FCC RADIO TEST REPORT

FCC ID	:	MSQ-RTHR00
Equipment	:	Wireless-AX11000 Tri-band Gigabit Router, ROG Rapture Tri-band Gaming Router
Brand Name	:	ASUS
Model Name	:	RT-AX95U, GT-AX11000
Applicant	:	ASUSTeK COMPUTER INC. 4F, No. 150, Li-Te Rd., Peitou, Taipei 112, Taiwan
Manufacturer (1)	:	ASKEY TECHNOLOGY (JIANG SU) LTD NO1388, Jiao Tong Road, Wujiang Economic Technological Development Area Jiangsu Province 215200 China
Manufacturer (2)	:	Compal Networking (KunShan) Co., LTD. No. 520, Nabbang Rd., Economic & Technical Development Zone Kunshan, Jiangsu Province China
Standard	:	47 CFR FCC Part 15.247

The product was received on Jun. 05, 2018 , and testing was started from Aug. 07, 2018 and completed on Sep. 04, 2018. We, SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR812227-03AA	01	Initial issue of report	Sep. 06, 2018
FR812227-03AA	02	Modifying SKU information; for item 2 of the chapter 1.1.4 Table for Multiple Listing.	Sep. 12, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Reviewed by: Sam Chen
Report Producer: Wendy Pan

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
2400-2483.5	b, g, n (HT20), ac (VHT20), ax (HEW20)	2412-2462	1-11 [11]
2400-2483.5	n (HT40), ac (VHT40), ax (HEW40)	2422-2452	3-9 [7]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	802.11b	20	4TX
2.4-2.4835GHz	802.11g	20	4TX
2.4-2.4835GHz	802.11n HT20	20	4TX
2.4-2.4835GHz	802.11n HT20-BF	20	4TX
2.4-2.4835GHz	802.11ac VHT20	20	4TX
2.4-2.4835GHz	802.11ac VHT20-BF	20	4TX
2.4-2.4835GHz	802.11ax HEW20	20	4TX
2.4-2.4835GHz	802.11ax HEW20-BF	20	4TX
2.4-2.4835GHz	802.11n HT40	40	4TX
2.4-2.4835GHz	802.11n HT40-BF	40	4TX
2.4-2.4835GHz	802.11ac VHT40	40	4TX
2.4-2.4835GHz	802.11ac VHT40-BF	40	4TX
2.4-2.4835GHz	802.11ax HEW40	40	4TX
2.4-2.4835GHz	802.11ax HEW40-BF	40	4TX

Note:
- 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- 11g, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- VHT20, VHT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- HEW20, HEW40 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- BWch is the nominal channel bandwidth.
- Nss-Min is the minimum number of spatial streams.
- Nant is the number of outputs. e.g., 2(2,3) means have 2 outputs for port 2 and port 3. 2 means have 2 outputs for port 1 and port 2.

1.1.2 Antenna Information

Set	Ant.	Port				Brand	P/N	Type	Connector	Gain (dBi)			
		2.4GHz	5GHz B1/B2	5GHz B3	5GHz B4					2.4GHz	5GHz B1/B2	5GHz B3	5GHz B4
1	1	1	-	4	4	WHA YU	C660-510413-A	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	2	2	-	3	3	WHA YU	C660-510413-A	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	3	3	-	2	2	WHA YU	C660-510413-A	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	4	4	-	1	1	WHA YU	C660-510413-A	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	5	-	1	-	-	WHA YU	C660-510413-A	Dipole	Reverse SMA Plug	-	2.3	-	-
	6	-	2	-	-	WHA YU	C660-510413-A	Dipole	Reverse SMA Plug	-	2.3	-	-
	7	-	3	-	-	WHA YU	C660-510413-A	Dipole	Reverse SMA Plug	-	2.3	-	-
	8	-	4	-	-	WHA YU	C660-510413-A	Dipole	Reverse SMA Plug	-	2.3	-	-
2	1	1	-	4	4	WHA YU	C660-510431-A	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	2	2	-	3	3	WHA YU	C660-510431-A	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	3	3	-	2	2	WHA YU	C660-510431-A	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	4	4	-	1	1	WHA YU	C660-510431-A	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	5	-	1	-	-	WHA YU	C660-510431-A	Dipole	Reverse SMA Plug	-	2.3	-	-
	6	-	2	-	-	WHA YU	C660-510431-A	Dipole	Reverse SMA Plug	-	2.3	-	-
	7	-	3	-	-	WHA YU	C660-510431-A	Dipole	Reverse SMA Plug	-	2.3	-	-
	8	-	4	-	-	WHA YU	C660-510431-A	Dipole	Reverse SMA Plug	-	2.3	-	-
3	1	1	-	4	4	PSA	RFDPA161000SBLB801	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	2	2	-	3	3	PSA	RFDPA161000SBLB801	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	3	3	-	2	2	PSA	RFDPA161000SBLB801	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	4	4	-	1	1	PSA	RFDPA161000SBLB801	Dipole	Reverse SMA Plug	1.9	-	2.3	1.9
	5	-	1	-	-	PSA	RFDPA161000SBLB801	Dipole	Reverse SMA Plug	-	2.3	-	-
	6	-	2	-	-	PSA	RFDPA161000SBLB801	Dipole	Reverse SMA Plug	-	2.3	-	-
	7	-	3	-	-	PSA	RFDPA161000SBLB801	Dipole	Reverse SMA Plug	-	2.3	-	-
	8	-	4	-	-	PSA	RFDPA161000SBLB801	Dipole	Reverse SMA Plug	-	2.3	-	-

Note: B1 means Band1. The rule also applies to B2, B3, and B4.

Because WHA YU's antennas and PSA's antennas are the same type antennas and same gain, only the WHA YU's set 1 antennas was tested and recorded in the report.

<For 2.4GHz Band>

For IEEE 802.11b/g/n/ac/ax mode <4TX/4RX>:

Ant.1 (Port 1), Ant.2 (Port 2), Ant.3 (Port 3) and Ant.4 (Port 4) will transmit/receive the same signal simultaneously.

Ant.1 (Port 1), Ant.2 (Port 2), Ant.3 (Port 3) and Ant.4 (Port 4) can be used as transmitting/receiving antennas.

<For 5GHz Band>

For Band 1/2

For IEEE 802.11a/n/ac/ax mode <4TX/4RX>:

Ant.5 (Port 1), Ant.6 (Port 2), Ant.7 (Port 3) and Ant.8 (Port 4) will transmit/receive the same signal simultaneously.

Ant.5 (Port 1), Ant.6 (Port 2), Ant.7 (Port 3) and Ant.8 (Port 4) can be used as transmitting/receiving antennas.

For Band 3/4

For IEEE 802.11a/n/ac/ax mode <4TX/4RX>:

Ant.1 (Port 4), Ant.2 (Port 3), Ant.3 (Port 2) and Ant.4 (Port 1) will transmit/receive the same signal simultaneously.

Ant.1 (Port 4), Ant.2 (Port 3), Ant.3 (Port 2) and Ant.4 (Port 1) can be used as transmitting/receiving antennas.

1.1.3 EUT Operational Condition

EUT Power Type	From power adapter			
Beamforming Function	☒	With beamforming	☐	Without beamforming
	The product has beamforming function for 802.11n/ac/ax.			
Function	☒	Point-to-multipoint	☐	Point-to-point
Test Software Version	accessMTool_3_0_0_5			

1.1.4 Table for Multiple Listing

1. The difference for each equipment name and model name is shown as below:

Equipment Name	Model Name	Description
Wireless-AX11000 Tri-band Gigabit Router, ROG Rapture Tri-band Gaming Router	RT-AX95U, GT-AX11000	All the models/equipment names are identical; the different models/equipment names served as marketing strategy.

From the above models, model: RT-AX95U was selected as representative model for the test and its data was recorded in this report.

2. There are two EUT, the detail information as following:

EUT	SKU	LAN Transformer	
		Brand Name	P/N
1	1	SWAPnet	NS777202*1
		SWAPnet	NS771802*1
2	2	Mingtek	HN8001VG*1
		Mingtek	HN18101HF*1

1.1.5 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR812227-01AA

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Removing 8 LAN Ports of the EUT. 2. Adding the R230 version of the 4 ports of the EUT. Based on the above modification. 3. Adding AX160 mode. 4. Adding home mesh mode. 5. Adding the Client without radar detection mode. 6. Adding the bridge mode. 7. Adding the extender mode. 8. Adding two sets of antenna with same type, same gain but different brand names and model names (Please refer chapter 1.1.2 Antenna Information.) 9. Adding Zero Wait function for bandwidth 20/40/80 in DFS band. 10. Adding an equipment name: ROG Rapture Tri-band Gaming Router (Please refer chapter 1.1.4 Table for Multiple Listing.) 11. Adding the LED on the top cover LOGO. 12. Changing heat sink. 13. Adding a 2.5GHz LAN Port. 14. Changing Flash. 15. Changing Transformer.	For Modification item 2, 5, 11, 12, 13,14, 15. 1. AC Power-line Conducted Emissions. 2. Emissions in Restricted Frequency Bands Below 1GHz. For Modification item 12 As below test items will be based on original output power to re-test. 1. Emissions in Restricted Frequency Bands Above 1GHz. 11ac VHT20 (2442MHz) For Modification item 1, 3, 4, 6, 7, 8, 9, 10 It's no need to re-test.

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 558074 D01 v04
- FCC KDB 662911 D01 v02r01

1.3 Testing Location Information

Testing Location			
☐	HWA YA	ADD :	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
		TEL :	886-3-327-3456 FAX : 886-3-318-0055
☒	JHUBEI	ADD :	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.
		TEL :	886-3-656-9065 FAX : 886-3-656-9085

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Radiated (Others test)	03CH01-CB	Mason Chen	20°C / 50%	Aug. 07, 2018 ~ Sep. 04, 2018
Radiated (Below 1GHz test)	03CH01-CB	KJ Chang	22°C / 54%	Aug. 29, 2018
AC Conduction	CO02-CB	Peter Wu	22°C / 59%	Aug. 27, 2018

Test site Designation No. TW0006 with FCC.
Test site registered number IC 4086D with Industry Canada.

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated 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 Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%

2 Test Configuration of EUT

2.1 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral
Operating Mode	Normal Link
The EUT has AP Router, Client without radar detection, Bridge, Extender and Mesh and two SKUs and equips with adapter 1 ~ adapter 3. After evaluated, EUT1 (SKU1) AP Router (Master) + adapter 2 generated the worst test result, thus the measurement test will follow this same test.	
1	EUT1 (SKU1) AP Router (Master) + adapter 2

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	Normal Link
The EUT has AP Router, Client without radar detection, Bridge, Extender and Mesh and two SKUs and equips with adapter 1 ~ adapter 3. After evaluated, EUT1 (SKU1) AP Router (Master) + adapter 3 generated the worst test result, thus the measurement test will follow this same test.	
1	EUT1 (SKU1) AP Router (Master) + adapter 3
Operating Mode > 1GHz	CTX
1	EUT1 (SKU1) AP Router (Master)

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation
Operating Mode	
1	WLAN 2.4GHz + WLAN 5GHz band 1, 2 + WLAN 5GHz band 3, 4
Refer to Sporton Test Report No.: FA812227-03 for Co-location RF Exposure Evaluation.	

Note: 1. The EUT supports below functions:

(1) AP Router (Master)

(2) Client without radar detection

(3) Bridge (Client without radar detection)

(4) Extender (Master)

(5) Mesh (Client without radar detection)

2. The EUT only be used at Z axis.
3. This model supports full RU configuration only, and the model does not have adjustable power levels for each user.

2.2 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

2.3 Accessories

Accessories				
Equipment Name	**Brand Name**	**Model Name**	**Type**	**Rating**
Adapter 1	DELTA	ADP-65DW B	-	INPUT: 100-240V~50-60Hz, 1.5A OUTPUT: 19V, 3.42A
Adapter 2	DELTA	ADP-65DW Y	-	INPUT: 100-240V~50-60Hz, 1.5A OUTPUT: 19V, 3.42A
Adapter 3	PI	AD2087320	010-1LF	INPUT: 100-240V~50/60Hz, 1.5A OUTPUT: 19V, 3.42A
Other				
RJ-45 cable: Shielded, 1.5m				

2.4 Support Equipment

For Test Site No: CO02-CB

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	NB*6	DELL	E6430	N/A
2	PC	DELL	OPTIPLEX 380	N/A
3	HDD3.0*2	WD	WDBACY5000AWT	N/A

For Test Site No: 03CH01-CB / Below 1GHz

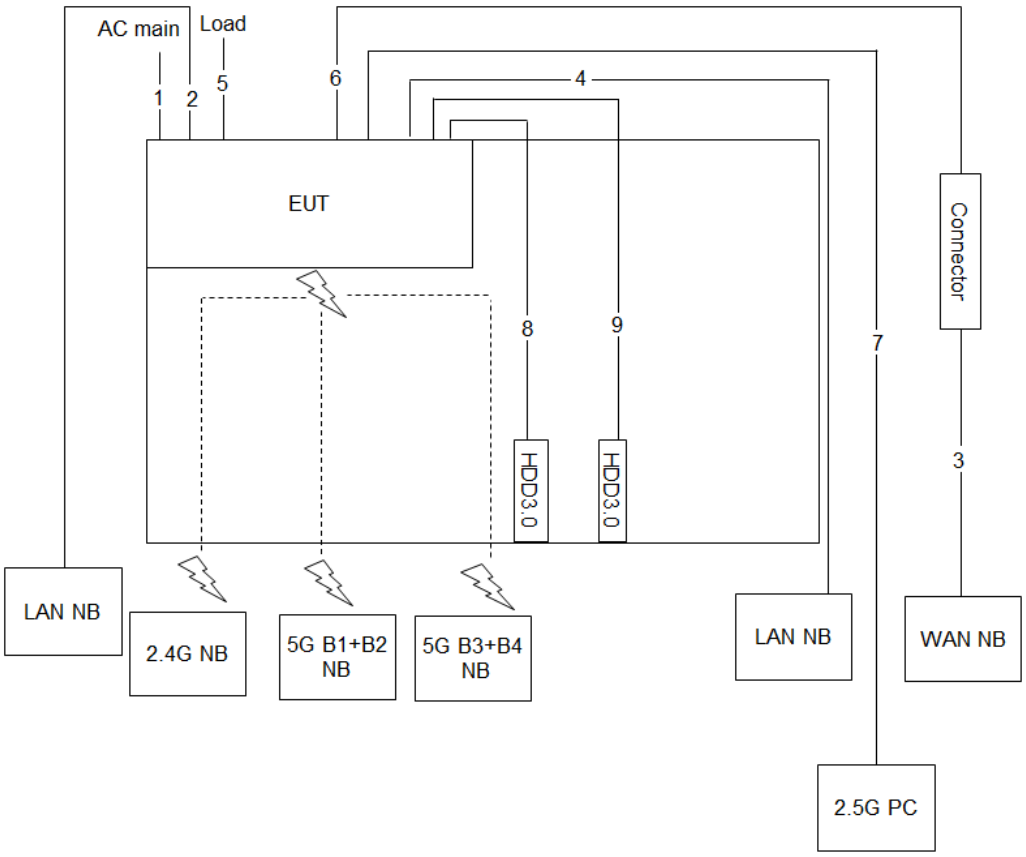
Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	NB*2	DELL	E4300	N/A
2	NB*4	Apple	Mac Book	N/A
3	PC	DELL	OPTIPLEX 380	N/A
4	Flash disk3.0*2	Transcend	JetFlash-700	N/A

For Test Site No: 03CH01-CB / Above 1GHz

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	NB	DELL	E4300	N/A

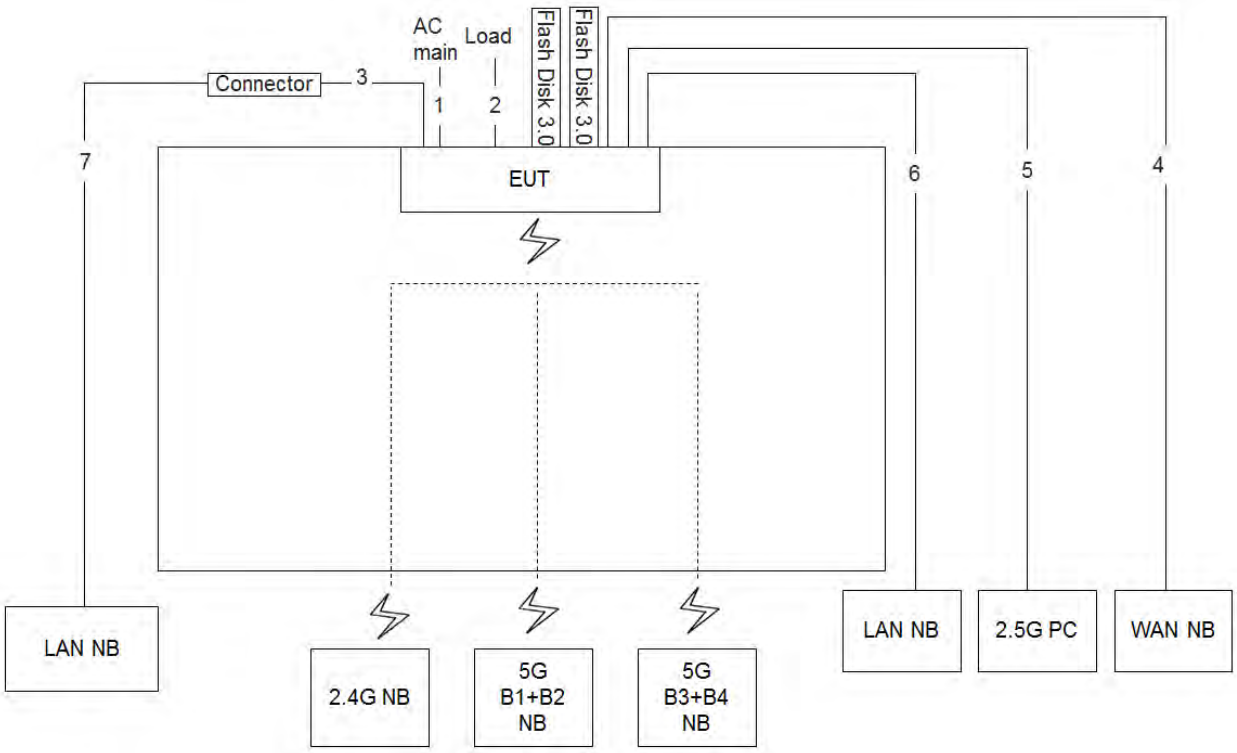
2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



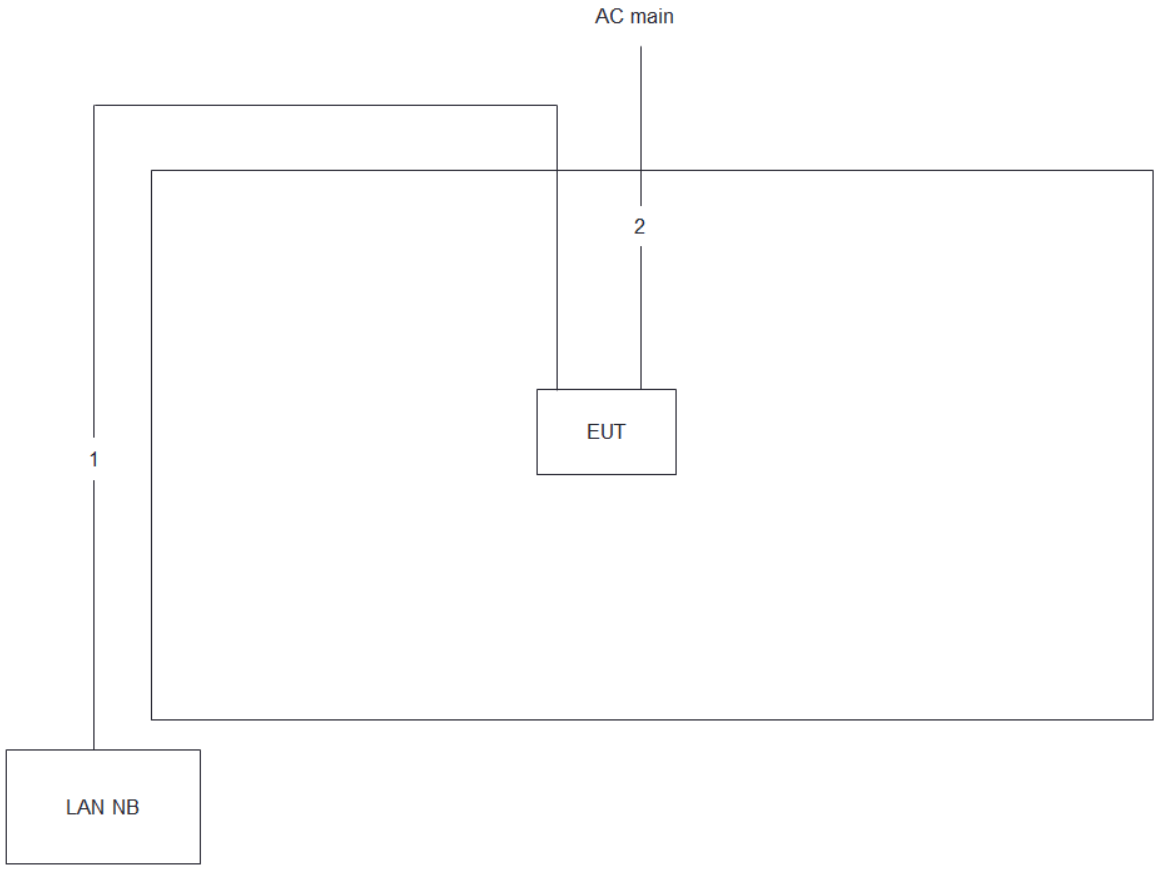
Item	Connection	Shielded	Length
1	Power cable	No	2.3m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	10m
5	RJ-45 cable*2	No	1.5m
6	RJ-45 cable	Yes	1.5m
7	RJ-45 cable	No	10m
8	USB cable	Yes	1.5m
9	USB cable	Yes	1.5m

Test Setup Diagram - Radiated Test < 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	2.3m
2	RJ-45 cable*2	No	1.5m
3	RJ-45 cable	Yes	1.5m
4	RJ-45 cable	No	10m
5	RJ-45 cable	No	10m
6	RJ-45 cable	No	10m
7	RJ-45 cable	No	10m

Test Setup Diagram - Radiated Test > 1GHz



Item	Connection	Shielded	Length
1	RJ-45 cable	No	10m
2	Power cable	No	2.3m

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Measuring Instruments

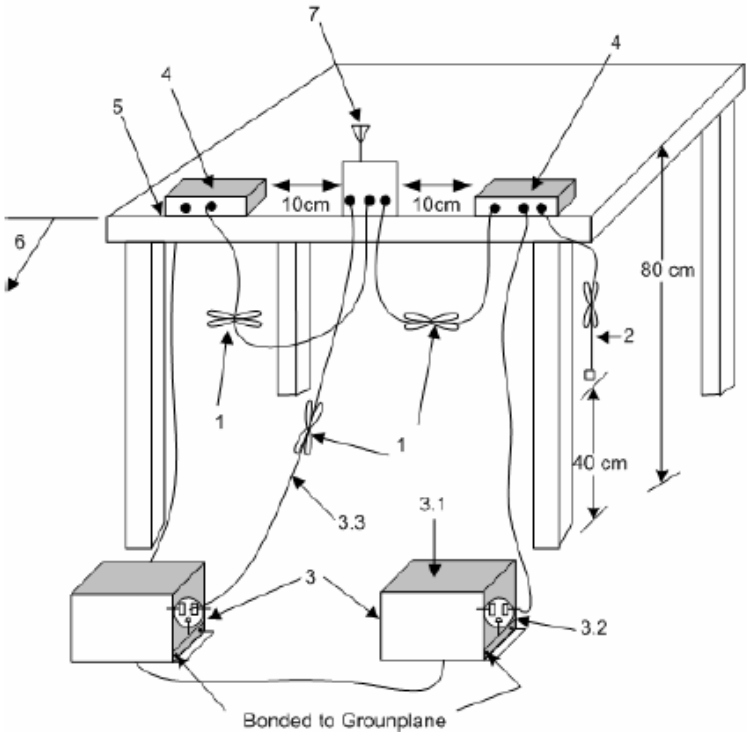
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
☒ Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

3.1.4 Test Setup

AC Power-line Conducted Emissions



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.
2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
3.1—All other equipment powered from additional LISN(s).
3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
3.3—LISN at least 80 cm from nearest part of EUT chassis.
4—Non-EUT components of EUT system being tested.
5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 Emissions in Restricted Frequency Bands

3.2.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

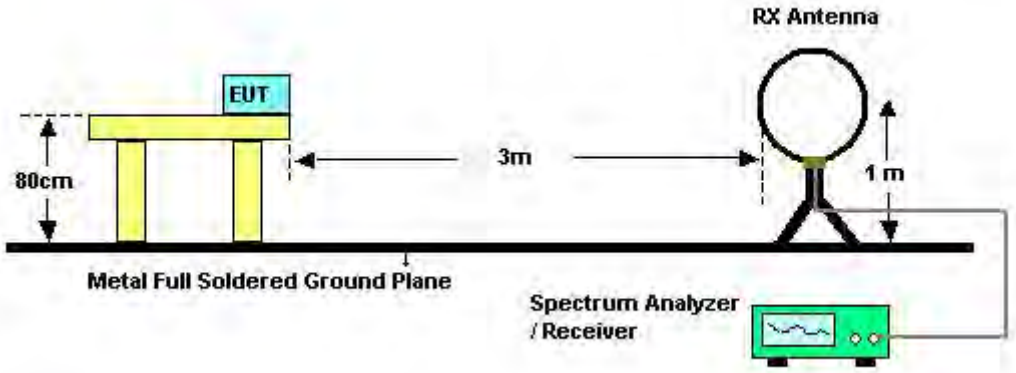
3.2.3 Test Procedures

Test Method			
▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].			
▪ Refer as ANSI C63.10, clause 6.9.2.2 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.			
▪ For the transmitter unwanted emissions shall be measured using following options below:			
	▪ Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.		
		☐	Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle ≥98%)
		☐	Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
		☒	Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW≥1/T).
		☐	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
		☒	Refer as FCC KDB 558074, clause 12.2.4 measurement procedure peak limit.
▪ For the transmitter band-edge emissions shall be measured using following options below:			
	▪ Refer as FCC KDB 558074 clause 13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.		
	▪ Refer as FCC KDB 558074, clause 13.2 (ANSI C63.10, clause 6.9.3) for marker-delta method for band-edge measurements.		
	▪ Refer as FCC KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).		
▪ For conducted and cabinet radiation measurement, refer as FCC KDB 558074, clause 12.2.2.			
	▪ For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB		
	▪ For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.		

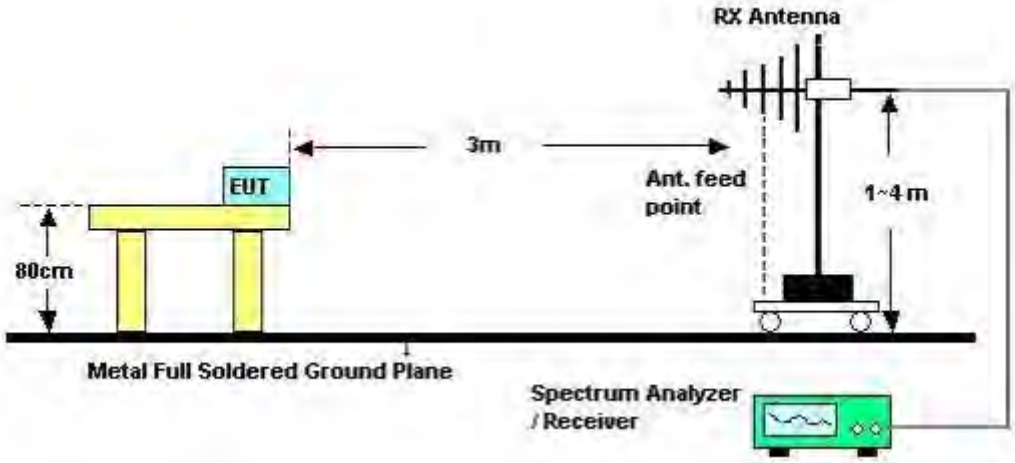
3.2.4 Test Setup

Transmitter Radiated Emissions

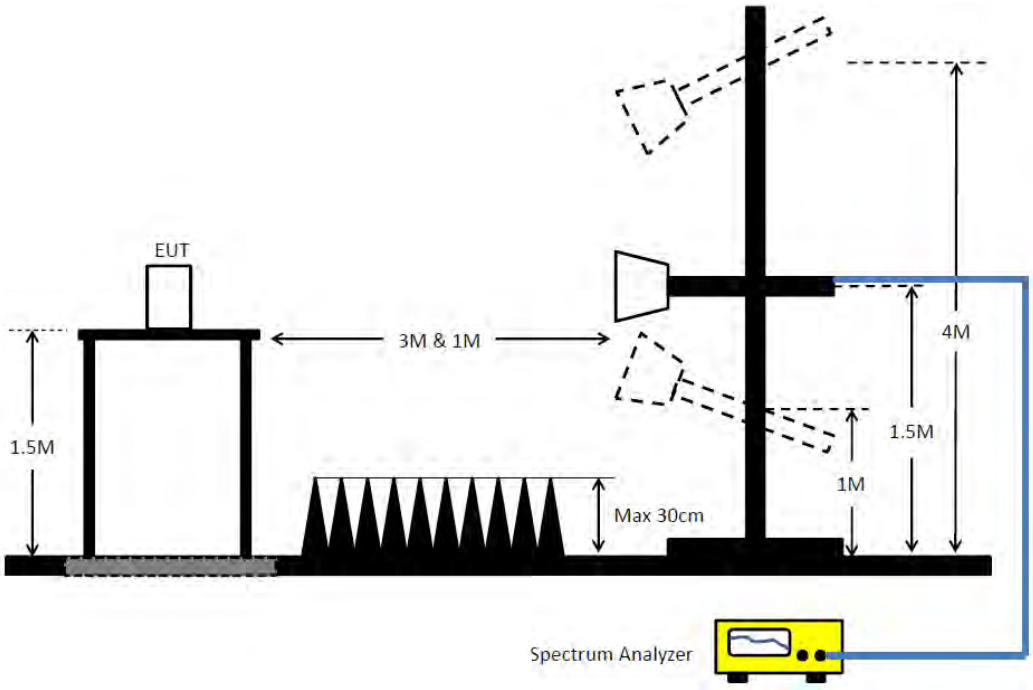
9kHz ~30MHz



30MHz~1GHz



Above 1GHz



3.2.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.
The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10 harmonic or 40 GHz, whichever is appropriate.

3.2.6 Test Result of Transmitter Radiated Unwanted Emissions

Refer as Appendix B

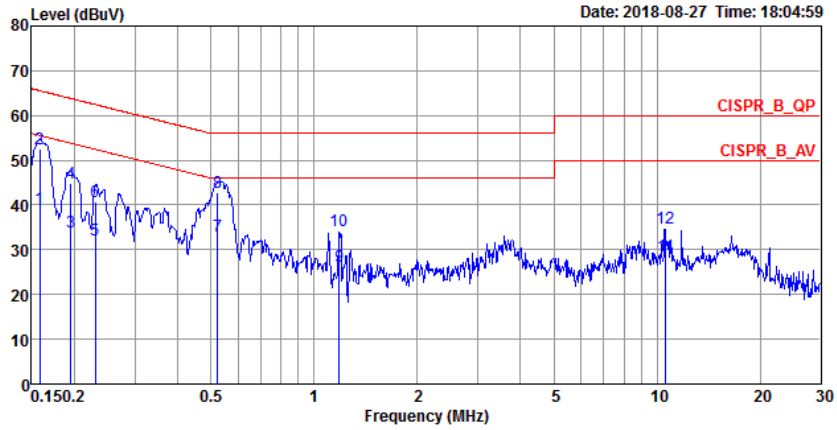
4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Nov. 24, 2017	Nov. 23, 2018	Conduction (CO02-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 13, 2017	Nov. 12, 2018	Conduction (CO02-CB)
EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8.4GHz	Jan. 17, 2018	Jan. 16, 2019	Conduction (CO02-CB)
COND Cable	Woken	Cable	2	0.15MHz ~ 30MHz	Nov. 10, 2017	Nov. 09, 2018	Conduction (CO02-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO02-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 27, 2018	Aug. 26, 2019	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2018	Mar. 15, 2019	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 20, 2017	Nov. 19, 2018	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 28, 2018	Jun. 27, 2019	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2018	May 01, 2019	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 09, 2018	Jan. 08, 2019	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 04, 2018	Jul. 03, 2019	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 23, 2017	Nov. 22, 2018	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100354	9kHz ~ 2.75GHz	Dec. 08, 2017	Dec. 07, 2018	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH01-CB)

Note: Calibration Interval of instruments listed above is one year.

N.C.R. means Non-Calibration required

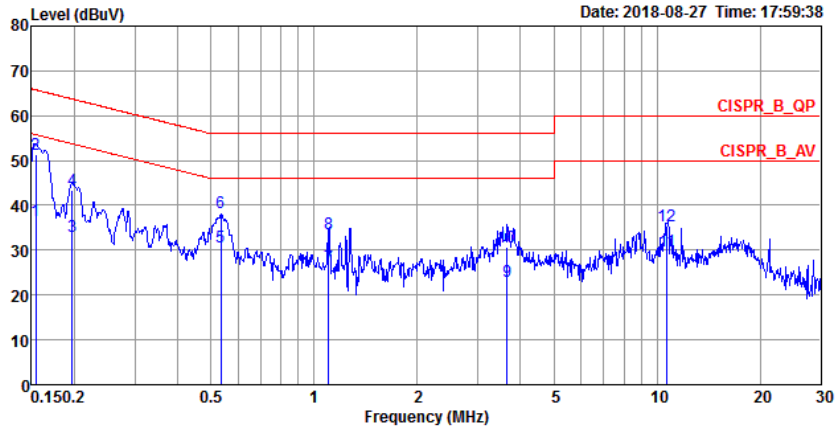
AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1582	39.26	-16.30	55.56	29.08	10.17	0.01	Average	NEUTRAL
2	0.1582	52.56	-13.00	65.56	42.38	10.17	0.01	QP	NEUTRAL
3	0.1955	33.99	-19.81	53.80	23.81	10.17	0.01	Average	NEUTRAL
4	0.1955	45.00	-18.80	63.80	34.82	10.17	0.01	QP	NEUTRAL
5	0.2304	32.21	-20.23	52.44	22.03	10.17	0.01	Average	NEUTRAL
6	0.2304	40.86	-21.58	62.44	30.68	10.17	0.01	QP	NEUTRAL
7	0.5238	32.92	-13.08	46.00	22.72	10.17	0.03	Average	NEUTRAL
8	0.5238	42.84	-13.16	56.00	32.64	10.17	0.03	QP	NEUTRAL
9	1.1857	26.26	-19.74	46.00	16.05	10.18	0.03	Average	NEUTRAL
10	1.1857	34.23	-21.77	56.00	24.02	10.18	0.03	QP	NEUTRAL
11	10.5954	28.64	-21.36	50.00	18.24	10.33	0.07	Average	NEUTRAL
12	10.5954	34.71	-25.29	60.00	24.31	10.33	0.07	QP	NEUTRAL

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

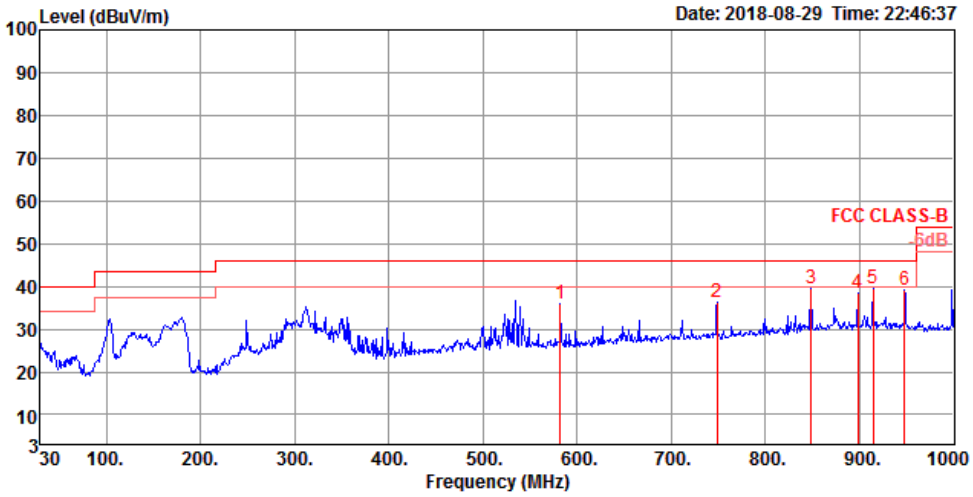
AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Line
Operating Function	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1540	36.60	-19.18	55.78	26.43	10.16	0.01	Average	LINE
2	0.1540	51.45	-14.33	65.78	41.28	10.16	0.01	QP	LINE
3	0.1965	33.19	-20.57	53.76	23.02	10.16	0.01	Average	LINE
4	0.1965	43.30	-20.46	63.76	33.13	10.16	0.01	QP	LINE
5	0.5350	30.71	-15.29	46.00	20.52	10.16	0.03	Average	LINE
6	0.5350	38.30	-17.70	56.00	28.11	10.16	0.03	QP	LINE
7	1.1032	26.14	-19.86	46.00	15.95	10.17	0.02	Average	LINE
8	1.1032	33.62	-22.38	56.00	23.43	10.17	0.02	QP	LINE
9	3.6464	23.13	-22.87	46.00	12.84	10.22	0.07	Average	LINE
10	3.6464	30.56	-25.44	56.00	20.27	10.22	0.07	QP	LINE
11	10.6871	29.68	-20.32	50.00	19.28	10.33	0.07	Average	LINE
12	10.6871	35.56	-24.44	60.00	25.16	10.33	0.07	QP	LINE

Note 1: “>20dB” means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found emissions (No emissions were detected.)

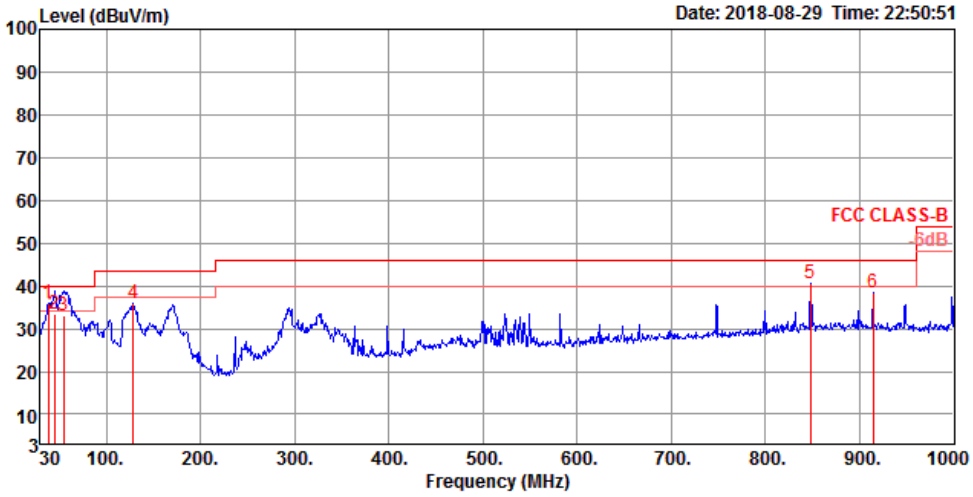
RSE below 1GHz Result			
Operating Mode	1	**Polarization**	Horizontal
Operating Function	Normal Link		



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	581.93	35.79	46.00	-10.21	40.48	2.91	24.80	32.40	200	59	Peak	HORIZONTAL
2	748.77	36.43	46.00	-9.57	39.48	3.31	26.17	32.53	150	60	Peak	HORIZONTAL
3	848.68	39.68	46.00	-6.32	41.31	3.54	27.27	32.44	125	148	Peak	HORIZONTAL
4	898.15	38.48	46.00	-7.52	39.63	3.64	27.68	32.47	100	157	Peak	HORIZONTAL
5	914.64	39.49	46.00	-6.51	40.48	3.66	27.80	32.45	125	38	Peak	HORIZONTAL
6	947.62	39.12	46.00	-6.88	39.82	3.70	28.00	32.40	100	145	Peak	HORIZONTAL

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

RSE below 1GHz Result			
Operating Mode	1	**Polarization**	Vertical
Operating Function	Normal Link		



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	38.73	35.89	40.00	-4.11	46.25	0.77	20.51	31.64	100	208	Peak	VERTICAL
2	44.55	33.48	40.00	-6.52	47.12	0.81	17.25	31.70	125	298	QP	VERTICAL
3	54.25	33.22	40.00	-6.78	50.28	0.90	13.83	31.79	100	355	QP	VERTICAL
4	128.94	35.79	43.50	-7.71	47.78	1.38	18.52	31.89	100	163	Peak	VERTICAL
5	847.71	40.73	46.00	-5.27	42.36	3.54	27.27	32.44	100	352	Peak	VERTICAL
6	914.64	38.54	46.00	-7.46	39.53	3.66	27.80	32.45	125	171	Peak	VERTICAL

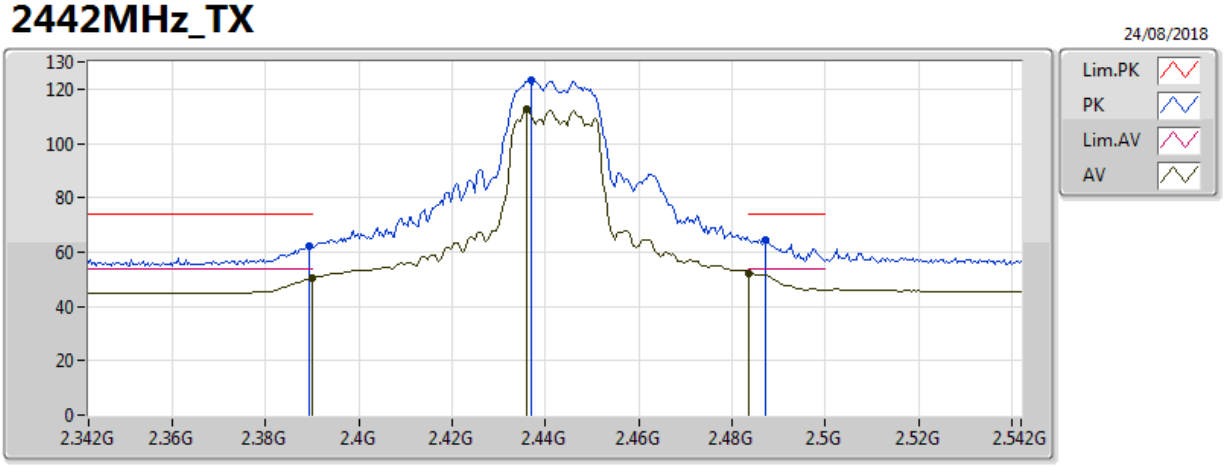
Note 1: “>20dB” means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found emissions (No emissions were detected.)

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
802.11ac VHT20_Nss1,(MCS0)_4TX	Pass	AV	2.483502G	52.05	54.00	-1.95	32.42	3	Vertical	332	1.49	-

802.11ac VHT20_Nss1,(MCS0)_4TX

2442MHz_TX

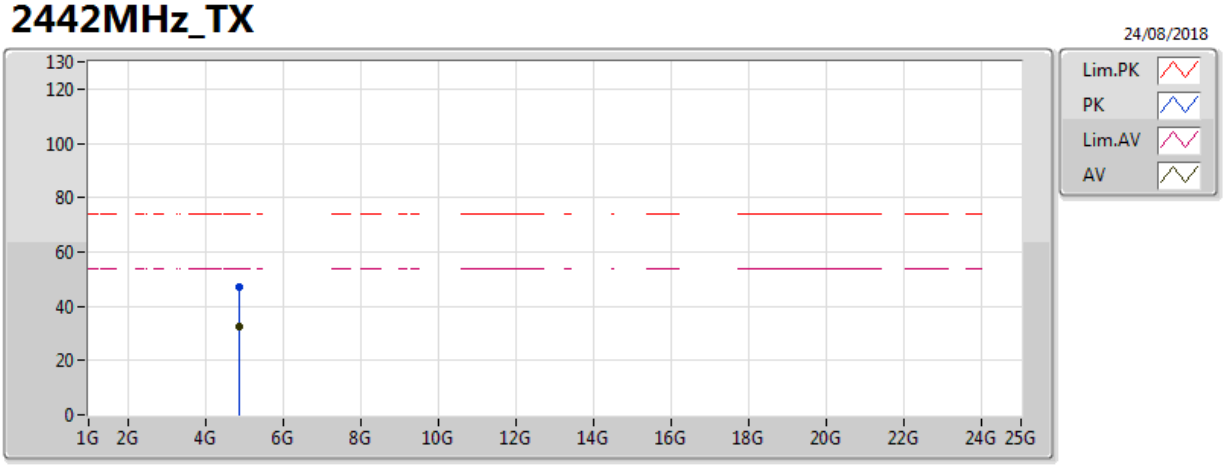


20180824
EUT Z_4TX TX_Dipole
Setting 98
03-M-1
FSP

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)
PK	2.3892G	62.37	74.00	-11.63	32.13	3	Vertical	332	1.49
AV	2.389998G	50.40	54.00	-3.60	32.13	3	Vertical	332	1.49
PK	2.4368G	123.39	Inf	-Inf	32.27	3	Vertical	332	1.49
AV	2.436G	112.75	Inf	-Inf	32.27	3	Vertical	332	1.49
PK	2.4872G	64.35	74.00	-9.65	32.42	3	Vertical	332	1.49
AV	2.483502G	52.05	54.00	-1.95	32.42	3	Vertical	332	1.49

802.11ac VHT20_Nss1,(MCS0)_4TX

2442MHz_TX

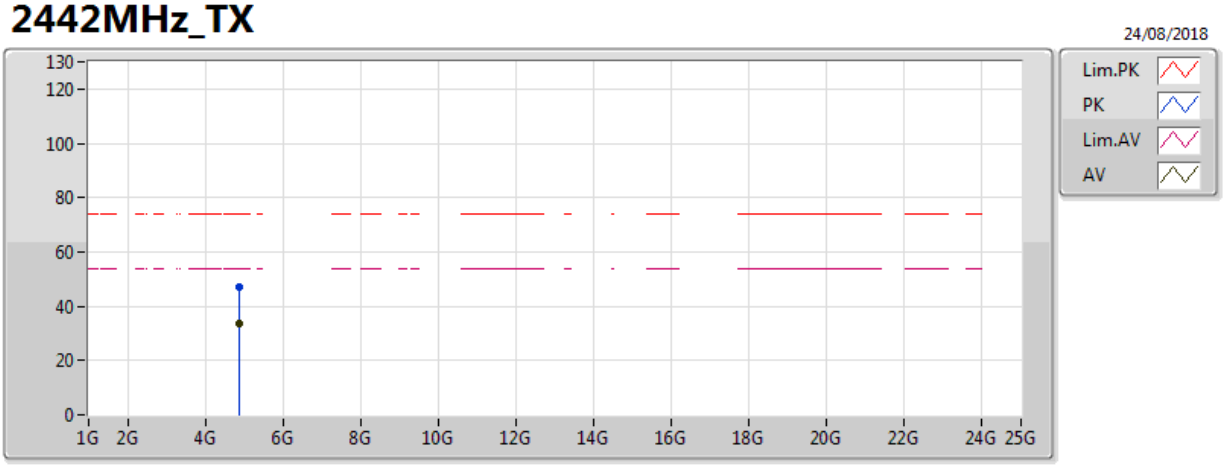


20180824
EUT Z_4TX TX_Dipole
Setting 98
03-M-1
FSP

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)
PK	4.88572G	46.98	74.00	-27.02	5.39	3	Vertical	357	1.20
AV	4.8864G	32.75	54.00	-21.25	5.39	3	Vertical	357	1.20

802.11ac VHT20_Nss1,(MCS0)_4TX

2442MHz_TX



20180824
EUT Z_4TX TX_Dipole
Setting 98
03-M-1
FSP

Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)
PK	4.88202G	47.05	74.00	-26.95	5.38	3	Horizontal	247	1.43
AV	4.88206G	33.55	54.00	-20.45	5.38	3	Horizontal	247	1.43