



Radio Test Report

FCC ID: ZQ6-AP5811SA & IC:11956A-AP5811SA**Change II**

Report No.	:	TBR-C-202601-0203-52
Applicant	:	AMPAK Technology Inc
Equipment Under Test (EUT)		
EUT Name	:	AP5811SA
Model No.	:	AP5811SA
Series Model No.	:	N/A
Brand Name	:	AMPAK, SPARKLAN
Sample ID	:	HC-C-202601-0203-01-01&HC-C-202601-0203-02-01
Receipt Date	:	2026-01-26
Test Date	:	2026-01-26 to 2026-03-16
Issue Date	:	2026-03-16
Standards	:	FCC Part 15 Subpart C 15.247 RSS 247 Issue 4 July 2025 RSS-Gen Issue 5 April 2018+Amendment 1(March 2019)+Amendment 2(February 2021)
Test Method	:	ANSI C63.10: 2020+Cor.1:2023+C63.10a: 2024+Errata to C63.10a: 2024 KDB 558074 D01 15.247 Meas Guidance v05r02
Conclusions	:	PASS
		In the configuration tested, the EUT complied with the standards specified above.
Test By	:	Gold. zhang
Reviewed By	:	Henry huang
Approved By	:	Ivan Su



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

Contents

CONTENTS	2
1. GENERAL INFORMATION ABOUT EUT	4
1.1 Client Information	4
1.2 General Description of EUT (Equipment Under Test)	4
1.3 Block Diagram Showing the Configuration of System Tested.....	6
1.4 Description of Support Units	6
1.5 Description of Test Mode	7
1.6 Description of Test Software Setting	8
1.7 Measurement Uncertainty	9
1.8 Test Facility.....	9
2. TEST SUMMARY.....	10
3. TEST SOFTWARE	10
4. TEST EQUIPMENT AND TEST SITE	11
5. CONDUCTED EMISSION TEST	12
5.1 Test Standard and Limit	12
5.2 Test Setup.....	12
5.3 Test Procedure	12
5.4 Deviation From Test Standard.....	12
5.5 EUT Operating Mode	13
5.6 Test Data.....	13
6. RADIATED AND CONDUCTED UNWANTED EMISSIONS.....	14
6.1 Test Standard and Limit	14
6.2 Test Setup.....	15
6.3 Test Procedure	16
6.4 Deviation From Test Standard.....	17
6.5 EUT Operating Mode	17
6.6 Test Data.....	17
7. RESTRICTED BANDS AND BAND EDGE REQUIREMENT	18
7.1 Test Standard and Limit	18
7.2 Test Setup.....	18
7.3 Test Procedure	19
7.4 Deviation From Test Standard.....	20
7.5 EUT Operating Mode	20
7.6 Test Data.....	20
8. ANTENNA REQUIREMENT	21
12.1 Test Standard and Limit	21
12.2 Deviation From Test Standard	21
12.3 Antenna Connected Construction.....	21
12.4 Test Data	21
ATTACHMENT A--CONDUCTED EMISSION TEST DATA	22
ATTACHMENT B--UNWANTED EMISSIONS DATA	24



ATTACHMENT C--RESTRICTED BANDS REQUIREMENT TEST DATA.....32

Revision History

Report No.	Version	Description	Issued Date
TBR-C-202601-0203-52	Rev.01	Initial issue of report	2026-03-16

Note:

- (1) This report is Class II change report for the original equipment have changed, the transmitter module itself has not changed. More information about the test data please refer to the original test report.
- (2) Add an antenna (EAF727A) . The interface for connecting the RF cable is the same as before. However, the antenna gain is smaller than before. (Antenna: -1.1dBi)
- (3) Based on these changes, only tests were conducted on "conductive radiation", "non-essential radiation emissions at frequencies of 1GHz and below, and those above 1GHz", as well as "restricted frequency bands". The other items that were not reported still meet the requirements of the latest standard.



1. General Information about EUT

1.1 Client Information

Applicant	:	AMPAK Technology Inc
Address	:	6F., No. 23, Huanke 1st Rd., Zhubei City, Hsinchu 302047, Taiwan
Manufacturer	:	AMPAK Technology Inc
Address	:	6F., No. 23, Huanke 1st Rd., Zhubei City, Hsinchu 302047, Taiwan

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	AP5811SA
Models No.	:	AP5811SA
Model Different	:	N/A
Product Description	Operation Frequency:	2412MHz~2462MHz
	Number of Channel:	11 channels
	Antenna Gain:	-1.1dBi PCB Antenna
	Modulation Type:	802.11b: DSSS (DQPSK, DBPSK, CCK) 802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Power Rating	:	DC 3.3V
Software Version	:	N/A
Hardware Version	:	N/A
Remark: (1)The antenna gain provided by the applicant, the verified for the RF conduction test provided by TOBY test lab. (2)The above antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible. (3)For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		



(4) Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	05	2432	09	2452
02	2417	06	2437	10	2457
03	2422	07	2442	11	2462
04	2427	08	2447		
Note: CH 01~CH 11 for 20MHz Bandwidth					

Antenna Information

Model No. of antenna:	Type of antenna:	Gain of the antenna (Max.)
		Antenna 1
AD-103AG	Dipole Antenna	2.02dBi
AD-301N	Dipole Antenna	4.4dBi
AD-302N	Dipole Antenna	3.14dBi
AD-303N	Dipole Antenna	3.14dBi
AD-305N	Dipole Antenna	5.0dBi
AD-501AX	Dipole Antenna	3.7dBi
AD-510AX	Dipole Antenna	2.27dBi
AD-512AX	Dipole Antenna	2.35dBi
AD-514AX	Dipole Antenna	3.07dBi
AD-515AX	Dipole Antenna	5.96dBi
EAF727A	PCB Antenna	-1.1dBi

Note: This module will use eleven different antennas, and only the one with the larger antenna gain(**Antenna1: 5.96dBi(AD-515AX)**)will be used for test.

Add an antenna (EAF727A) . The interface for connecting the RF cable is the same as before.

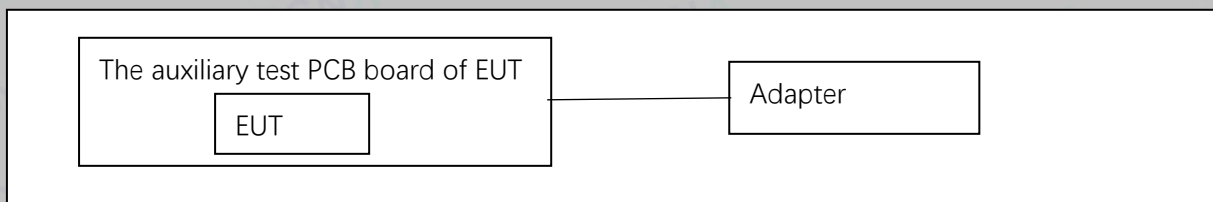
However, the antenna gain is smaller than before. (Antenna: -1.1dBi)

	HVIN	Brand Name
First PV	AP5811SA	AMPAK
Second PV	AP5811SA	SPARKLAN

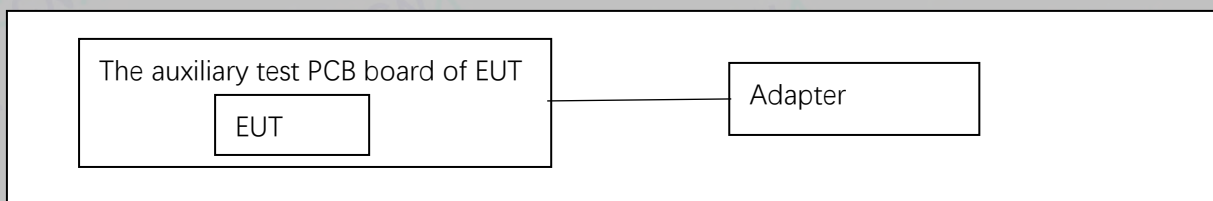


1.3 Block Diagram Showing the Configuration of System Tested

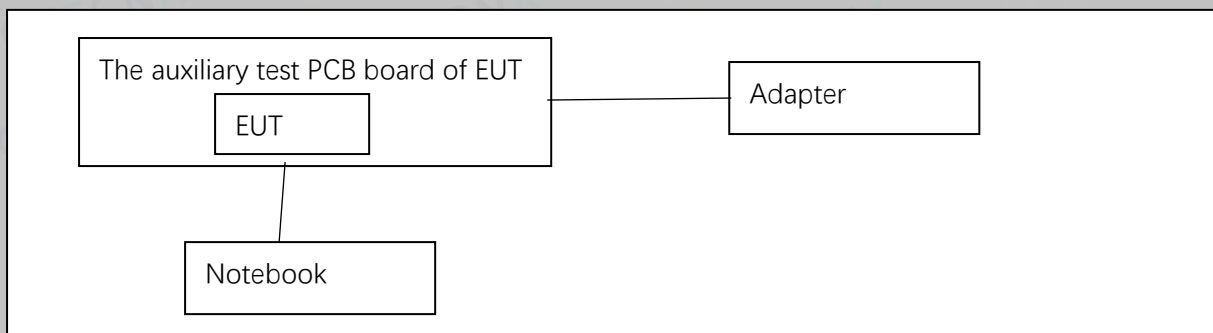
Conducted Test



Radiated Test



Conducted Measurements Test



1.4 Description of Support Units

Equipment Information				
Name	Model	S/N	Manufacturer	Used “√”
Notebook	HYLR-WFQ9	AAMFPM1418000165	DELL	√
Adapter	N/A	N/A	N/A	√
The auxiliary test PCB board of EUT	N/A	N/A	N/A	√



1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Conducted Emission Test(AC POWER)	
Final Test Mode	Description
Mode 1	TX b Mode Channel 01
For Radiated and RF Conducted Test	
Final Test Mode	Description
Mode 2	TX Mode b Mode Channel 01/06/11
Mode 3	TX Mode g Mode Channel 01/06/11
Mode 4	TX Mode n(HT20) Mode Channel 01/06/11
Mode 4	TX Mode ax(HE20) Mode Channel 01/06/11
Note: All modes have tests. Above 1GHz only reflects the worst data mode(b); Restricted Bands only reflects the worst data mode(b).	

Note:

- (1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

802.11b Mode: CCK

802.11g Mode: OFDM

802.11n (HT20) Mode: MCS 0

802.11ax (HE20) Mode: MCS 0

- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a Mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.



1.6 Description of Test Software Setting

During testing channel & Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.

Test Software: cmd command			
Test Mode: Continuously transmitting			
Mode	Data Rate	Channel	Parameters
802.11b	CCK/ 1Mbps	01	19
	CCK/ 1Mbps	06	19
	CCK/ 1Mbps	11	19
802.11g	OFDM/ 6Mbps	01	15
	OFDM/ 6Mbps	06	15
	OFDM/ 6Mbps	11	15
802.11n(HT20)	MCS 0	01	15
	MCS 0	06	15
	MCS 0	11	15
802.11ax(HE20)	MCS 0	01	15
	MCS 0	06	15
	MCS 0	11	15



1.7 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U_{Lab})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	± 3.50 dB ± 3.10 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	± 4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	± 4.50 dB
Radiated Emission	Level Accuracy: Above 1000MHz	± 4.20 dB
RF Power-Conducted	---	± 0.95 dB
Power Spectral Density-Conducted	---	± 3 dB
Occupied Bandwidth	---	$\pm 3.8\%$
Unwanted Emission-Conducted	---	± 2.72 dB
Temperature	---	$\pm 0.6^{\circ}\text{C}$
Humidity	---	$\pm 4\%$
Supply voltages	---	$\pm 2\%$

1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1/F., Building 6, Rundongsheng Industrial Zone, Longzhu, Xixiang, Bao'an District, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.FCC Accredited Test Site Number: 854351. Designation Number: CN1223.

IC Registration No.: (11950A)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A. CAB identifier: CN0056.



2. Test Summary

Standard Section		Test Item	Test Sample(s)	Judgment	Remark
FCC	IC				
FCC 15.207(a)	RSS-Gen 8.8	Conducted Emission	HC-C-202601-0203-02-01	PASS	/
FCC 15.209 & 15.247(d)	RSS-Gen 8.9 & RSS 247 6.6	Radiated Unwanted Emissions	HC-C-202601-0203-02-01	PASS	/
FCC 15.247(d)	RSS-Gen 8.10& RSS-247 6.6	Emissions in Restricted Bands	HC-C-202601-0203-02-01	PASS	/

Note: (1) N/A is an abbreviation for Not Applicable.
(2) This report is Class II change report for the original equipment have changed, the transmitter module itself has not changed. More information about the test data please refer to the original test report.

3. Test Software

Test Item	Test Software	Manufacturer	Version No.
Radiation Emission	EZ-EMC	EZ	Ver.GARAD-3A1.1+
Radiation Emission	EZ-EMC	EZ	Ver.GARAD-3A1.1+
Radiation Emission	TS+	Tonscend	5.0.5
RF Conducted Measurement	MTS-8310	MWRFTest	V2.0.0.0
RF Test System	JS1120	Tonscend	V3.6.21



4. Test Equipment and Test Site

Test Site				
No.	Test Site	Manufacturer	Specification	Used
TB-EMCSR001	Shielding Chamber #1	YIHENG	7.5*4.0*3.0 (m)	√
TB-EMCSR002	Shielding Chamber #2	YIHENG	8.0*4.0*3.0 (m)	X
TB-EMCCA001	3m Anechoic Chamber #A	ETS	9.0*6.0*6.0 (m)	X
TB-EMCCB002	3m Anechoic Chamber #B	YIHENG	9.0*6.0*6.0 (m)	√

Conducted Emission Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jun. 16, 2025	Jun. 15, 2026
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jun. 16, 2025	Jun. 15, 2026
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jun. 16, 2025	Jun. 15, 2026
LISN	Rohde & Schwarz	ENV216	101131	Jun. 16, 2025	Jun. 15, 2026

Radiation Emission Test(B Site)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MY49100060	Aug. 27, 2025	Aug. 26, 2026
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jun. 16, 2025	Jun. 15, 2026
EMI Test Receiver	Rohde & Schwarz	ESU-8	100472/008	Jan. 30, 2026	Jan. 29, 2027
Bilog Antenna	SCHWARZBECK	VULB 9168	1225	Oct. 18, 2025	Oct. 17, 2027
Horn Antenna	SCHWARZBECK	BBHA 9120 D	2463	Jun. 14, 2024	Jun. 13, 2026
Horn Antenna	SCHWARZBECK	BBHA 9170	1118	Jan. 31, 2026	Jan. 30, 2028
HF Amplifier	Tonscend	TAP9E6343	AP21C806117	Jun. 14, 2024	Jun. 13, 2026
HF Amplifier	Tonscend	TAP051845	AP21C806141	Aug. 27, 2025	Aug. 26, 2026
HF Amplifier	Tonscend	TAP0184050	AP21C806129	Aug. 27, 2025	Aug. 26, 2026
Pre-amplifier	HP	8449B	3008A00849	Feb. 02, 2026	Feb.01, 2027
Highpass Filter	CD	HPM-6.4/18G	---	N/A	N/A
Highpass Filter	CD	HPM-2.8/18G	---	N/A	N/A
Highpass Filter	XINBO	XBLBQ-HTA67(8-25G)	22052702-1	N/A	N/A

Antenna Conducted Emission

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jun. 16, 2025	Jun. 15, 2026
MXA Signal Analyzer	KEYSIGHT	N9020B	MY60110172	Aug. 27, 2025	Aug. 26, 2026
MXA Signal Analyzer	Agilent	N9020A	MY47380425	Aug. 27, 2025	Aug. 26, 2026
Vector Signal Generator	Agilent	N5182A	MY50141294	Aug. 27, 2025	Aug. 26, 2026
Analog Signal Generator	Agilent	N5181A	MY48180463	Aug. 27, 2025	Aug. 26, 2026
Vector Signal Generator	KEYSIGHT	N5182B	MY59101429	Aug. 27, 2025	Aug. 26, 2026
Analog Signal Generator	KEYSIGHT	N5173B	MY61252685	Aug. 27, 2025	Aug. 26, 2026
RF Control Unit	Tonsced	JS0806-2	21F8060439	Aug. 27, 2025	Aug. 26, 2026
Power Control Box	Tonsced	JS0806-4ADC	21C8060387	N/A	N/A
RF Power Sensor	DARE!! Instruments	RadiPowerRPR30 06W	17I00015SNO26	Aug. 27, 2025	Aug. 26, 2026
			17I00015SNO29	Aug. 27, 2025	Aug. 26, 2026
			17I00015SNO31	Aug. 27, 2025	Aug. 26, 2026
			17I00015SNO33	Aug. 27, 2025	Aug. 26, 2026
Attenuator	XINQY	10dB	---	N/A	N/A
Attenuator	XINQY	10dB	---	N/A	N/A



5. Conducted Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard

RSS-Gen 8.8

FCC Part 15.207

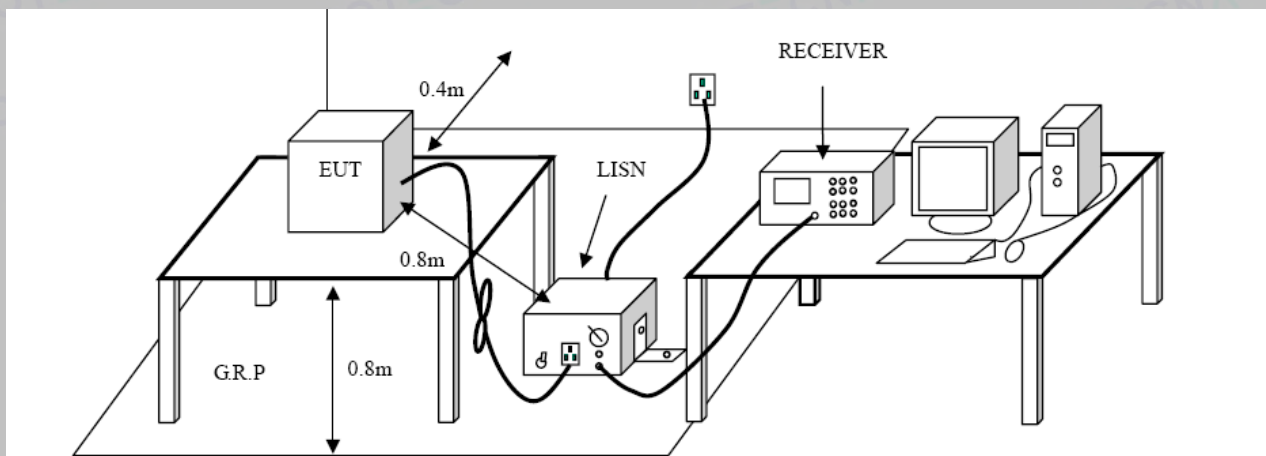
5.1.2 Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.2 Test Setup



5.3 Test Procedure

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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 to 40 cm long.
- I/O cables that are not connected to a peripheral 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.

5.4 Deviation From Test Standard

No deviation



5.5 EUT Operating Mode

Please refer to the description of test mode.

5.6 Test Data

Please refer to the Attachment A inside test report.



6. Radiated and Conducted Unwanted Emissions

6.1 Test Standard and Limit

6.1.1 Test Standard

RSS-Gen 8.9 & RSS 247 6.6

FCC Part 15.209 & FCC Part 15.247(d)

6.1.2 Test Limit

General field strength limits at frequencies Below 30MHz			
Frequency (MHz)	Field Strength ($\mu\text{A/m}$)*	Field Strength (microvolt/meter)**	Measurement Distance (meters)
0.009~0.490	6.37/F (F in kHz)	2400/F(KHz)	300
0.490~1.705	63.7/F (F in kHz)	24000/F(KHz)	30
1.705~30.0	0.08	30	30

Note: 1, The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.
2, *is for RSS Standard, **is for FCC Standard.

General field strength limits at frequencies above 30 MHz		
Frequency (MHz)	Field strength ($\mu\text{V/m}$ at 3 m)	Measurement Distance (meters)
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

General field strength limits at frequencies Above 1000MHz		
Frequency (MHz)	Distance of 3m (dBuV/m)	
	Peak	Average
Above 1000	74	54

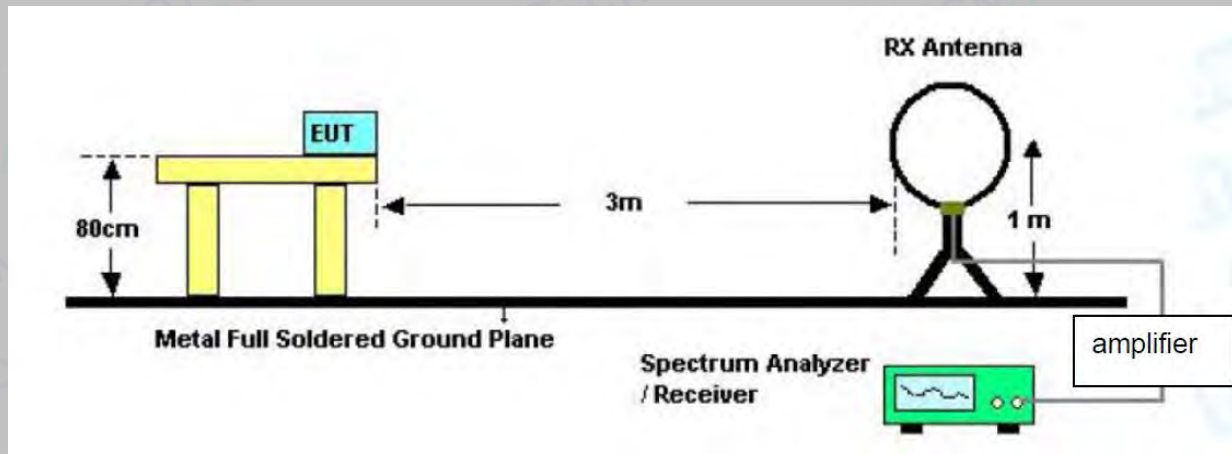
Note:
(1) The tighter limit applies at the band edges.
(2) Emission Level(dBuV/m)=20log Emission Level(uV/m)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB.

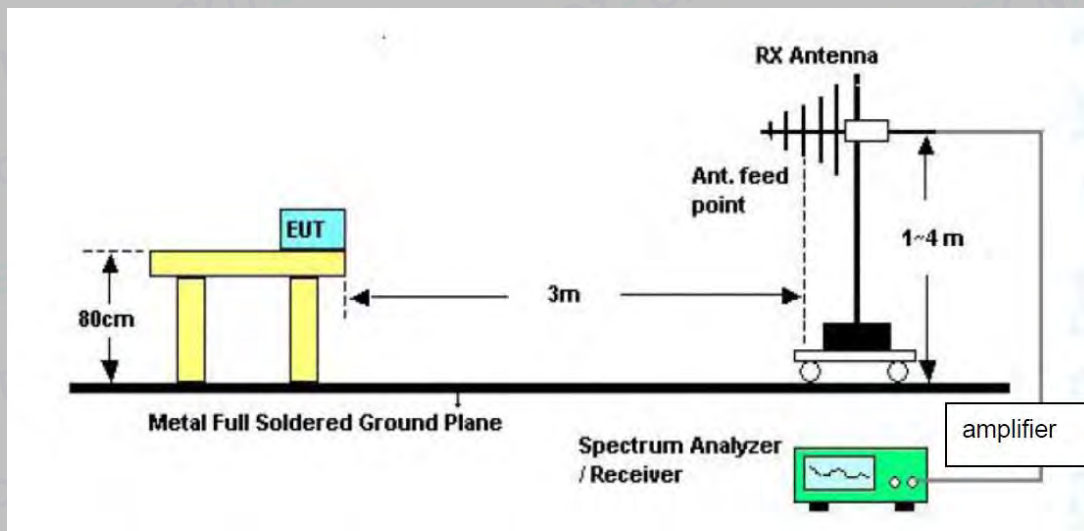


6.2 Test Setup

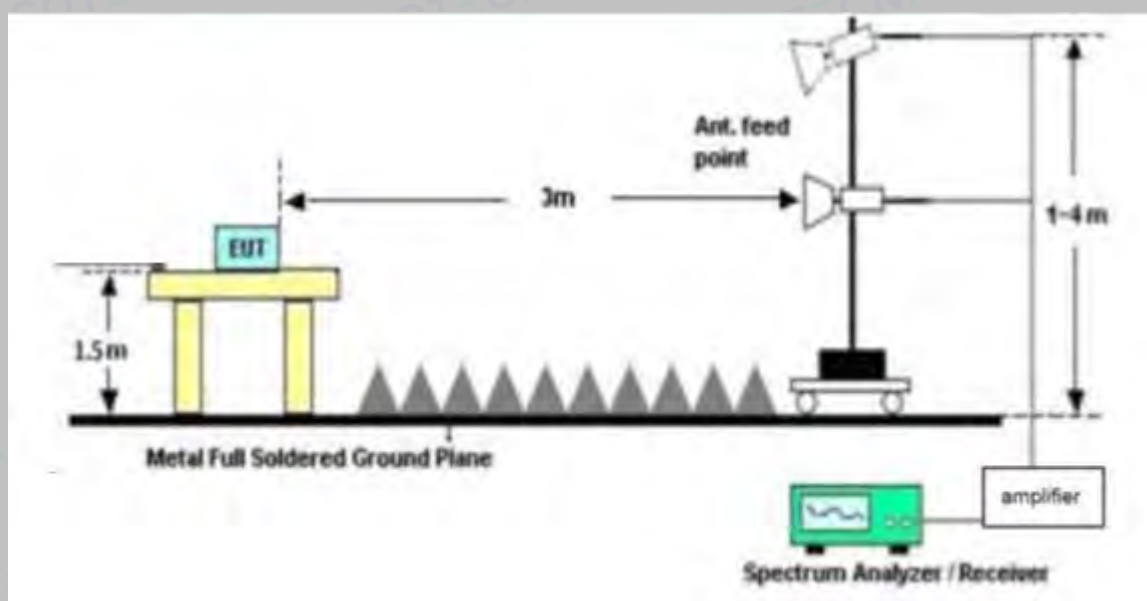
Radiated measurement



Below 30MHz Test Setup



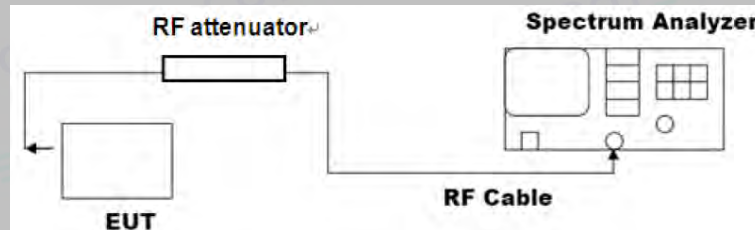
Below 1000MHz Test Setup



Above 1GHz Test Setup



Conducted measurement



6.3 Test Procedure

---Radiated measurement

- The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Below 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- Testing frequency range 30MHz-1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection. Testing frequency range 9KHz-150Hz the measuring instrument use VBW=200Hz with Quasi-peak detection. Testing frequency range 9KHz-30MHz the measuring instrument use VBW=9kHz with Quasi-peak detection.
- Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- For the actual test configuration, please see the test setup photo.



--- Conducted measurement

●Reference level measurement

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to ≥ 1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW $\geq [3 \times \text{RBW}]$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

●Emission level measurement

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW $\geq [3 \times \text{RBW}]$.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

6.4 Deviation From Test Standard

No deviation

6.5 EUT Operating Mode

Please refer to the description of test mode.

6.6 Test Data

Radiated measurement please refer to the Attachment B inside test report.



7. Restricted Bands and Band Edge Requirement

7.1 Test Standard and Limit

7.1.1 Test Standard

RSS-Gen 8.10 & RSS 247 6.6

FCC Part 15.205 & FCC Part 15.247(d)

7.1.2 Test Limit

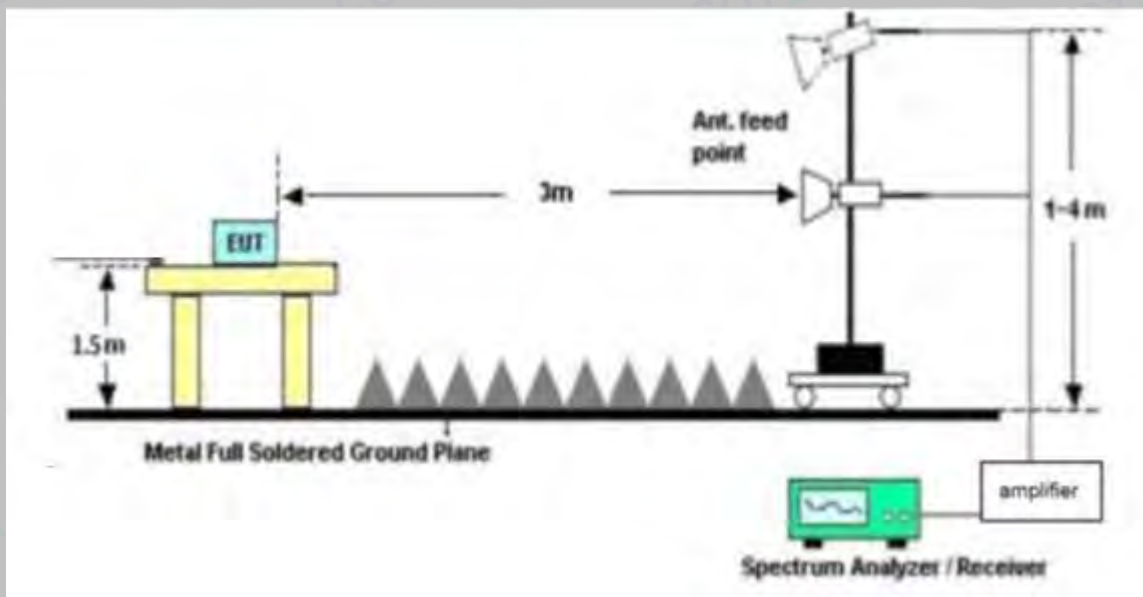
Restricted Frequency Band (MHz)	Distance Meters(at 3m)	
	Peak (dBuV/m)	Average (dBuV/m)
2310 ~2390	74	54
2483.5 ~2500	74	54
	Peak (dBm) _{see 7.3 e)}	Average (dBm) _{see 7.3 e)}
2310 ~2390	-21.20	-41.20
2483.5 ~2500	-21.20	-41.20

Note: According the ANSI C63.10 11.12.2 antenna-port conducted measurements may also be used as an alternative to radiated measurements for determining compliance in the restricted frequency bands requirements. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case emissions is required.

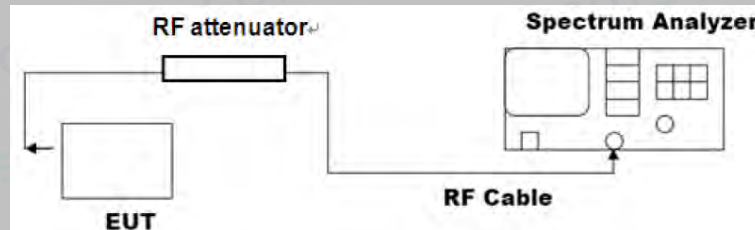
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

7.2 Test Setup

Radiated measurement



Conducted measurement



7.3 Test Procedure

---Radiated measurement

- Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- The Peak Value and average value both need to comply with applicable limit above 1 GHz.
- Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- For the actual test configuration, please see the test setup photo.

--- Conducted measurement

- a) Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 11.12.2.3 through 11.12.2.5 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
- b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP (see 11.12.2.6 for guidance on determining the applicable antenna gain).
- c) Add the appropriate maximum ground reflection factor to the EIRP (6 dB for frequencies ≤ 30 MHz; 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive; and 0 dB for frequencies > 1000 MHz).
- d) For MIMO devices, measure the power of each chain and sum the EIRP of all chains in



linear terms (i.e., watts and mW).

e) Convert the resultant EIRP to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20 \log d + 104.8$$

where

E is the electric field strength in dBuV/m

EIRP is the equivalent isotropically radiated power in dBm

d is the specified measurement distance in m

f) Compare the resultant electric field strength level with the applicable regulatory limit.

g) Perform the radiated spurious emission test.

7.4 Deviation From Test Standard

No deviation

7.5 EUT Operating Mode

Please refer to the description of test mode.

7.6 Test Data

Radiated measurement please refer to the Attachment C inside test report.



8. Antenna Requirement

12.1 Test Standard and Limit

12.1.1 Test Standard

RSS Gen 6.8

12.1.2 Requirement(FCC Part 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

(RSS-Gen 6.8)

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

12.2 Deviation From Test Standard

No deviation

12.3 Antenna Connected Construction

The Max. gains of the antenna used for transmitting is -1.1dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

12.4 Test Data

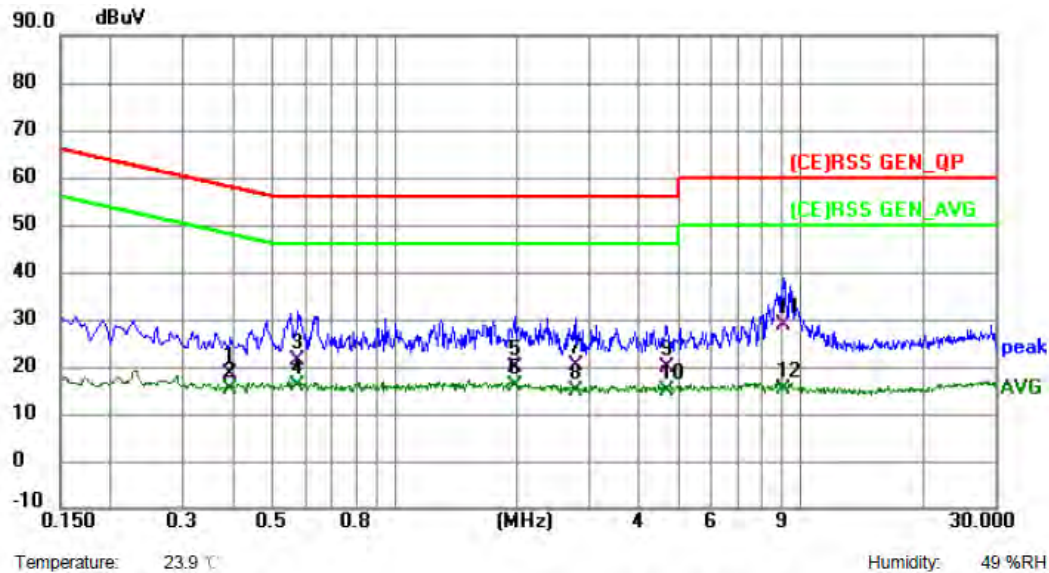
The EUT antenna is a PCB Antenna. It complies with the standard requirement.

Antenna Type
☒ Permanent attached antenna
☐ Unique connector antenna
☐ Professional installation antenna



Attachment A--Conducted Emission Test Data

Test Voltage:	AC 120V/60Hz
Terminal:	Line
Test Mode:	Mode 1
Remark:	Only worse case is reported.



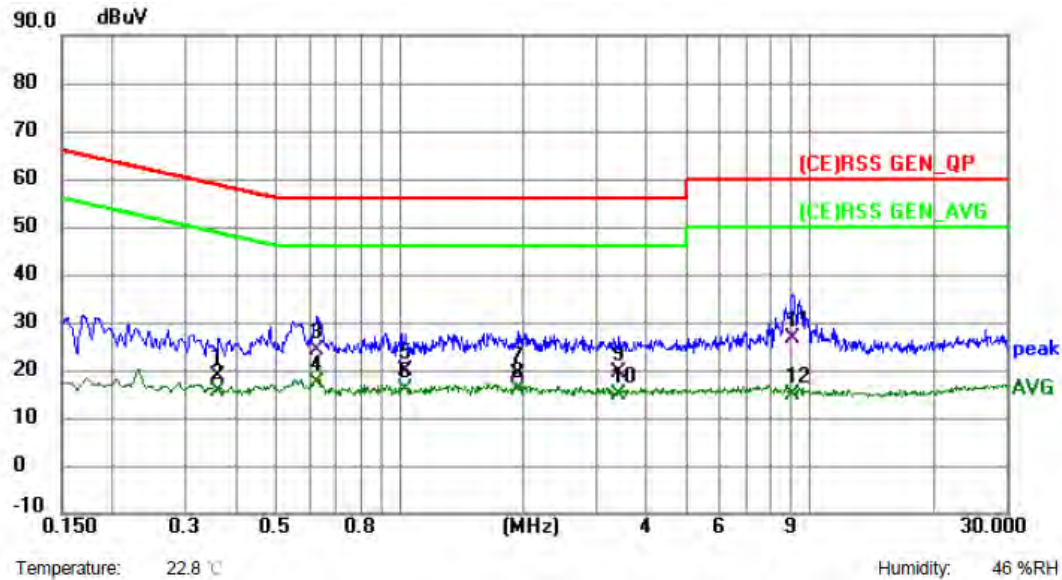
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB	dBuV	dBuV	dB	
1		0.393	9.15	9.39	18.54	58.00	-39.46	QP
2		0.393	5.88	9.39	15.27	48.00	-32.73	AVG
3		0.578	11.91	9.46	21.37	56.00	-34.63	QP
4	*	0.578	6.50	9.46	15.96	46.00	-30.04	AVG
5		1.977	10.22	9.49	19.71	56.00	-36.29	QP
6		1.977	6.27	9.49	15.76	46.00	-30.24	AVG
7		2.792	10.85	9.49	20.34	56.00	-35.66	QP
8		2.792	5.49	9.49	14.98	46.00	-31.02	AVG
9		4.686	10.56	9.44	20.00	56.00	-36.00	QP
10		4.686	5.41	9.44	14.85	46.00	-31.15	AVG
11		9.028	19.17	9.63	28.80	60.00	-31.20	QP
12		9.028	5.59	9.63	15.22	50.00	-34.78	AVG

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = QuasiPeak/Average (dBuV) - Limit (dBuV)



Test Voltage:	AC 120V/60Hz
Terminal:	Neutral
Test Mode:	Mode 1
Remark:	Only worse case is reported.



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV	dBuV	dB	
1		0.361	9.31	9.44	18.75	58.71	-39.96	QP
2		0.361	6.07	9.44	15.51	48.71	-33.20	AVG
3		0.627	14.45	9.54	23.99	56.00	-32.01	QP
4	*	0.627	7.94	9.54	17.48	46.00	-28.52	AVG
5		1.036	10.36	9.33	19.69	56.00	-36.31	QP
6		1.036	6.50	9.33	15.83	46.00	-30.17	AVG
7		1.932	9.71	9.49	19.20	56.00	-36.80	QP
8		1.932	6.29	9.49	15.78	46.00	-30.22	AVG
9		3.435	10.09	9.39	19.48	56.00	-36.52	QP
10		3.435	5.34	9.39	14.73	46.00	-31.27	AVG
11		9.069	16.90	9.84	26.74	60.00	-33.26	QP
12		9.069	5.11	9.84	14.95	50.00	-35.05	AVG

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = QuasiPeak/Average (dBuV) - Limit (dBuV)



Attachment B--Unwanted Emissions Data

---Radiated Unwanted Emissions

9 KHz~30 MHz

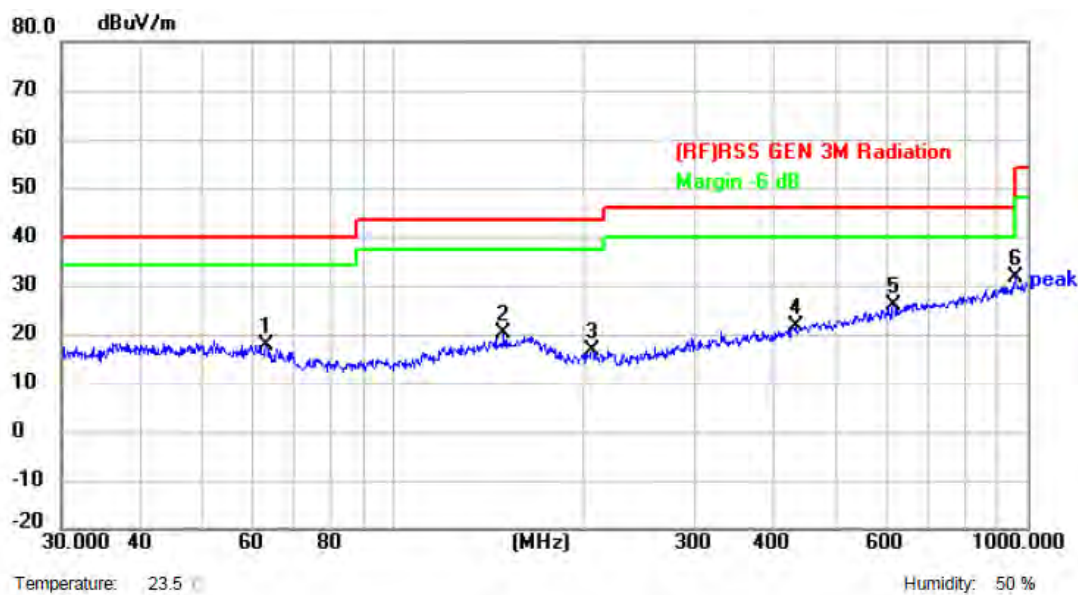
From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB

Below the permissible value has no need to be reported.

30MHz~1GHz

Test Voltage:	AC 120V/60Hz
Ant. Pol.	Horizontal
Test Mode:	Mode 1
Remark:	Only worse case is reported.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	63.0915	42.20	-24.62	17.58	40.00	-22.42	peak	P
2	149.4857	42.71	-22.47	20.24	43.50	-23.26	peak	P
3	206.3975	40.96	-24.32	16.64	43.50	-26.86	peak	P
4	431.0314	40.04	-18.40	21.64	46.00	-24.36	peak	P
5	616.3716	38.99	-13.00	25.99	46.00	-20.01	peak	P
6 *	958.7943	38.61	-7.14	31.47	46.00	-14.53	peak	P

Remark:

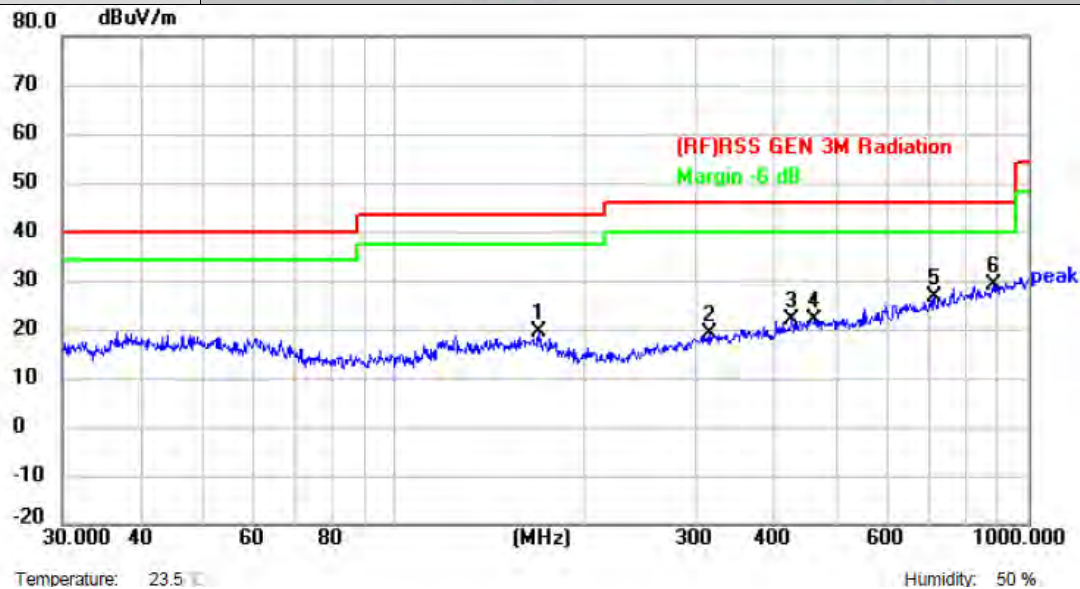
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)

2. QuasiPeak (dBuV/m)= Corr. (dB/m)+ Read Level (dBuV)

3. Margin (dB) = QuasiPeak (dBuV/m)-Limit QPK(dBuV/m)



Test Voltage:	AC 120V/60Hz
Ant. Pol.	Vertical
Test Mode:	Mode 1
Remark:	Only worse case is reported.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	169.0053	41.04	-21.60	19.44	43.50	-24.06	peak	P
2	314.3763	40.20	-21.23	18.97	46.00	-27.03	peak	P
3	425.0280	40.44	-18.44	22.00	46.00	-24.00	peak	P
4	460.7271	39.18	-17.14	22.04	46.00	-23.96	peak	P
5	711.6734	38.34	-11.89	26.45	46.00	-19.55	peak	P
6 *	881.4067	37.84	-8.66	29.18	46.00	-16.82	peak	P

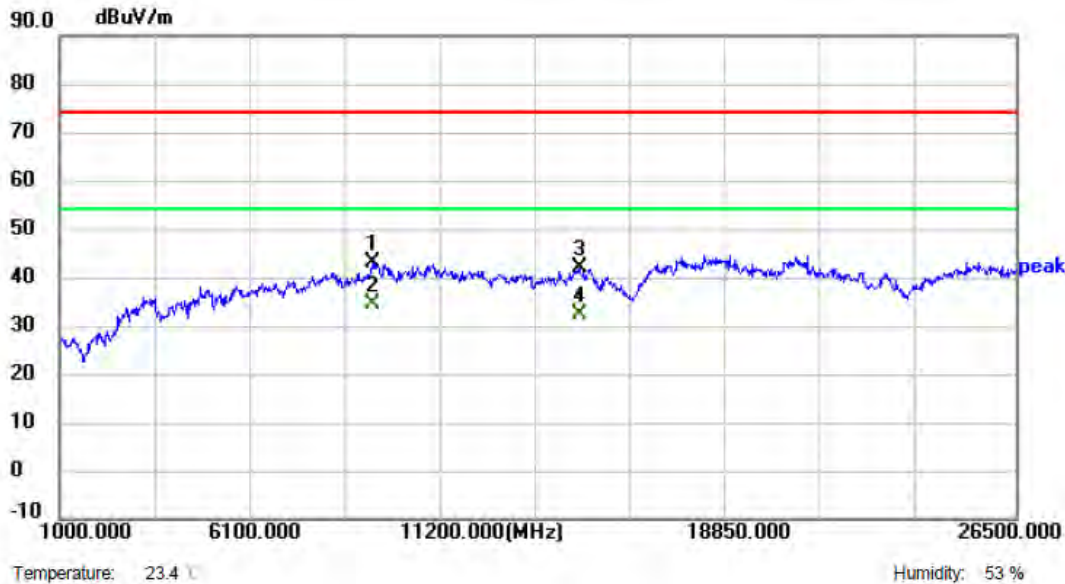
Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)
2. QuasiPeak (dBuV/m)= Corr. (dB/m)+ Read Level (dBuV)
3. Margin (dB) = QuasiPeak (dBuV/m)-Limit QPK(dBuV/m)



Above 1GHz

Test Voltage:	AC 120V/60Hz
Ant. Pol.	Horizontal
Test Mode:	TX B Mode 2412MHz



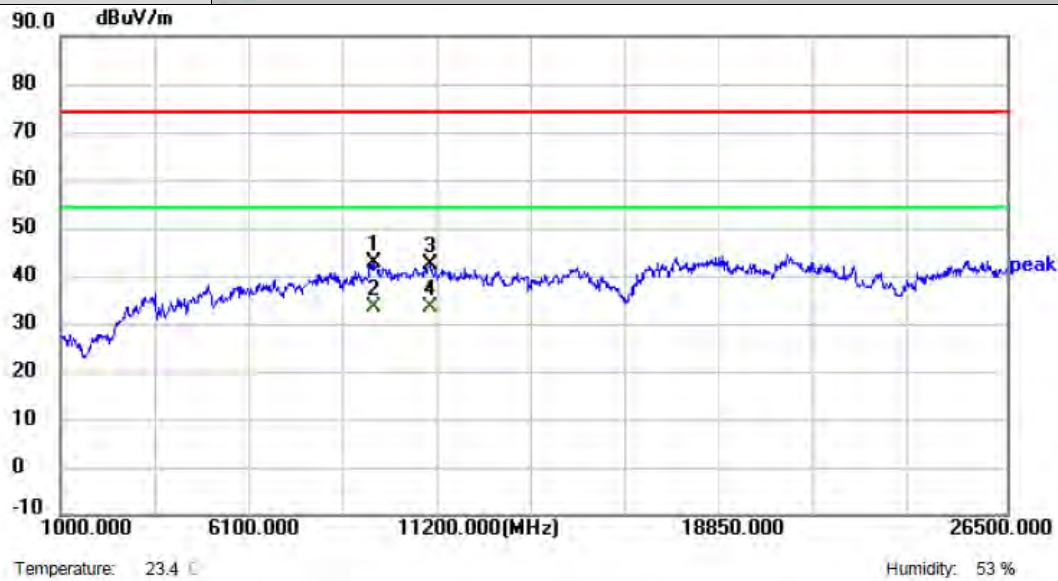
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	9338.5000	46.26	-3.20	43.06	74.00	-30.94	peak	P
2 *	9338.5000	37.57	-3.20	34.37	54.00	-19.63	AVG	P
3	14872.0000	39.06	2.88	41.94	74.00	-32.06	peak	P
4	14872.0000	29.40	2.88	32.28	54.00	-21.72	AVG	P

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)
2. Peak/AVG (dBuV/m)= Corr. (dB/m)+ Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m)-Limit PK/AVG(dBuV/m)
4. The tests evaluated 1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency. Test with highpass filter (Pass Frequency: 2.8-18G and 8-25G), and 18GHz-26.5GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.



Test Voltage:	AC 120V/60Hz
Ant. Pol.	Vertical
Test Mode:	TX B Mode 2412MHz



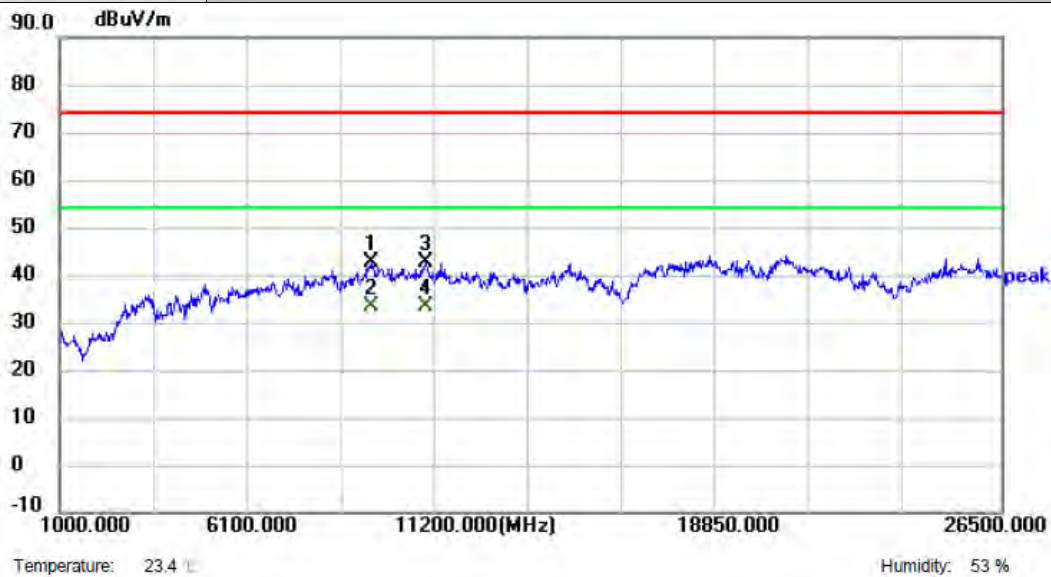
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	9466.0000	44.28	-1.62	42.66	74.00	-31.34	peak	P
2	9466.0000	35.10	-1.62	33.48	54.00	-20.52	AVG	P
3	10945.0000	43.38	-1.21	42.17	74.00	-31.83	peak	P
4 *	10945.0000	34.75	-1.21	33.54	54.00	-20.46	AVG	P

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)
2. Peak/AVG (dBuV/m)= Corr. (dB/m)+ Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m)-Limit PK/AVG(dBuV/m)
4. The tests evaluated 1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency. Test with highpass filter (Pass Frequency: 2.8-18G and 8-25G), and 18GHz-26.5GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.



Test Voltage:	AC 120V/60Hz
Ant. Pol.	Horizontal
Test Mode:	TX B Mode 2437MHz



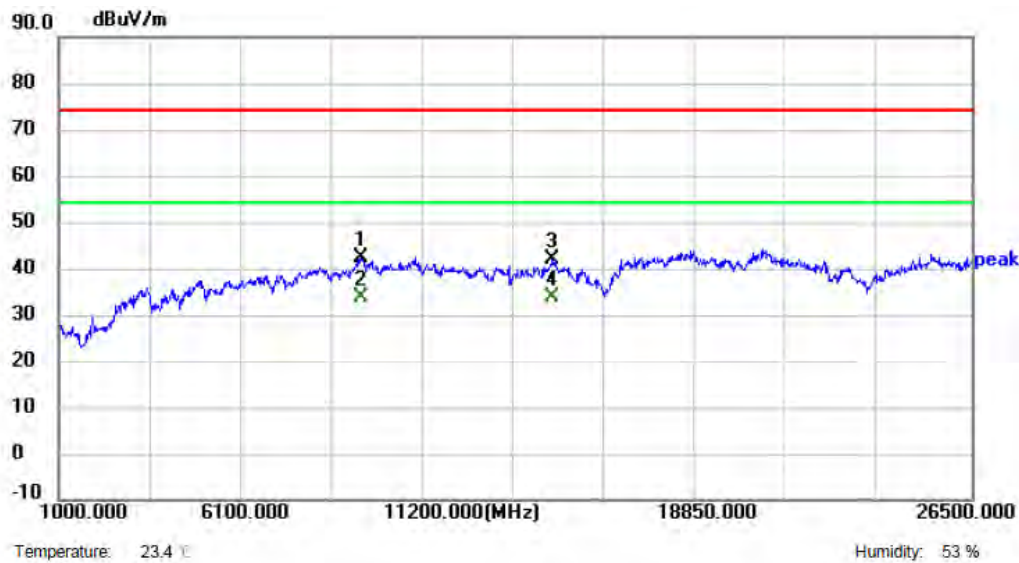
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	9466.0000	44.40	-1.62	42.78	74.00	-31.22	peak	P
2	9466.0000	34.86	-1.62	33.24	54.00	-20.76	AVG	P
3	10919.5000	44.11	-1.30	42.81	74.00	-31.19	peak	P
4 *	10919.5000	34.71	-1.30	33.41	54.00	-20.59	AVG	P

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)
2. Peak/AVG (dBuV/m)= Corr. (dB/m)+ Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m)-Limit PK/AVG(dBuV/m)
4. The tests evaluated 1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency. Test with highpass filter (Pass Frequency: 2.8-18G and 8-25G), and 18GHz-26.5GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.



Test Voltage:	AC 120V/60Hz
Ant. Pol.	Vertical
Test Mode:	TX B Mode 2437MHz



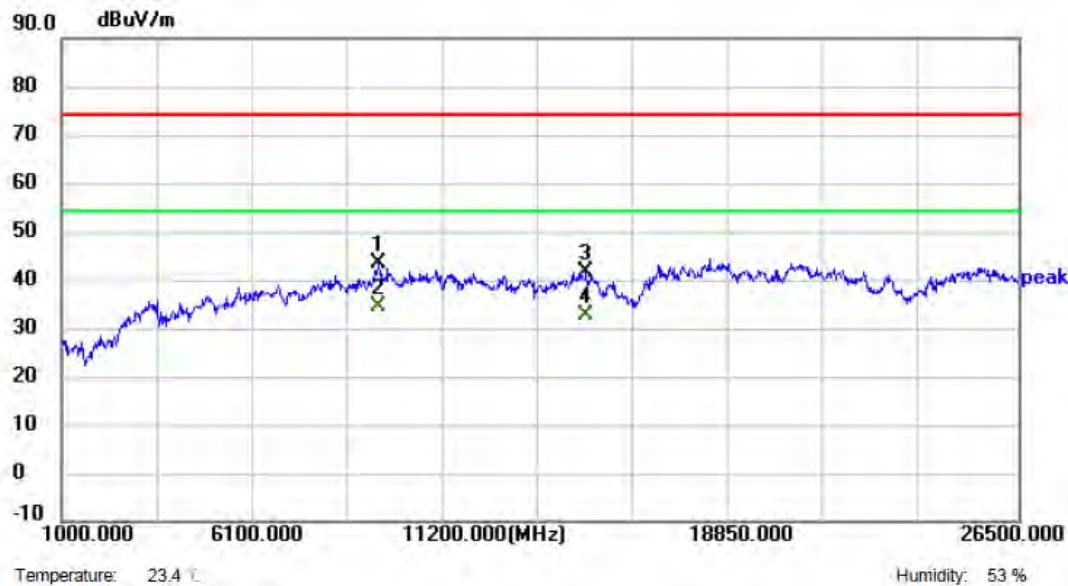
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	9440.5000	44.19	-1.87	42.32	74.00	-31.68	peak	P
2	9440.5000	35.53	-1.87	33.66	54.00	-20.34	AVG	P
3	14795.5000	39.40	2.70	42.10	74.00	-31.90	peak	P
4 *	14795.5000	31.11	2.70	33.81	54.00	-20.19	AVG	P

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)
2. Peak/AVG (dBuV/m)= Corr. (dB/m)+ Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m)-Limit PK/AVG(dBuV/m)
4. The tests evaluated 1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency. Test with highpass filter (Pass Frequency: 2.8-18G and 8-25G), and 18GHz-26.5GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.



Test Voltage:	AC 120V/60Hz
Ant. Pol.	Horizontal
Test Mode:	TX B Mode 2462MHz



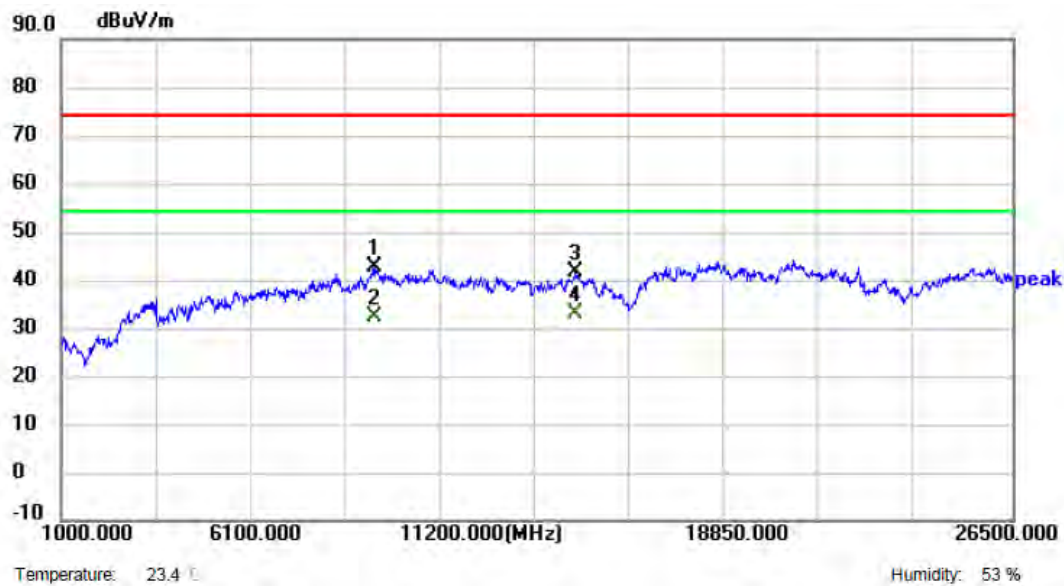
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	9466.0000	45.10	-1.62	43.48	74.00	-30.52	peak	P
2 *	9466.0000	36.17	-1.62	34.55	54.00	-19.45	AVG	P
3	14974.0000	39.09	2.49	41.58	74.00	-32.42	peak	P
4	14974.0000	30.19	2.49	32.68	54.00	-21.32	AVG	P

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)
2. Peak/AVG (dBuV/m)= Corr. (dB/m)+ Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m)-Limit PK/AVG(dBuV/m)
4. The tests evaluated 1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency. Test with highpass filter (Pass Frequency: 2.8-18G and 8-25G), and 18GHz-26.5GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.



Test Voltage:	AC 120V/60Hz
Ant. Pol.	Vertical
Test Mode:	TX B Mode 2462MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	9415.0000	44.89	-2.30	42.59	74.00	-31.41	peak	P
2	9415.0000	34.68	-2.30	32.38	54.00	-21.62	AVG	P
3	14795.5000	38.83	2.70	41.53	74.00	-32.47	peak	P
4 *	14795.5000	30.35	2.70	33.05	54.00	-20.95	AVG	P

Remark:

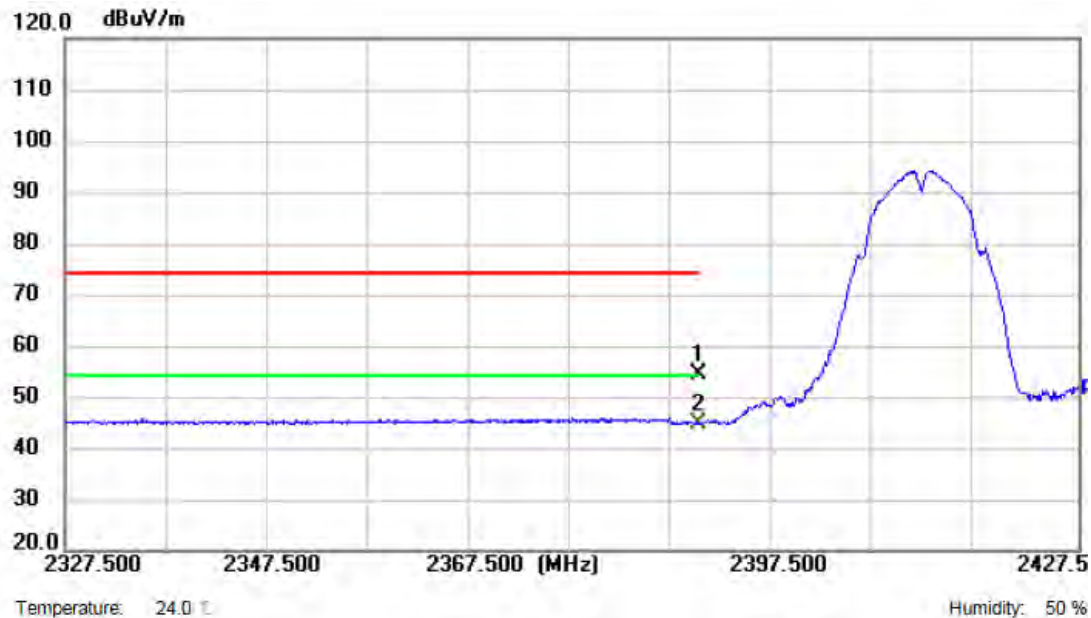
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)
2. Peak/AVG (dBuV/m)= Corr. (dB/m)+ Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m)-Limit PK/AVG(dBuV/m)
4. The tests evaluated 1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency. Test with highpass filter (Pass Frequency: 2.8-18G and 8-25G), and 18GHz-26.5GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.



Attachment C--Restricted Bands Requirement Test Data

Radiation Test

Test Voltage:	AC 120V/60Hz
Ant. Pol.	Horizontal
Test Mode:	TX b Mode 2412MHz
Remark:	Only worse case is reported.



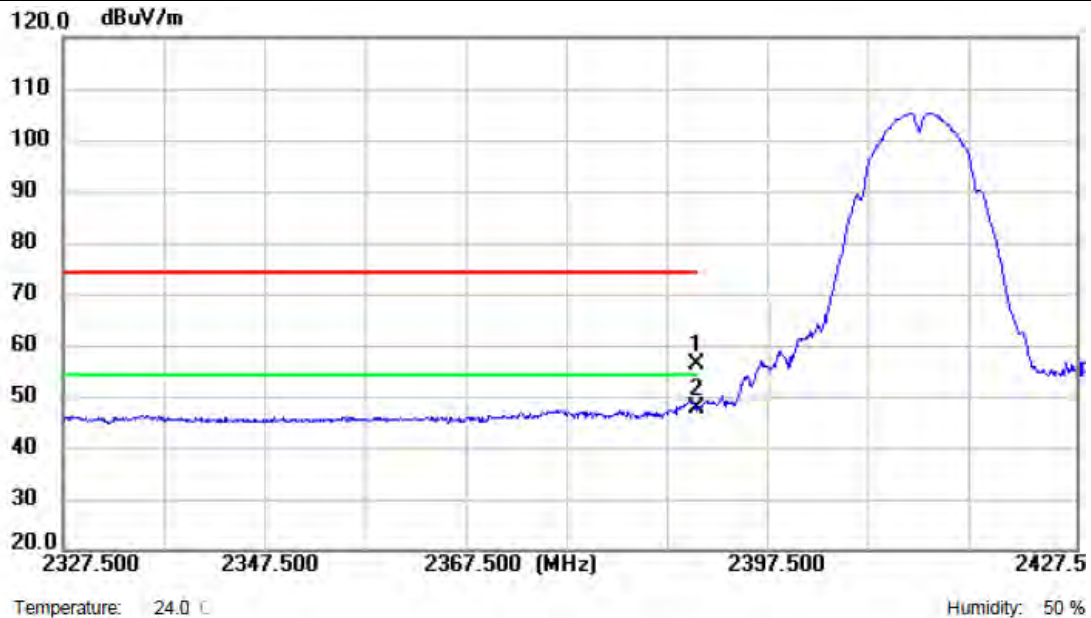
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	2390.0000	44.40	9.98	54.38	74.00	-19.62	peak	P
2 *	2390.0000	34.89	9.98	44.87	54.00	-9.13	AVG	P

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)
2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
3. Margin (dB) = Peak/AVG (dBμV/m)-Limit PK/AVG(dBμV/m)



Test Voltage:	AC 120V/60Hz
Ant. Pol.	Vertical
Test Mode:	TX b Mode 2412MHz
Remark:	Only worse case is reported.



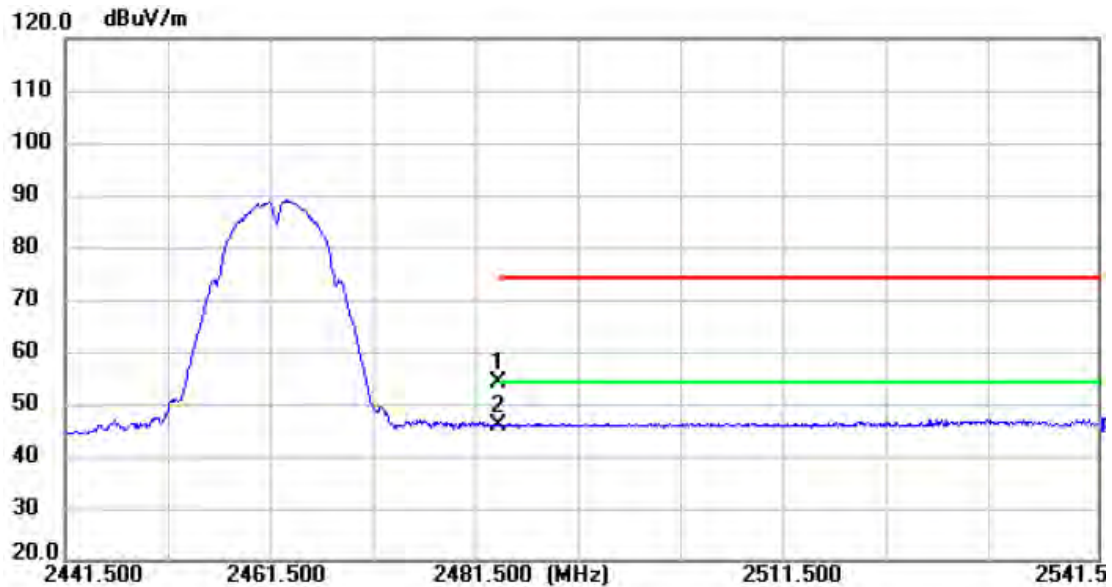
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 *	2390.0000	46.20	9.98	56.18	74.00	-17.82	peak	P
2	2390.0000	37.54	9.98	47.52	74.00	-26.48	peak	P

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)
2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
3. Margin (dB) = Peak/AVG (dBμV/m)-Limit PK/AVG(dBμV/m)



Test Voltage:	AC 120V/60Hz
Ant. Pol.	Horizontal
Test Mode:	TX b Mode 2462MHz
Remark:	Only worse case is reported.



Temperature: 24.0 °C

Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 *	2483.5000	43.90	10.20	54.10	74.00	-19.90	peak	P
2	2483.5000	35.75	10.20	45.95	74.00	-28.05	peak	P

Remark:

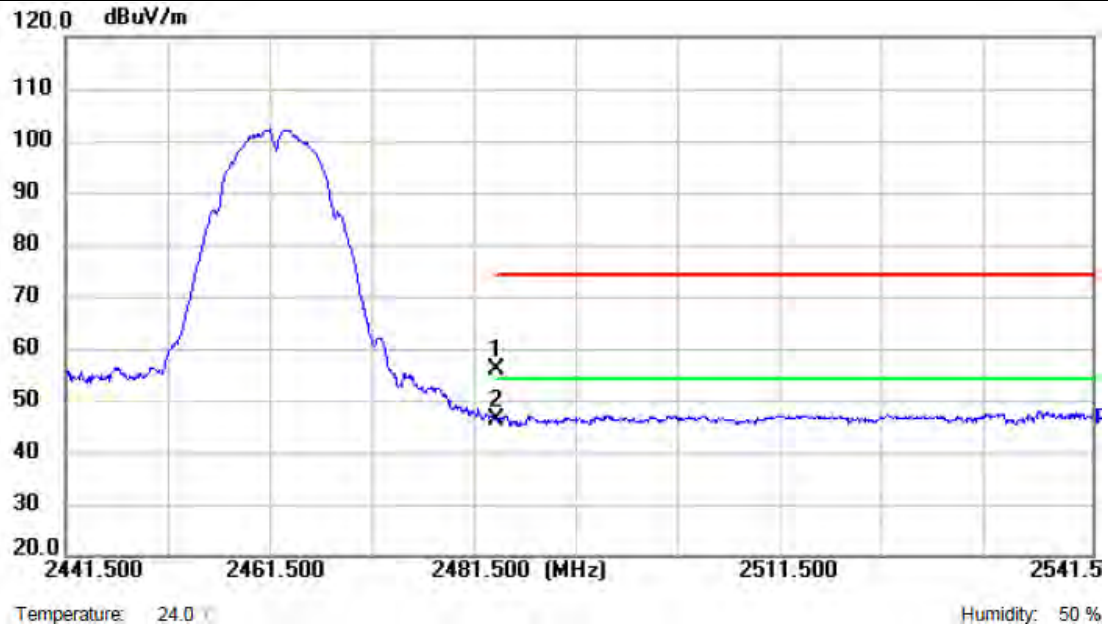
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)

2. Peak/AVG (dBuV/m)= Corr. (dB/m)+ Read Level (dBuV)

3. Margin (dB) = Peak/AVG (dBuV/m)-Limit PK/AVG(dBuV/m)



Test Voltage:	AC 120V/60Hz
Ant. Pol.	Vertical
Test Mode:	TX b Mode 2462MHz
Remark:	Only worse case is reported.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 *	2483.5000	45.53	10.20	55.73	74.00	-18.27	peak	P
2	2483.5000	36.04	10.20	46.24	74.00	-27.76	peak	P

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)+AMP(dB)
2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
3. Margin (dB) = Peak/AVG (dBμV/m)-Limit PK/AVG(dBμV/m)

-----END OF THE REPORT-----

