

Test Report No:
2320217R-RFUSV01S-A

TEST REPORT

FCC Rules&Regulations

Product Name	35b Security Router, Gigabit Broadband Router
Brand Name	DrayTek
Model No.	Vigor2767Vax (Serial models please refer to section 1.1)
FCC ID	VGY2767AX
Applicant's Name / Address	Draytek Corporaiton No. 26, Fu Shing Road, Hukou County, Hsin-Chu Industrial Park, Hsinchu, Taiwan
Manufacturer's Name	Draytek Corporaiton
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 Bill Lin	
Approved by Alan Chen	
Date of Receipt	2023/02/07
Date of Issue	2024/05/03
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.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

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	2024/05/03

Summary of Test Result

Report Clause	Test Items	Result (PASS/FAIL)	Remark
3	AC Power Line Conducted Emission	PASS	-
4	6 dB Bandwidth	PASS	-
5	Maximum Conducted Output Power	PASS	-
6	Maximum Power Spectral Density	PASS	-
7	Antenna Port Conducted Emission	PASS	-
8	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	2400 ~ 2483.5 MHz	
Operating Frequency / Channel Number	IEEE 802.11b/g/n/ac/ax (20 MHz)	2412 ~ 2462 MHz / 11 Channels
	IEEE 802.11n/ac/ax (40 MHz)	2422 ~ 2452 MHz / 7 Channels
Type of Modulation	IEEE 802.11b	DSSS-DBPSK, DQPSK, CCK
	IEEE 802.11g/n	OFDM-BPSK, QPSK, 16QAM, 64QAM
	IEEE 802.11ac	OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM
	IEEE 802.11ax	OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM

Accessories Information					
No.	Equipment Name	Brand Name	Model No.	Rating	Remark
1	Power Adapter	CWT	2ABL030F US	Input: AC 100-240V~1A, 50-60Hz Output: 12V $\overline{\text{---}}$ 2.5A	Cable out: Non-Shielded, 1.5m
2	Power Adapter	CWT	2ABL024F US	Input: AC 100-240V~0.8A, 50-60Hz Output: 12V $\overline{\text{---}}$ 2A	Cable out: Non-Shielded, 1.5m
3	Power Adapter	CWT	2ABN036F US	Input: AC 100-240V~1A, 50-60Hz Output: 12V $\overline{\text{---}}$ 3A	Cable out: Non-Shielded, 1.5m
4	Power Adapter	MOSO	MSS-V2500WR 120-030E0-US	Input: AC 100-240V~1A, 50-60Hz Output: 12V $\overline{\text{---}}$ 2.5A	Cable out: Non-Shielded, 1.5m
5	Power Adapter	MOSO	MS-V2000R120 -024Q0-US	Input: AC 100-240V~0.7A, 50-60Hz Output: 12V $\overline{\text{---}}$ 2A	Cable out: Non-Shielded, 1.5m
6	Power Adapter	MOSO	V30-V3000R12 0-036T0-US	Input: AC 100-240V~1A, 50-60Hz Output: 12V $\overline{\text{---}}$ 3A, 36W	Cable out: Non-Shielded, 1.5m
No.	Equipment Name	Description			
7	RJ11 Cable	Non-Shielded, 1.8m. (The cable is only available for models with DSL functionality.)			
8	RJ45 Cable	Non-Shielded, 3m			

The difference for each model is shown as below:

Item	Model name	Product name	PCB#	DSL	Eth-RJ45	SFP	2.5G	wlan 5GHz	wlan 2.4GHz	FXS	USB port
1	Vigor 2767Vax	35b Security Router	V0x	V(vdsl2/35b)			V	V	V	2	2
2	Vigor 2767ax		V0x	V(vdsl2/35b)			V	V	V		2
3	Vigor 2136FVax	Gigabit Broadband Router	V2x			V	V	V	V	2	2
4	Vigor 2136Vax		V2x		V		V	V	V	2	2
5	Vigor 2136Fax		V2x			V	V	V	V		2
6	Vigor 2136ax		V2x		V		V	V	V		2

From the above models, model: Vigor2767Vax was selected as representative model for the test and its data was recorded in this report.

Antenna Information					
Item.	Brand Name	Model No.	Type	Antenna Gain	Directional Gain
1	Angeei	DPD2430SRW(Main)	Dipole	2.3 dBi for 2400 MHz	5.31 dBi
		DPD2430SRW(Aux)			

Note:

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

For IEEE 802.11b/g/n/ac/ax Mode: (2TX, 2RX)

Both Ant. 0 and Ant. 1 can be used as transmitting/receiving antennas.

1.2. EUT Information

EUT Power Type	From Adapter			
EUT Function	☒	Point-to-multipoint	☐	Point-to-point
Beamforming Function	☒	With beamforming	☐	Without beamforming
Resource Unit of 802.11ax	☒	Full RU	☐	Partial RU

1.3. Testing Location Information

USA	FCC Registration 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	25.2 °C	2024/04/01
	Humidity (%RH)	10~90 %	66.0 %	
Radiated Emission	Temperature (°C)	10~40 °C	22.5 °C	2024/02/22~2024/03/25
	Humidity (%RH)	10~90 %	60.5 %	
RF Conducted Emission	Temperature (°C)	10~40 °C	23.1 °C	2024/02/21~2024/03/29
	Humidity (%RH)	10~90 %	63.1 %	

1.4. Measurement Uncertainty

Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Test Item	Uncertainty
AC Power Line Conducted Emission	± 3.50 dB
6 dB Bandwidth	± 1580.61 Hz
Maximum Conducted Output Power	Spectrum Analyzer: ± 2.14 dB Power Meter: ± 1.05 dB
Maximum Power Spectral Density	± 2.14 dB
Antenna Port Conducted Emission	± 2.14 dB
Radiated Emission	9 kHz~30 MHz: ± 3.88 dB 30 MHz~1 GHz: ± 4.42 dB 1 GHz~18 GHz: ± 4.28 dB 18 GHz~40 GHz: ± 3.90 dB
Duty Cycle	± 0.53 %

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	101601	2023/06/20	2024/06/19
V	Two-Line V-Network	R&S	ENV216	101478	2023/09/13	2024/09/12
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	103465	2023/06/14	2024/06/13
V	Spectrum Analyzer	KEYSIGHT	N9010A	MY53470892	2023/11/09	2024/11/08
V	Peak Power Analyzer	KEYSIGHT	8990B	MY51000539	2023/05/15	2024/05/14
V	Wideband Power Sensor	KEYSIGHT	N1923A	MY59240002	2023/05/18	2024/05/17
V	Wideband Power Sensor	KEYSIGHT	N1923A	MY59240003	2023/05/18	2024/05/17

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 V3.0.0.14.

For Radiated Measurements /HY-CB01

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Loop Antenna	AMETEK	HLA6121	56736	2023/05/23	2024/05/22
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-0675	2023/08/09	2025/08/08
V	Horn Antenna	RF SPIN	DRH18-E	210508A18ES	2023/05/26	2024/05/25
V	Horn Antenna	Com-Power	AH-840	101100	2023/10/02	2025/10/01
V	Pre-Amplifier	SGH	0301	20211007-7	2024/01/10	2025/01/09
V	Pre-Amplifier	EMCI	EMC051845SE	980632	2024/01/10	2025/01/09
V	Pre-Amplifier	EMCI	EMC05820SE	980362	2024/01/10	2025/01/09
V	Pre-Amplifier	EMCI	EMC184045SE	980369	2024/01/10	2025/01/09
V	Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314	2024/01/10	2025/01/09
V	Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242	2024/01/10	2025/01/09
V	Filter	MICRO TRONICS	BRM50702	G251	2024/01/05	2025/01/04
	Filter	MICRO TRONICS	BRM50716	067	2024/01/05	2025/01/04
V	EMI Test Receiver	R&S	ESR3	102792	2024/01/05	2025/01/04
V	Spectrum Analyzer	R&S	FSV3044	101115	2024/01/11	2025/01/10
V	Coaxial Cable	SUHNER	SUCOFLEX 106	25450/6	2024/01/10	2025/01/09
V	Coaxial Cable	SGH	SGH18	2021003-8	2024/01/10	2025/01/09
V	Coaxial Cable	SGH	HA800	GD20110222-8	2024/01/10	2025/01/09
V	Coaxial Cable	EMCI	EMC106	151113	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	AC 120V / 60Hz

2.2. Test Frequency Mode

Test Software Version	QATool Version 0.0.2.73
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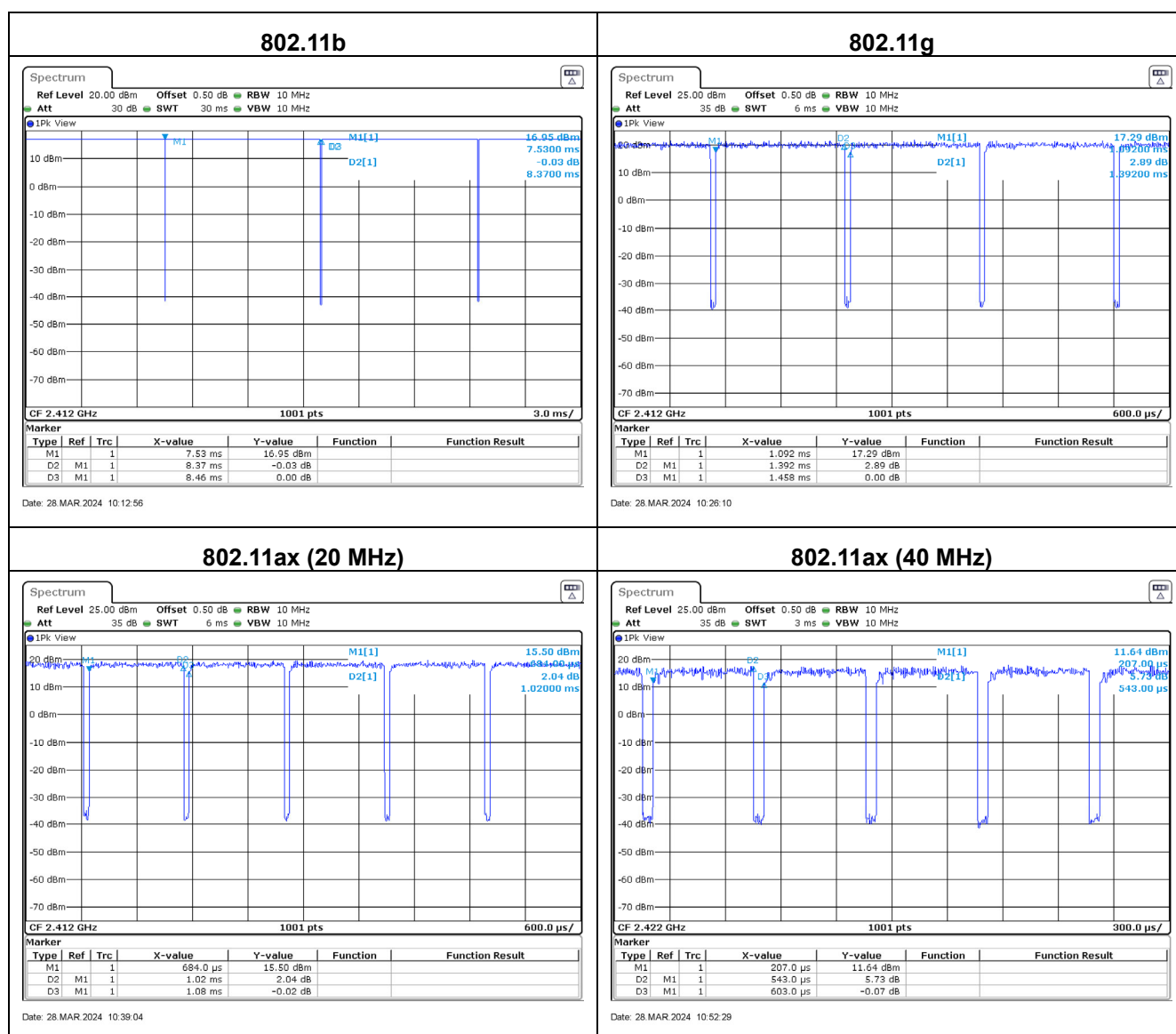
Modulation	Frequency (MHz)	Power Setting
802.11b	2412	12.5(19)
	2437	12(18)
	2462	11(16)
802.11g	2412	16(20)
	2437	19(26)
	2462	16(20)
802.11ax (20 MHz)	2412	15.5(1F)
	2437	19(26)
	2462	15.5(1F)
802.11ax (40 MHz)	2422	14.5(1D)
	2437	16(20)
	2452	12.5(19)

2.3. Duty Cycle

According to C63.10 Section 11.12.2.5 Average measurement procedure.

VBW = 10Hz, when duty cycle $\geq 98\%$, VBW $\geq 1/T$, when duty cycle $< 98\%$

Modulation	On Times (ms)	On+Off Times (ms)	Duty Cycle (%)	Duty Factor (dB)	VBW (Hz)
802.11b	8.3700	8.4600	98.94	0.046	10
802.11g	1.3920	1.4580	95.47	0.201	1000
802.11ax (20 MHz)	1.0200	1.0800	94.44	0.248	1000
802.11ax (40 MHz)	0.5430	0.6030	90.05	0.455	2000



2.4. Worst Case Measurement Configuration

Test Mode	Mode 1 (Transmit)	802.11b
		802.11g
		802.11ax (20 MHz)
		802.11ax (40 MHz)
		802.11ax (20 MHz)-Beamforming
		802.11ax (40 MHz)-Beamforming

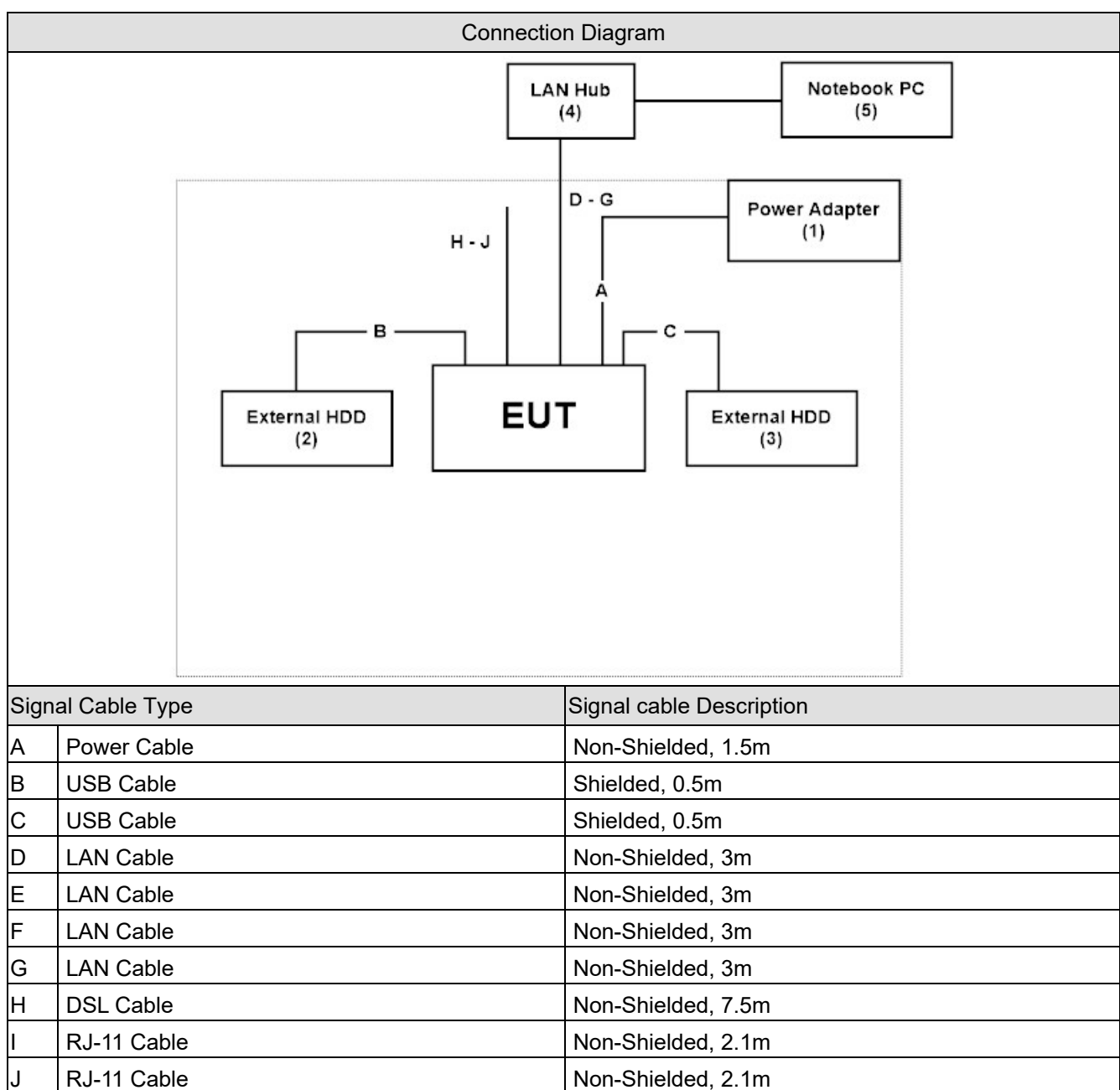
Note:

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.
4. Lowest data rates are tested in each mode. Only worst case is shown in the report.
(802.11b is 1Mbps, 802.11g is 6Mbps, 802.11ax is MCS0)
5. The spectrum plot against conducted item only shows the worst case.
6. The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz, 802.11ac mode for 20MHz/40MHz and 802.11ax mode for 20MHz/40MHz. Therefore, the worst case was investigated to representative the mode(802.11ax) in the test report.
7. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
8. The CDD mode and Beamforming mode are presented in the power output test item. For other test items, CDD mode is the worst case for the final test and shown in this report.
9. This device does not support channel puncturing and partial RU function.

2.5. Tested System Details

No.	Equipment	Brand Name	Model No.	Serial No.	Power Cord
1	Power Adapter	MOSO	MS-V2000R120-024Q0-US	N/A	N/A
2	External HDD	Transcend	TS1TSJ25H3B	F21786-0125	N/A
3	External HDD	Transcend	TS1TSJ25H3B	F21786-0005	N/A
4	LAN Hub	TP-LINK	TL-SG108	2161597000471	Non-Shielded, 1.5m
5	Notebook PC	DELL	P62G	CY9FJC2	N/A

2.6. Configuration of Tested System

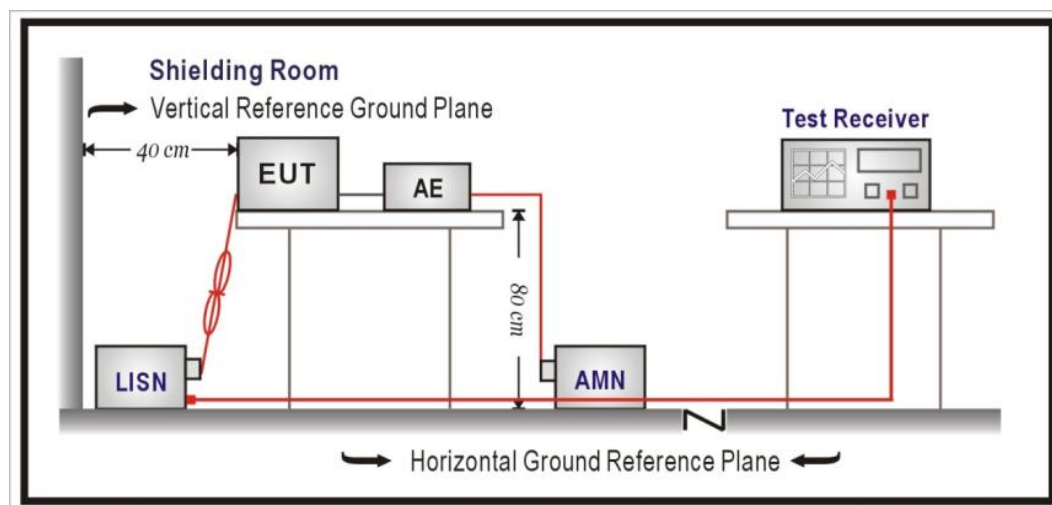


2.7. EUT Operating Procedures

1	Setup the EUT as shown in Section 2.6.
2	Execute software "QATool Version 0.0.2.73" on the Notebook PC.
3	Configure the test mode, the test channel, and the data rate.
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

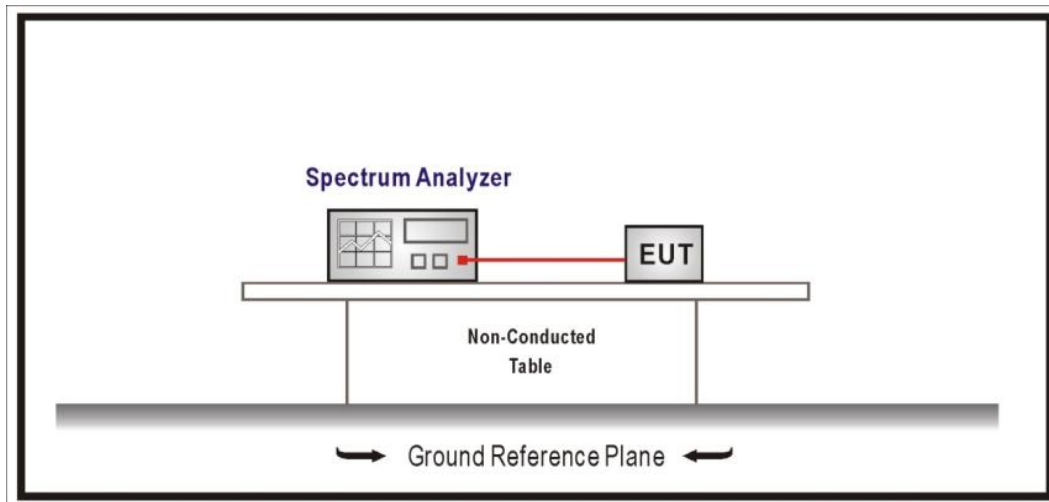
The EUT was setup according to ANSI C63.10: 2013 for AC Power Line Conducted Emissions.

3.4. Test Result of AC Power Line Conducted Emission

Refer as Appendix A

4. 6 dB Bandwidth

4.1. Test Setup



4.2. Test Limit

The 6 dB bandwidth: ≥ 500 kHz.

4.3. Test Procedures

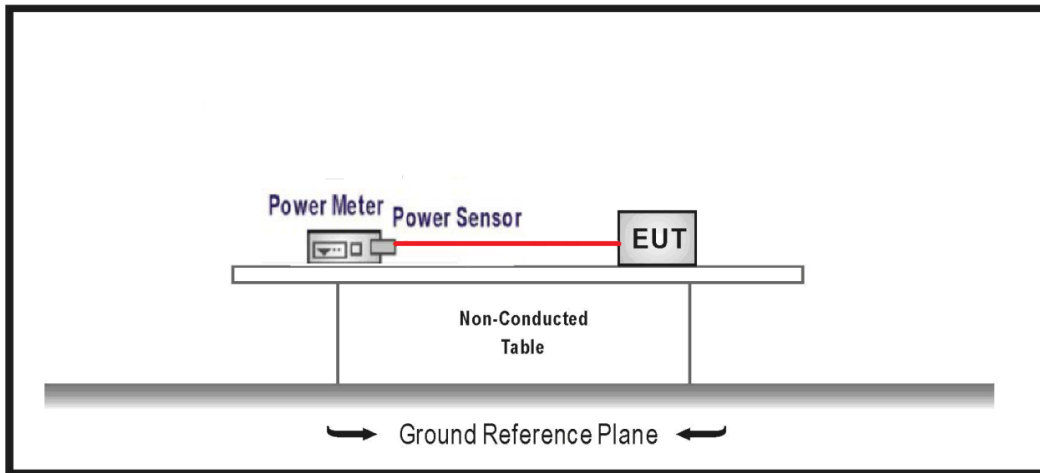
The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074.

4.4. Test Result of DTS Bandwidth

Refer as Appendix B

5. Maximum Conducted Output Power

5.1. Test Setup



5.2. Test Limit

The maximum conducted output power shall be less 30 dBm (1 Watt).

5.3. Test Procedures

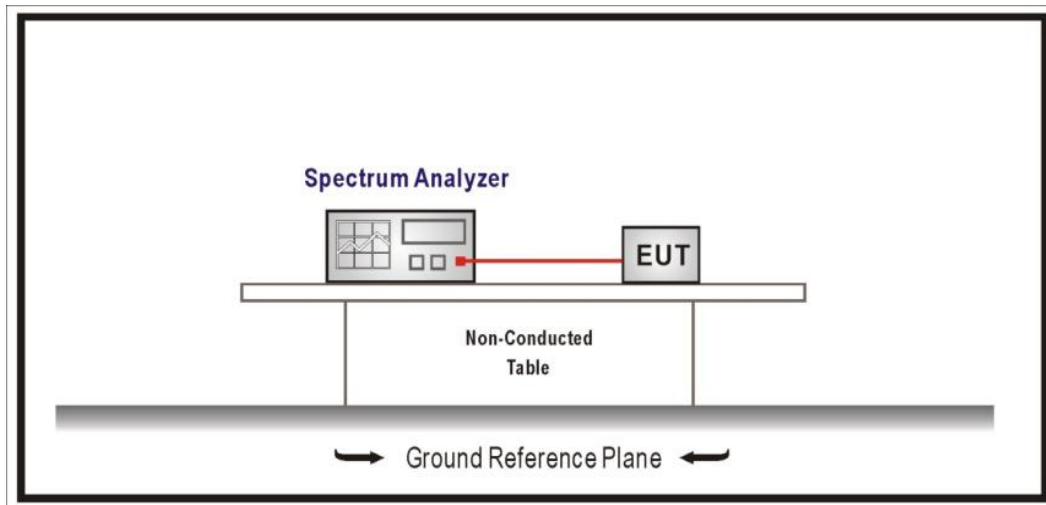
The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074.

5.4. Test Result of Maximum Conducted Output Power

Refer as Appendix C

6. Power Spectral Density

6.1. Test Setup



6.2. Test Limit

The power spectral density conducted from the intentional radiated to the antenna shall not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission.

6.3. Test Procedures

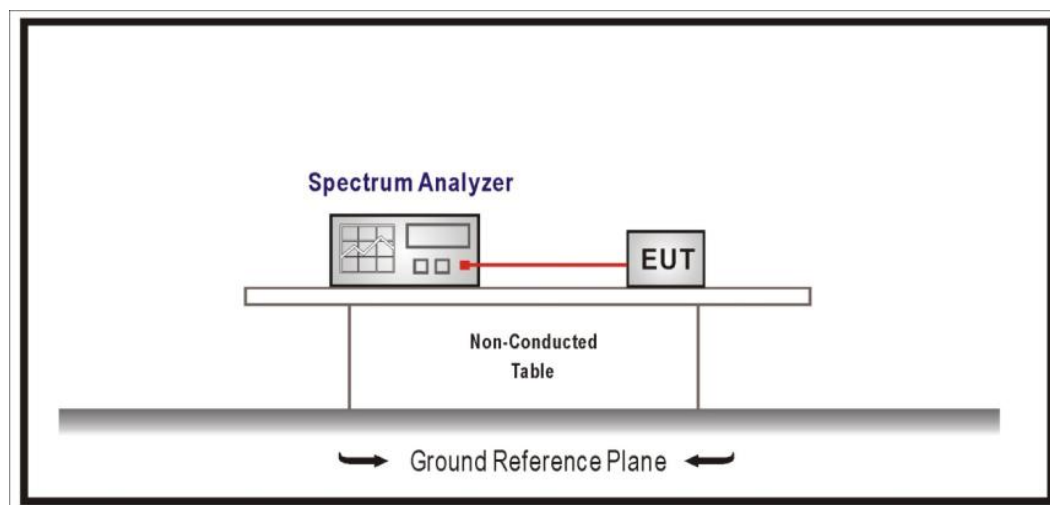
The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074.

6.4. Test Result of Maximum Power Spectral Density

Refer as Appendix D

7. Antenna Port Conducted Emission

7.1. Test Setup



7.2. Test Limit

RF output power procedure	Limit (dBc)
Peak output power procedure	20
Average output power procedure	30

Remarks:

1. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limit.
2. If the transmitter complies with the conducted power limit based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

7.3. Test Procedure

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

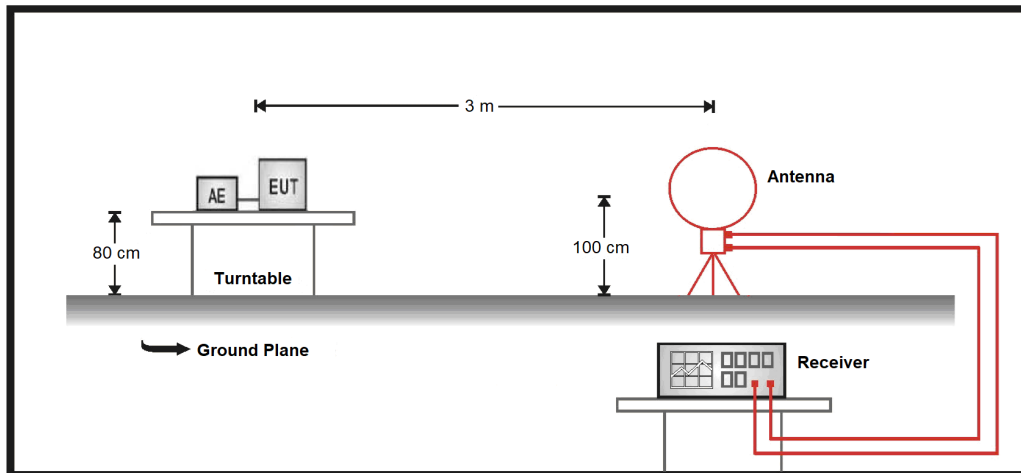
7.4. Test Result of Antenna Port Conducted Emission

Refer as Appendix E

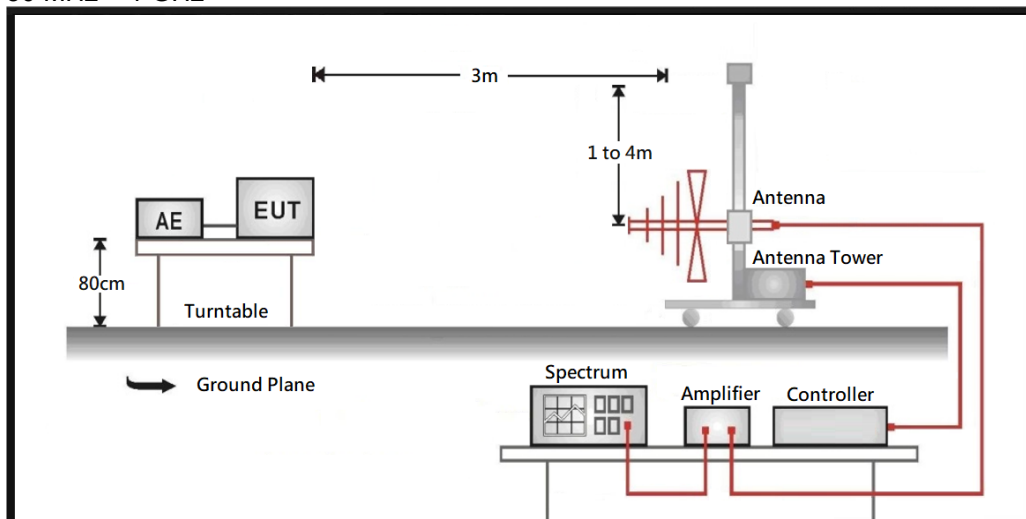
8. Radiated Emission

8.1. Test Setup

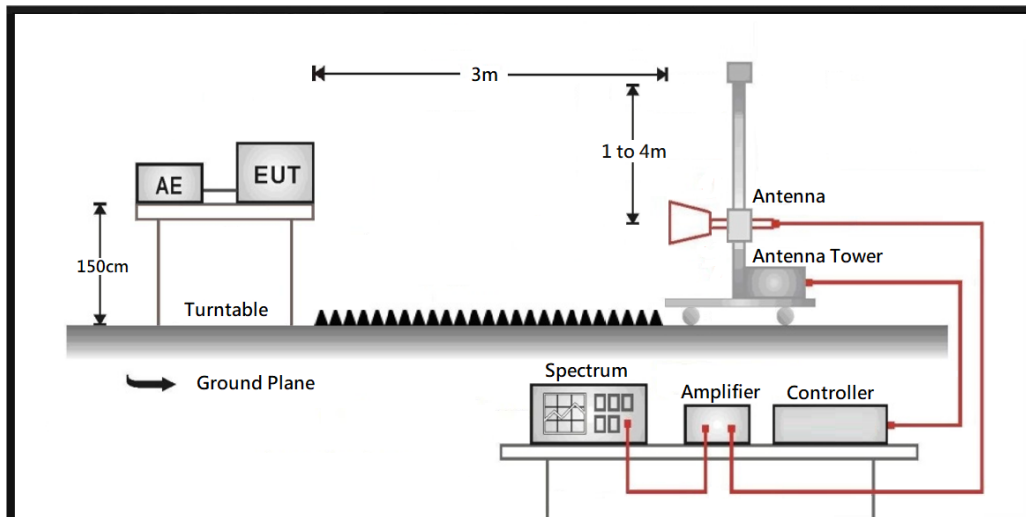
9 kHz ~ 30 MHz



30 MHz ~ 1 GHz



Above 1 GHz



8.2. 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.

8.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS 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.

8.4. Test Result of Radiated Emission

Refer as Appendix F