the test channel.
4	Verify that the EUT works properly.

3. AC Power Line Conducted Emission

3.1. Test Setup



3.2. Test Limit

Frequency (MHz)	QP (dBuV)	AV (dBuV)
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

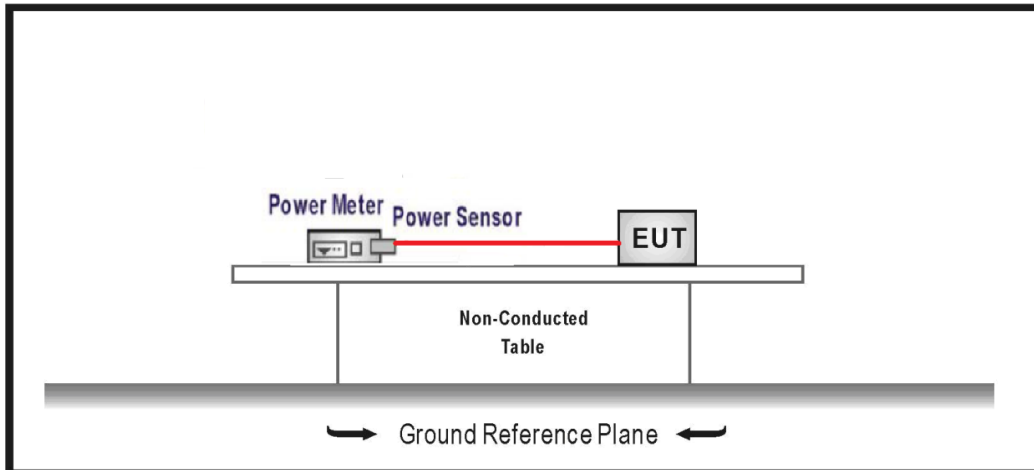
The EUT was setup according to ANSI C63.10: 2013 for AC Power Line Conducted Emissions.

3.4. Test Result of AC Power Line Conducted Emission

Refer as Appendix A

4. Maximum Conducted Output Power

4.1. Test Setup



4.2. Test Limit

For frequency hopping systems operating in the 902 ~ 928 MHz band:

1. Number of Hopping Frequencies ≥ 50 : 1 watt (30dBm)
2. $50 >$ Number of Hopping Frequencies ≥ 25 : 0.25 watt (23.98dBm)

For frequency hopping systems operating in the 2400 ~ 2483.5 MHz band:

1. Number of Hopping Frequencies ≥ 75 : 1 watt (30dBm)
2. $75 >$ Number of Hopping Frequencies ≥ 15 : 0.125 watts (20.97dBm)

For frequency hopping systems operating in the 5725 ~ 5850 MHz band:

Number of Hopping Frequencies ≥ 75 : 1 watt (30dBm)

4.3. Test Procedures

The EUT was setup according to ANSI C63.10: 2013 and tested according to FHSS test procedure of KDB 558074.

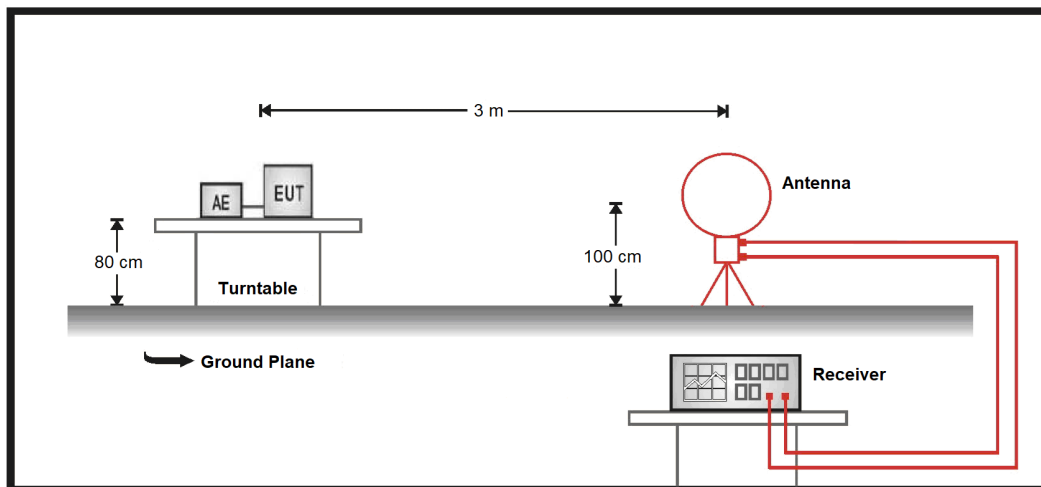
4.4. Test Result of Maximum Conducted Output Power

Refer as Appendix B

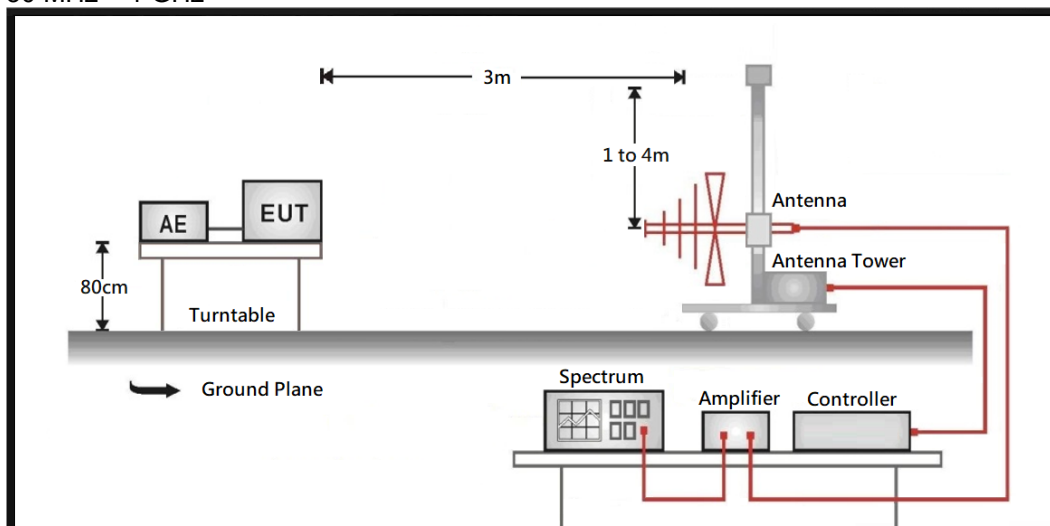
5. Radiated Emission

5.1. Test Setup

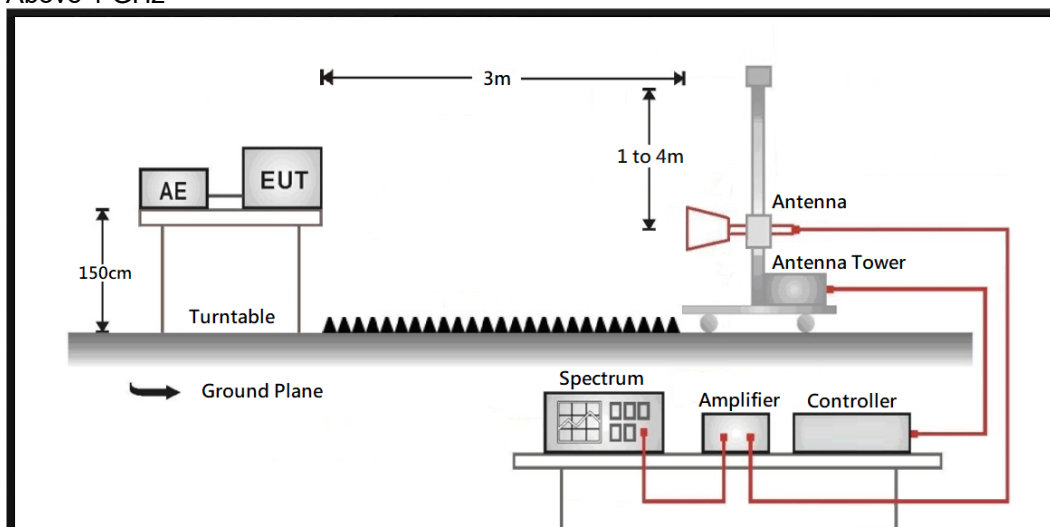
9 kHz ~ 30 MHz



30 MHz ~ 1 GHz



Above 1 GHz



5.2. Test Limit

Frequency (MHz)	Field strength (uV/m)	Field strength (dBuV/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 (dBuV/m) = 20 log Field strength (uV/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.

5.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to FHSS test procedure of KDB 558074.

The EUT and its simulators are placed on a turn table which is 0.8 or 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

On any frequency or frequencies from 9 kHz (include The the lowest oscillator frequency generated within the device up to the 10th harmonic) to 1000 MHz, the limit shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limit shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

The bandwidth below 1 GHz setting on the field strength meter is 120 kHz and above 1 GHz is 1 MHz.

5.4. Test Result of Radiated Emission

Refer as Appendix C