FCC Radio Test Report

FCC ID: RYK-WPEQ160ACNBT

This report concerns (check one): ☒**Original Grant** ☐**Class II Change**

Project No.	:	1706188
Equipment	:	802.11ac/a/b/g/n Wi-Fi+BT Module
Test Model	:	WPEQ-160ACN(BT)
Serial Model	:	WPEQ-160ACN
Applicant	:	SparkLAN Communications, Inc.
Address	:	8F.,No.257,Sec.2,Tiding-Blvd.,Neihu District,Taipei City 11493,Taiwan (R.O.C.)

Date of Receipt	:	Jun. 29, 2017
Date of Test	:	Jun. 29, 2017 ~ Aug. 10, 2017
Issued Date	:	Aug. 16, 2017
Tested by	:	BTL Inc.

Testing Engineer : Kenji Lin (Kenji Lin)

Technical Manager : James Chiu (James Chiu)

Authorized Signatory : Andy Chiu (Andy Chiu)

BTL INC.

B1, No.37, Lane 365, Yang Guang St.,
Nei-Hu District, Taipei City 114, Taiwan.
TEL:+886-2-2657-3299 FAX: +886-2- 2657-3331

Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL**shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

BTL's report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and **BTL-self**, extracts from the test report shall not be reproduced except in full with **BTL**'s authorized written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Table of Contents Page

REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-2-1706188	Original Issue.	Aug. 16, 2017

1. CERTIFICATION

Equipment	:	802.11ac/a/b/g/n Wi-Fi+BT Module
Brand Name	:	SparkLAN
Test Model	:	WPEQ-160ACN(BT)
Serial Model	:	WPEQ-160ACN
Applicant	:	SparkLAN Communications, Inc.
Manufacturer	:	SparkLAN Communications, Inc.
Address	:	8F.,No.257,Sec.2,Tiding-Blvd.,Neihu District,Taipei City 11493,Taiwan (R.O.C.)
Date of Test	:	Jun. 29, 2017 ~ Aug. 10, 2017
Test Sample	:	Production Sample
Standard(s)	:	FCC Part15, Subpart E(15.407) / ANSI C63.10-2013

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-2-1706188) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart E			
Standard(s) Section	Test Item	Judgement	Remark
15.207	AC Power Line Conducted Emissions	PASS	
15.407(a)	26dB Spectrum Bandwidth	PASS	
15.407(e)	6dB Spectrum Bandwidth	PASS	
15.407(a)	Maximum Conducted Output Power	PASS	
15.407(a)	Power Spectral Density	PASS	
15.407(a)	Radiated Emissions	PASS	
15.407(b)	Band Edge Emissions	PASS	
15.407(g)	Frequency Stability	PASS	
15.203	Antenna Requirements	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this test report.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

Conducted emission Test:

C05: (VCCI RN: C-4742; FCC RN:965108; FCC DN:TW1082)
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

Radiated emission Test (Below 1 GHz):

CB15: (FCC RN:674415; FCC DN:TW0659)
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

Radiated emission Test (Above 1 GHz):

CB15: (FCC RN:674415; FCC DN:TW0659)
No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

The reported uncertainty of measurement y ± 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 %.

A. Conducted emission test:

Test Site	Method	Measurement Frequency Range	U,(dB)
C05	CISPR	150 kHz ~ 30MHz	2.68

B. Radiated emission test:

Test Site	Method	Measurement Frequency Range	U,(dB)
CB15 (3m)	CISPR	9kHz ~ 150kHz	2.82
		150kHz ~ 30MHz	2.58

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
CB15 (3m)	CISPR	30MHz ~ 200MHz	V	4.20
		30MHz ~ 200MHz	H	3.64
		200MHz ~ 1,000MHz	V	4.56
		200MHz ~ 1,000MHz	H	3.90

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
CB15 (3m)	CISPR	1GHz ~ 6GHz	V	4.46
		1GHz ~ 6GHz	H	4.40
		6GHz ~ 18GHz	V	3.88
		6GHz ~ 18GHz	H	4.00

Test Site	Method	Measurement Frequency Range	U,(dB)
CB15 (1m)	CISPR	18 ~ 26.5 GHz	4.62
		26.5 ~ 40 GHz	5.12

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above.
These are our U_{lab} values in CISPR 16-4-2 terminology.
Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR}, as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz: 3.6 dB
Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz: 5.2 dB

It can be seen that our U_{lab} values are smaller than U_{CISPR}.
Note: unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	802.11ac/a/b/g/n Wi-Fi+BT Module		
Brand Name	SparkLAN		
Test Model	WPEQ-160ACN(BT)		
Serial Model	WPEQ-160ACN		
Model Difference	Model No.	WPEQ-160ACN(BT)	WPEQ-160ACN
	BT Function	○	×
EUT Power Rating	DC 3.3V (System supplied.)		
Product Description	Operation Frequency	UNII-1: 5150-5250MHz UNII-3: 5725-5850MHz	
	Modulation Type	OFDM	
	Bit Rate of Transmitter	300Mbps	
Output Power	Output Power (Max.)for UNII-1 (1TX)	802.11a: 19.02dBm 802.11ac (20M): 17.86dBm 802.11ac (40M): 17.61dBm 802.11ac (80M): 13.96dBm	
	Output Power (Max.)for UNII-3 (1TX)	802.11a: 18.34dBm 802.11ac (20M): 18.63dBm 802.11ac (40M): 17.72dBm 802.11ac (80M): 16.05dBm	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. Channel List:

802.11a 802.11n 20MHz 802.11ac 20MHz		802.11n 40MHz 802.11ac 40MHz		802.11ac 80MHz	
UNII-1		UNII-1		UNII-1	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

802.11a 802.11n 20MHz 802.11ac 20MHz		802.11n 40MHz 802.11ac 40MHz		802.11ac 80MHz	
UNII-3		UNII-3		UNII-3	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

3. Antenna Specification:

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain (dBi)	
					5150-5250 MHz	5725-5850 MHz
1	Wanshin	WSS038	Dipole	RP-SMA	5.5	4

Note: 2 U.FL connectors (main antenna 0 on, diversity antenna 1 off) for 1T1R.

4. The EUT doesn't support one or more than one antenna simultaneous transmitting for BT/WIFI 2.4G & 5G.

3.2 DESCRIPTION OF TEST MODES

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 above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)
Mode 2	TX AC(VHT20) Mode / CH36, CH40, CH48 (UNII-1)
Mode 3	TX AC(VHT40) / CH38, CH46 (UNII-1)
Mode 4	TX AC(VHT80) Mode / CH42 (UNII-1)
Mode 5	TX A Mode / CH149,CH157,CH165 (UNII-3)
Mode 6	TX AC(VHT20) Mode / CH149,CH157,CH165 (UNII-3)
Mode 7	TX AC(VHT40) / CH151,CH159 (UNII-3)
Mode 8	TX AC(VHT80) Mode / CH155 (UNII-3)
Mode 9	TX Mode

The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

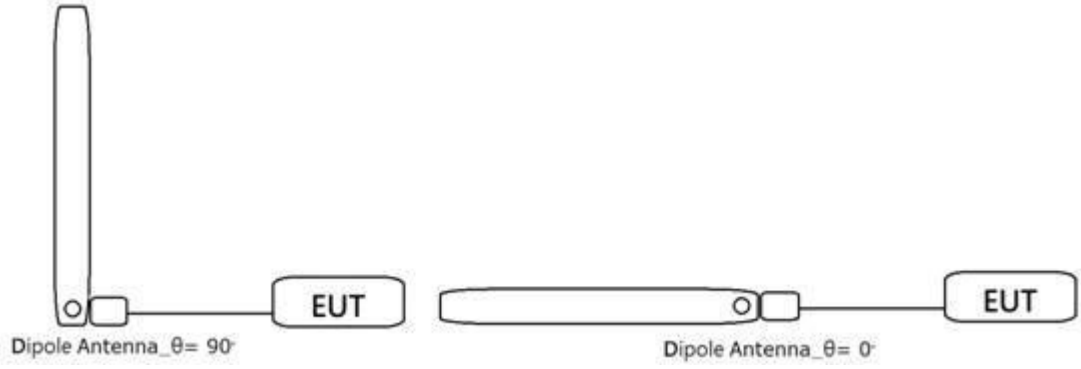
For Conducted Test	
Final Test Mode	Description
Mode 9	TX Mode

For Radiated Test	
Final Test Mode	Description
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)
Mode 2	TX AC(VHT20) Mode / CH36, CH40, CH48 (UNII-1)
Mode 3	TX AC(VHT40) / CH38, CH46 (UNII-1)
Mode 4	TX AC(VHT80) Mode / CH42 (UNII-1)
Mode 5	TX A Mode / CH149,CH157,CH165 (UNII-3)
Mode 6	TX AC(VHT20) Mode / CH149,CH157,CH165 (UNII-3)
Mode 7	TX AC(VHT40) / CH151,CH159 (UNII-3)
Mode 8	TX AC(VHT80) Mode / CH155 (UNII-3)

Note:

(1) For radiated below 1GHz test, the 802.11A mode is found to be the worst case and recorded.

(2) For Dipole Antenna, the EUT has pre-tested on positioned of 0° & 90°. The worst case was found positioned on 90°. Therefore only the test data of this 90° was used for radiated emission measurement test.



3.3 TABLE OF PARAMETERS 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

UNII-1 - 1TX			
Test Software Version	QRCT		
Frequency (MHz)	5180	5200	5240
A Mode	19	20	22

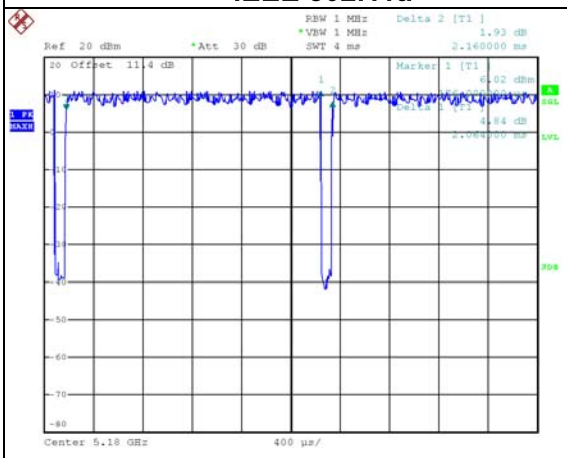
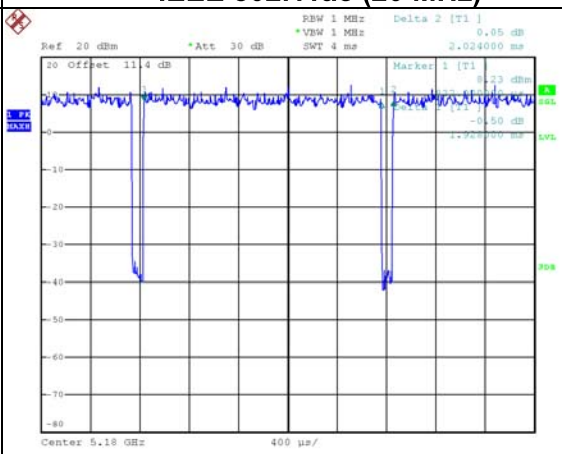
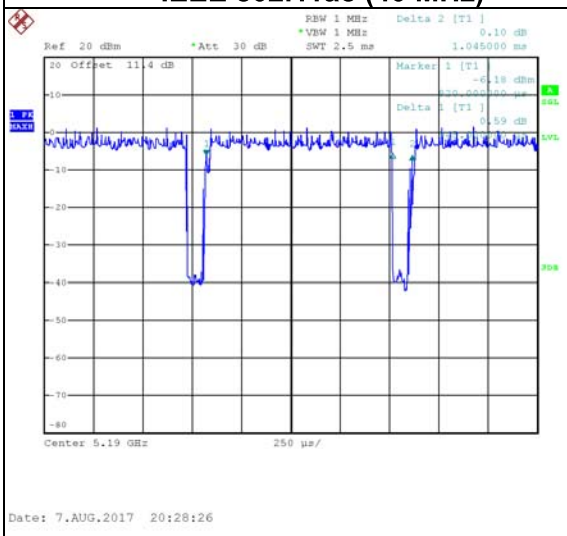
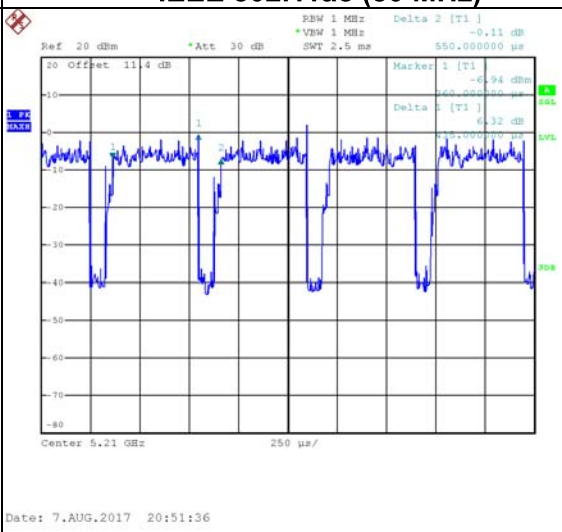
UNII-3 - 1TX			
Test Software Version	QRCT		
Frequency (MHz)	5745	5785	5825
A Mode	22	25	24

UNII-1 - 1TX			
Test Software Version	QRCT		
Frequency (MHz)	5180	5200	5240
AC20 Mode	19	19	20
Frequency (MHz)	5190	5230	
AC40 Mode	14	20	
Frequency (MHz)	5210		
AC80 Mode	14		

UNII-3 - 1TX			
Test Software Version	QRCT		
Frequency (MHz)	5745	5785	5825
AC20 Mode	23	22	25
Frequency (MHz)	5755	5795	
AC40 Mode	21	21	
Frequency (MHz)	5775		
AC80 Mode	18		

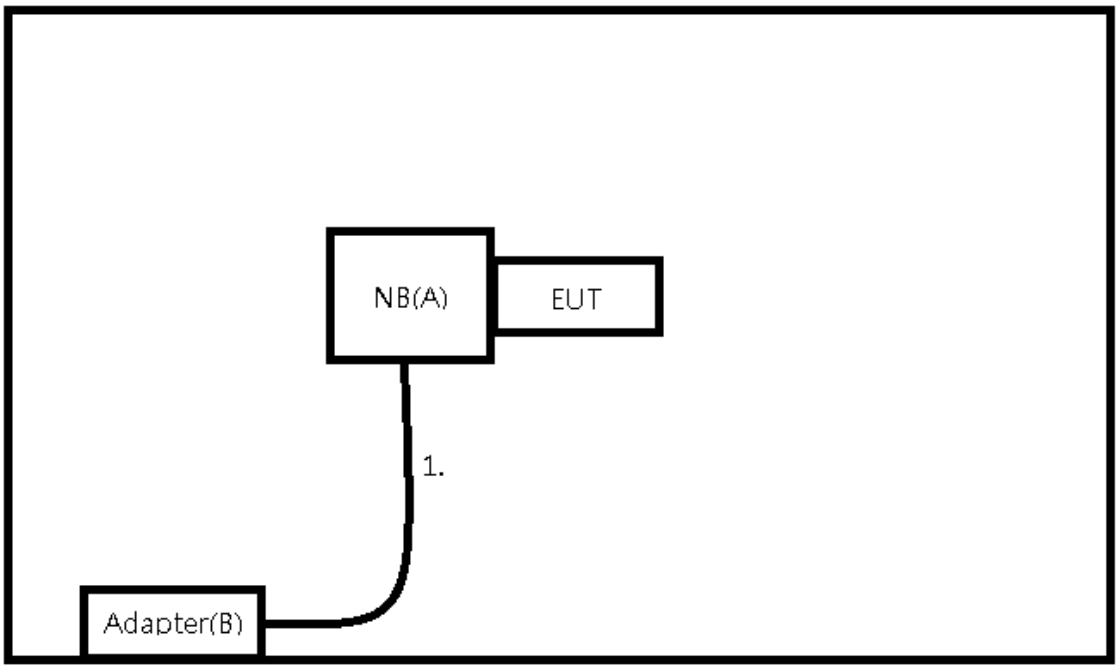
3.4 DUTY CYCLE

If duty cycle is ≥ 98 %, duty factor is not required.
If duty cycle is < 98 %, duty factor shall be considered.

IEEE 802.11a	IEEE 802.11ac (20 MHz)
	
Duty cycle = 2.064 ms / 2.160 ms = 95.56 % Duty Factor = 10 * log(1 / 0.9556) = 0.20	Duty cycle = 1.928 ms / 2.024 ms = 95.26 % Duty Factor = 10 * log(1 / 0.9526) = 0.21
IEEE 802.11ac (40 MHz)	**IEEE 802.11ac (80 MHz)**
	
Duty cycle = 0.945 ms / 1.045 ms = 90.43 % Duty Factor = 10 * log(1 / 0.9043) = 0.44	Duty cycle = 0.435 ms / 0.550 ms = 79.09 % Duty Factor = 10 * log(1 / 0.7909) = 1.02

Note:
For IEEE 802.11a and IEEE 802.11ac (20 MHz):
For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz (Duty cycle < 98%).
For IEEE 802.11ac (40 MHz):
For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 2 kHz (Duty cycle < 98%).
For IEEE 802.11ac (80 MHz):
For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 kHz (Duty cycle < 98%).

3.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.6 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
A	Notebook PC	HP	TPN-I119	N/A	N/A
B	Adapter	HP	HSTNN-CA40	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
1	YES	NO	1.5	Power Cable

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150kHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

4.1.2 TEST PROCEDURE

a. 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.

b. 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.

c. 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.

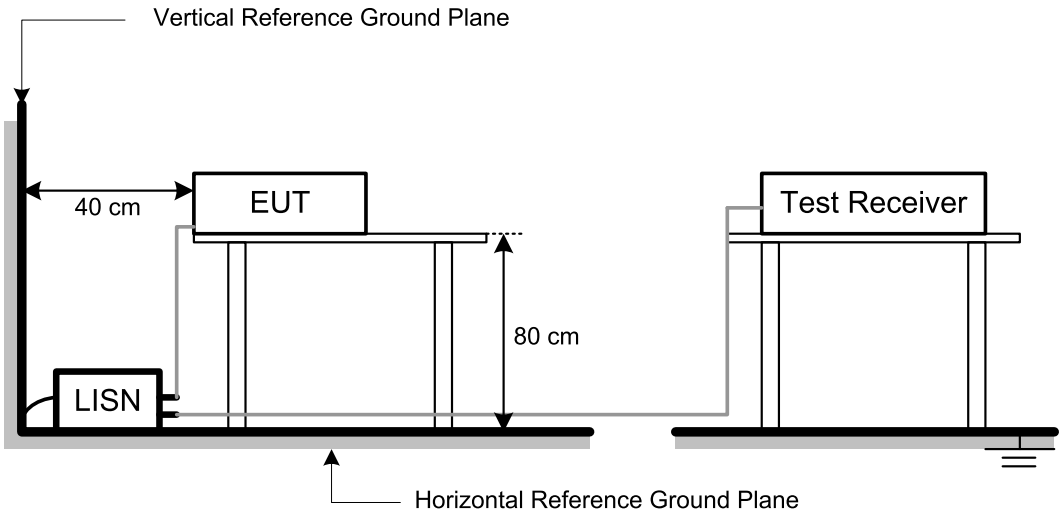
d. LISN at least 80 cm from nearest part of EUT chassis.

e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.
The EUT was programmed to be in continuously transmitting/TX Mode mode.

4.1.6 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the Attachment A.

Remark:

(1) All readings are QP Mode value unless otherwise stated AVG in column of『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform。In this case, a " * " marked in AVG Mode column of Interference Voltage Measured。

(2) Measuring frequency range from 150kHz to 30MHz。

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) The 9k ~ 30MHz radiated emissions have been verified between the Semi-anechoic chamber and Open site, it meets KDB414788 requirement.

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dBμV/m)
5150-5250	-27	68.3
5250-5350	-27	68.3
5470-5725	-27	68.3
5725-5850	-27(Note 2)	68.3
	10 (Note 2)	105.3
	15.6 (Note 2)	110.9
	27 (Note 2)	122.3

Note:

1. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength: $E = \frac{1000000\sqrt{30P}}{3}$ μV/m, where P is the eirp (Watts)

2. According to FCC 16-24, All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.

4.2.2 TEST PROCEDURE

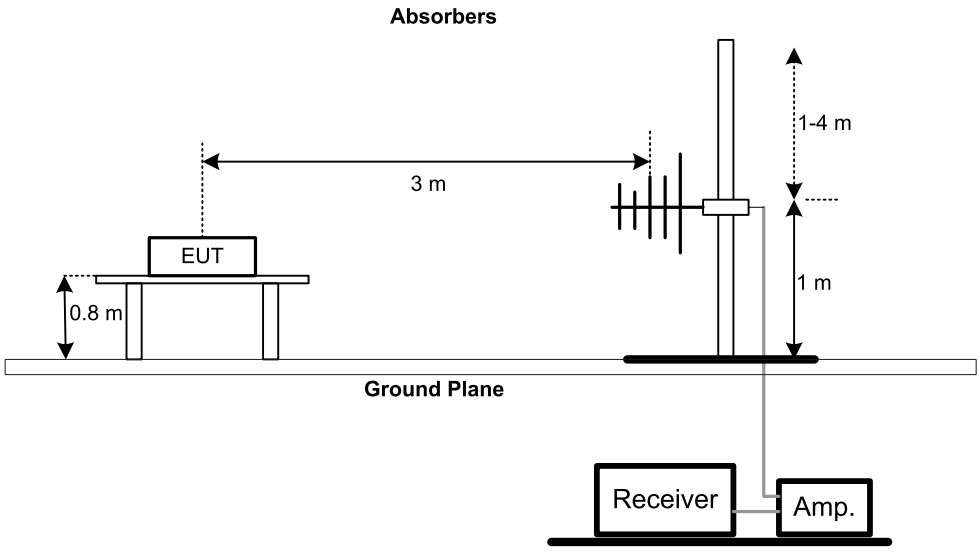
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform. (below 1GHz)
f. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform. (above 1GHz)
g. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

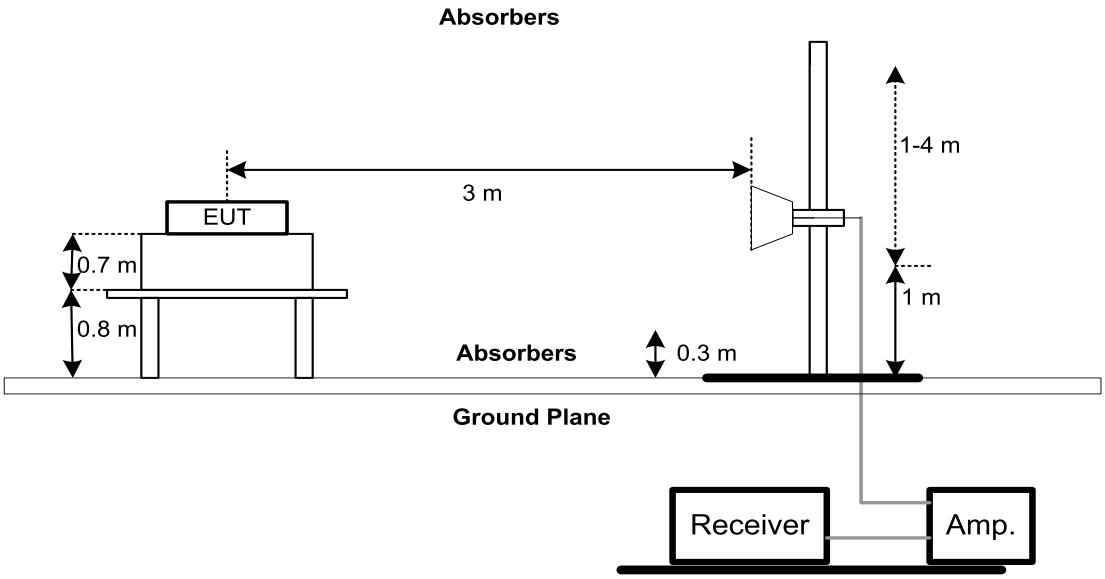
No deviation

4.2.4 TEST SETUP

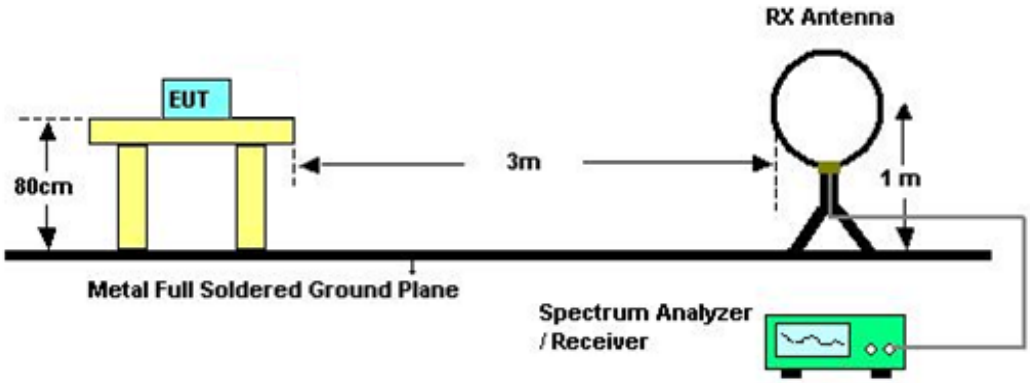
(A)Radiated Emission Test Set-Up Frequency Below 1GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



(C) Radiated emissions below 30MHz



4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

4.2.6 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 65% Test Voltage: AC 120V/60Hz

4.2.7 TEST RESULTS (9K TO 30MHz)

Please refer to the Attachment B

Remark:

(1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
(2) Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
(3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8 TEST RESULTS (BETWEEN 30 TO 1000 MHz)

Please refer to the Attachment C.

Remark:

(1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120kHz；SPA setting in RBW=120kHz, VBW =120kHz, Swp. Time = 0.3 sec./MHz。
(2) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform。
(3) Measuring frequency range from 30MHz to 1000MHz。
(4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table。

4.2.9 TEST RESULTS (ABOVE 1000 MHz)

Please refer to the Attachment D.

Remark:

(1) Spectrum Setting: 30MHz – 1000MHz , RBW= 100kHz, VBW=100kHz, Sweep time = 200 ms. 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time = Auto
(2) All readings are Peak unless otherwise stated AV in column of『Note』. Peak denotes that the Peak reading compliance with the AV Limits and then AV Mode measurement didn't perform.
(3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission 。
(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
(6) EUT Orthogonal Axes:
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand
(7) During the measurements above 1GHz it is taken care of that the EUT is always within the 3dB cone of radiation BW of the used antenna.
(8) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

5. 26dB SPECTRUM BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E			
Test Item	Limit	Frequency Range (MHz)	Result
Bandwidth	26 dB Bandwidth	5150-5250	PASS
	Minimum 500kHz 6dB Bandwidth	5725-5850	PASS

5.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b.

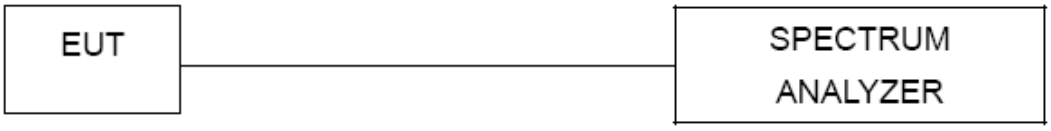
Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RBW	300 kHz
VBW	1000 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

c. Measured the spectrum width with power higher than 26dB below carrier

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

5.1.6 TEST RESULTS

Please refer to the Attachment E.

6. MAXIMUM CONDUCTED OUTPUT POWER

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E			
Test Item	Limit	Frequency Range (MHz)	Result
Conducted Output Power	Fixed:1 Watt (30dBm) Mobile and portable: 250mW (24dBm)	5150-5250	PASS
	1 Watt (30dBm)	5725-5850	PASS
Note: The maximum e.i.r.p at anyelevation angle above 30 degrees as measured from the horizon must not exceed 125mW(21dBm)			

6.1.1 TEST PROCEDURE

a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,

b.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RBW	= 1MHz.
VBW	≥ 3MHz.
Detector	RMS
Trace	Max Hold
Sweep Time	auto

c. Test was performed in accordance with method of KDB 789033 D02.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP

6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

6.1.6 TEST RESULTS

Please refer to the Attachment F.

7. POWER SPECTRAL DENSITY TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E			
Test Item	Limit	Frequency Range (MHz)	Result
Power Spectral Density	Other then Mobile and portable:17dBm/MHz Mobile and portable:11dBm/MHz	5150-5250	PASS
	30dBm/500kHz	5725-5850	PASS

8.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RBW	= 1MHz.
VBW	≥ 3MHz.
Detector	RMS
Trace average	100 trace
Sweep Time	Auto

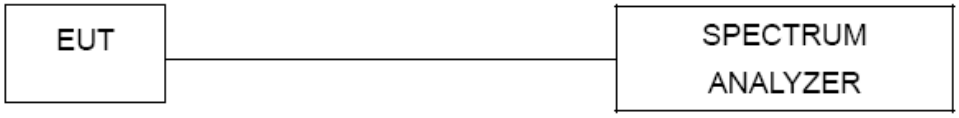
Note:

1. For UNII-3, according to KDB publication 789033 D02 General UNII Test Procedures New Rules v01, section II.F.5., it is acceptable to set RBW at 1MHz and VBW at 3MHz if the spectrum analyzer does not have 500kHz RBW.
2. The value measured with RBW=1MHz is to be added with 10log(500kHz/1MHz) which is -3dB. For example, if the measured value is +10dBm using RBW=1MHz (that is +10dBm/MHz), then the converted value will be +7dBm/500kHz.

7.1.1 DEVIATION FROM STANDARD

No deviation.

7.1.2 TEST SETUP



7.1.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

7.1.4 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

7.1.5 TEST RESULTS

Please refer to the Attachment G.

8. FREQUENCY STABILITY MEASUREMENT

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E			
Test Item	Limit	Frequency Range (MHz)	Result
Frequency Stability	Specified in the user's manual	5150-5250	PASS
		5725-5850	PASS

8.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RBW	10 kHz
VBW	10 kHz
Sweep Time	Auto

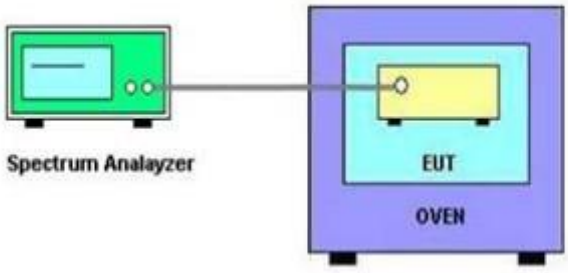
c. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.

d. User manual temperature is 0°C~40°C.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

8.1.6 TEST RESULTS

Please refer to the Attachment H.

9. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	101050	Jan. 25, 2018
2	Test Cable	TIMES	CFD300-NL	C02	Jun. 13, 2018
3	EMI Test Receiver	R&S	ESR7	101433	Dec. 09, 2017
4	Measurement Software	EZ	EZ_EMC (Version NB-03A)	N/A	N/A

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Preamplifier	EMCI	012645B	980267	Feb. 28, 2018
2	Preamplifier	EMCI	EMC02325	980217	Dec. 29, 2017
3	Preamplifier	EMCI	EMC2654045	980030	Feb. 14, 2018
4	Test Cable	EMCI	EMC104-SM-SM-8000	8m	Jan. 04, 2018
5	Test Cable	EMCI	EMC104-SM-SM-800	150207	Jan. 04, 2018
6	Test Cable	EMCI	EEMC104-SM-SM-3000	151205	Jan. 04, 2018
7	MXE EMI Receiver	Agilent	N9038A	MY55420127	Jan. 09, 2018
8	Signal Analyzer	Agilent	N9010A	MY52220990	Feb. 22, 2018
9	Loop Ant	EMCO	6502	42960	Nov. 24, 2017
10	Horm Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	Feb. 28, 2018
11	Horm Ant	Schwarzbeck	BBHA 9170	187	May 11, 2018
12	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-548	Jan. 16, 2018
13	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0623	Jan. 16, 2018

Spectrum Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

Maximum Conducted Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

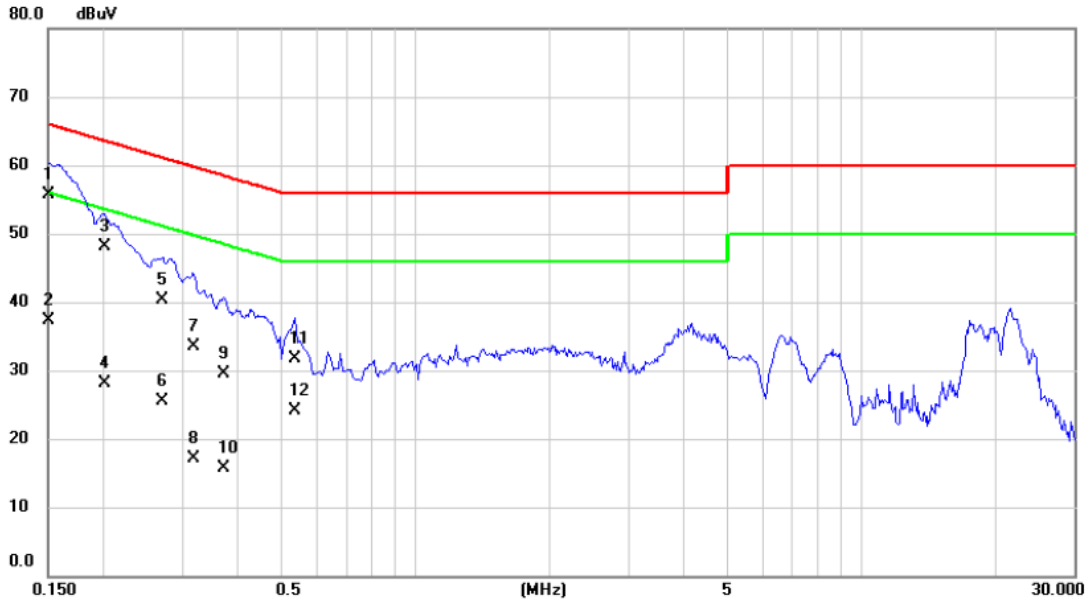
Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

Remark: ”N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

ATTACHMENT A - CONDUCTED EMISSION

Test Mode:	TX MODE_UNII-1

Line

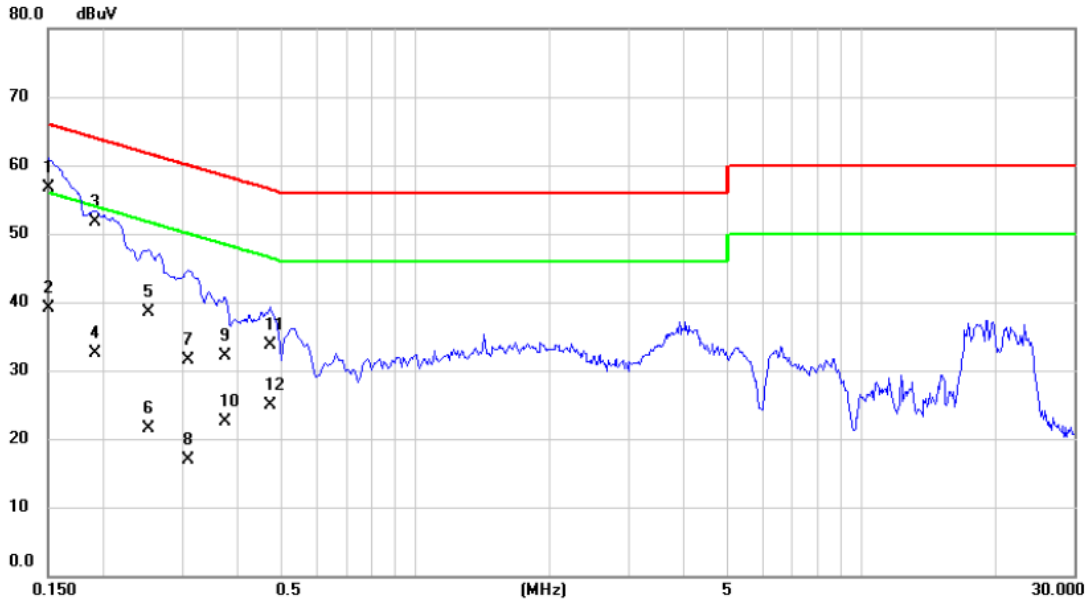


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1507	45.90	9.76	55.66	65.96	-10.30	QP	
2		0.1507	27.60	9.76	37.36	55.96	-18.60	AVG	
3		0.2004	38.40	9.74	48.14	63.59	-15.45	QP	
4		0.2004	18.40	9.74	28.14	53.59	-25.45	AVG	
5		0.2704	30.60	9.75	40.35	61.11	-20.76	QP	
6		0.2704	15.70	9.75	25.45	51.11	-25.66	AVG	
7		0.3173	23.80	9.74	33.54	59.78	-26.24	QP	
8		0.3173	7.30	9.74	17.04	49.78	-32.74	AVG	
9		0.3726	19.80	9.75	29.55	58.44	-28.89	QP	
10		0.3726	6.00	9.75	15.75	48.44	-32.69	AVG	
11		0.5360	21.90	9.76	31.66	56.00	-24.34	QP	
12		0.5360	14.30	9.76	24.06	46.00	-21.94	AVG	

Note：The test result has included the cable loss.

Test Mode:	TX MODE_UNII-1

Neutral

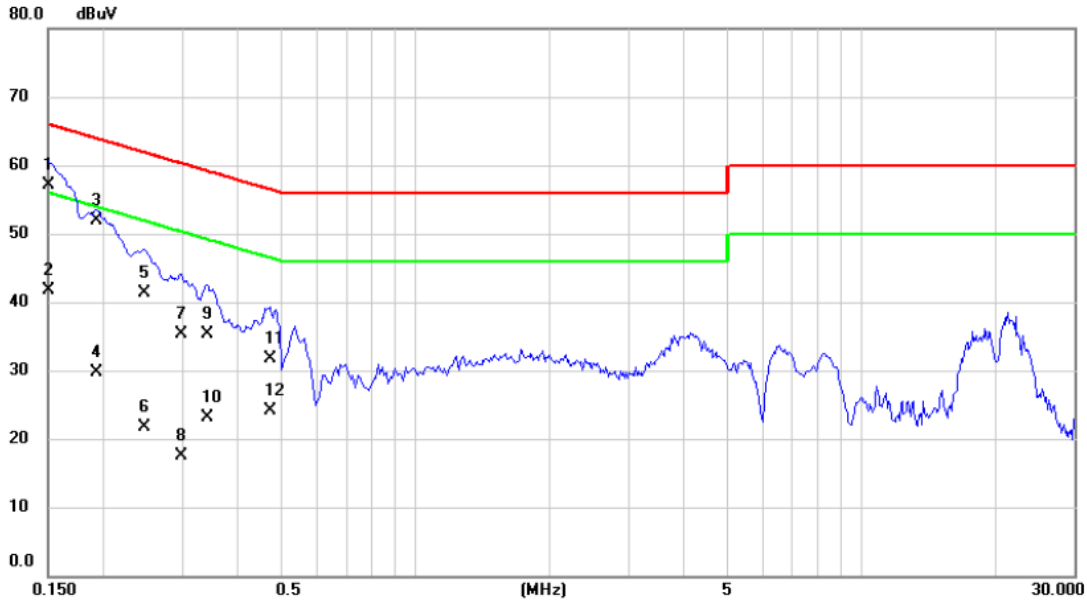


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	47.10	9.68	56.78	66.00	-9.22	QP	
2		0.1500	29.50	9.68	39.18	56.00	-16.82	AVG	
3		0.1913	42.10	9.68	51.78	63.98	-12.20	QP	
4		0.1913	22.90	9.68	32.58	53.98	-21.40	AVG	
5		0.2522	28.80	9.69	38.49	61.68	-23.19	QP	
6		0.2522	11.90	9.69	21.59	51.68	-30.09	AVG	
7		0.3096	21.90	9.68	31.58	59.98	-28.40	QP	
8		0.3096	7.20	9.68	16.88	49.98	-33.10	AVG	
9		0.3754	22.45	9.69	32.14	58.38	-26.24	QP	
10		0.3754	12.90	9.69	22.59	48.38	-25.79	AVG	
11		0.4720	24.00	9.70	33.70	56.48	-22.78	QP	
12		0.4720	15.30	9.70	25.00	46.48	-21.48	AVG	

Note：The test result has included the cable loss.

Test Mode:	TX MODE_UNII-3

Line

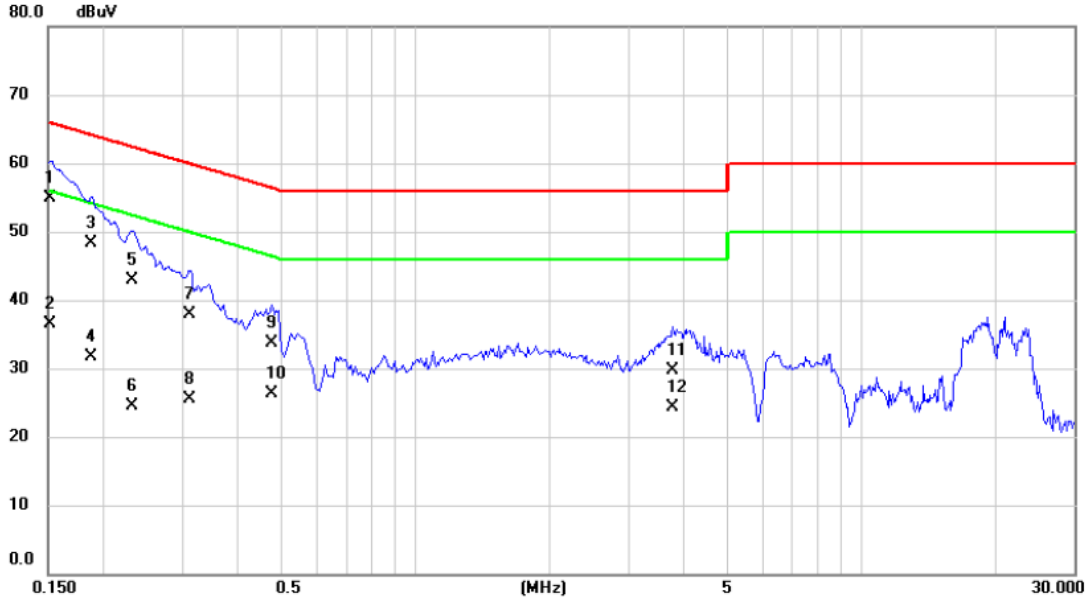


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	47.30	9.76	57.06	66.00	-8.94	QP	
2		0.1500	31.90	9.76	41.66	56.00	-14.34	AVG	
3		0.1927	42.20	9.74	51.94	63.92	-11.98	QP	
4		0.1927	20.00	9.74	29.74	53.92	-24.18	AVG	
5		0.2466	31.60	9.74	41.34	61.87	-20.53	QP	
6		0.2466	11.90	9.74	21.64	51.87	-30.23	AVG	
7		0.2977	25.50	9.75	35.25	60.31	-25.06	QP	
8		0.2977	7.80	9.75	17.55	50.31	-32.76	AVG	
9		0.3410	25.50	9.74	35.24	59.18	-23.94	QP	
10		0.3410	13.40	9.74	23.14	49.18	-26.04	AVG	
11		0.4713	22.00	9.76	31.76	56.49	-24.73	QP	
12		0.4713	14.40	9.76	24.16	46.49	-22.33	AVG	

Note：The test result has included the cable loss.

Test Mode:	TX MODE_UNII-3

Neutral



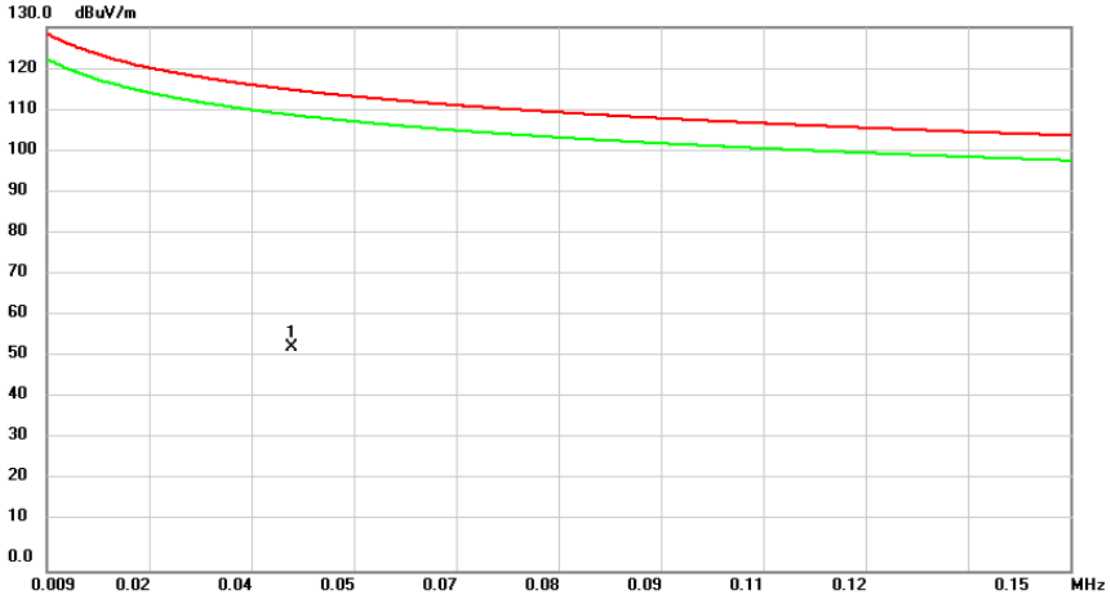
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1521	45.20	9.68	54.88	65.88	-11.00	QP	
2		0.1521	26.90	9.68	36.58	55.88	-19.30	AVG	
3		0.1878	38.70	9.68	48.38	64.13	-15.75	QP	
4		0.1878	22.00	9.68	31.68	54.13	-22.45	AVG	
5		0.2320	33.20	9.68	42.88	62.38	-19.50	QP	
6		0.2320	14.80	9.68	24.48	52.38	-27.90	AVG	
7		0.3110	28.30	9.68	37.98	59.94	-21.96	QP	
8		0.3110	15.80	9.68	25.48	49.94	-24.46	AVG	
9		0.4776	24.00	9.70	33.70	56.38	-22.68	QP	
10		0.4776	16.60	9.70	26.30	46.38	-20.08	AVG	
11		3.7760	19.80	9.82	29.62	56.00	-26.38	QP	
12		3.7760	14.50	9.82	24.32	46.00	-21.68	AVG	

Note：The test result has included the cable loss.

ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)

Test Mode:	UNII-1/TX A Mode_θ=90°

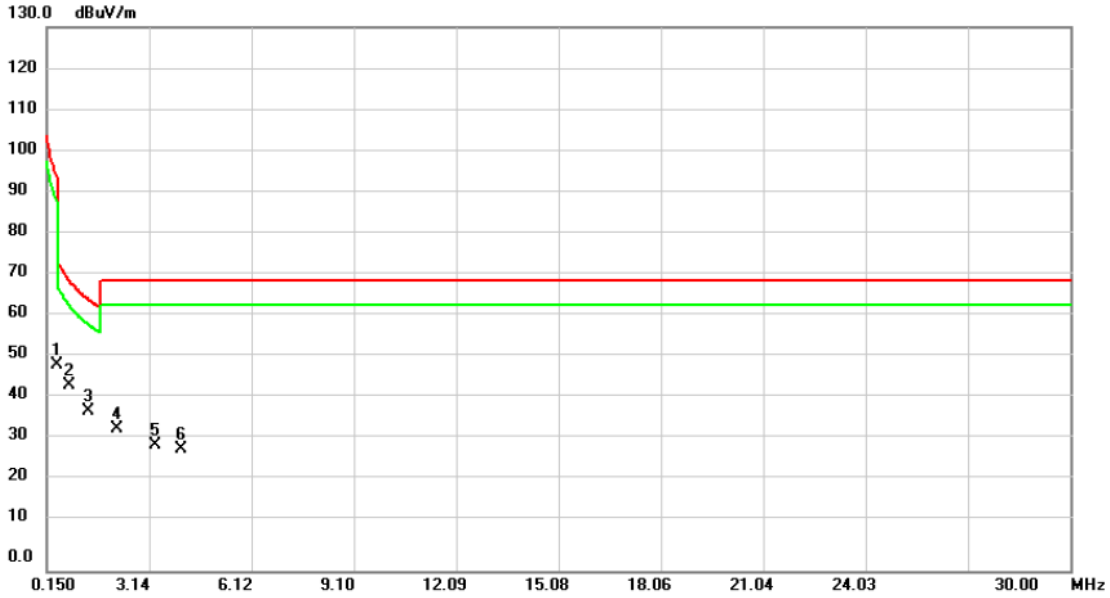
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0427	39.71	13.73	53.44	115.00	-61.56	peak	

Test Mode:	UNII-1/TX A Mode_θ=90°

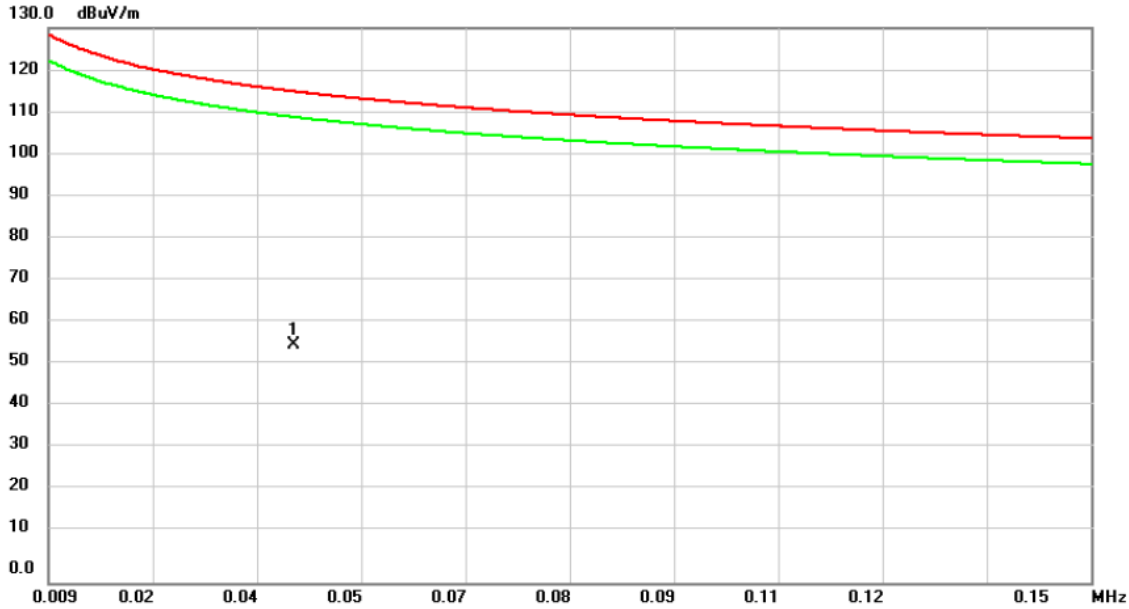
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.4485	37.41	11.80	49.21	94.57	-45.36	peak	
2	*	0.8064	32.31	11.92	44.23	69.47	-25.24	peak	
3		1.3730	26.48	11.83	38.31	64.85	-26.54	peak	
4		2.2096	22.66	11.46	34.12	69.54	-35.42	peak	
5		3.3140	18.93	11.15	30.08	69.54	-39.46	peak	
6		4.0901	17.86	11.26	29.12	69.54	-40.42	peak	

Test Mode:	UNII-1/TX A Mode_θ=90°

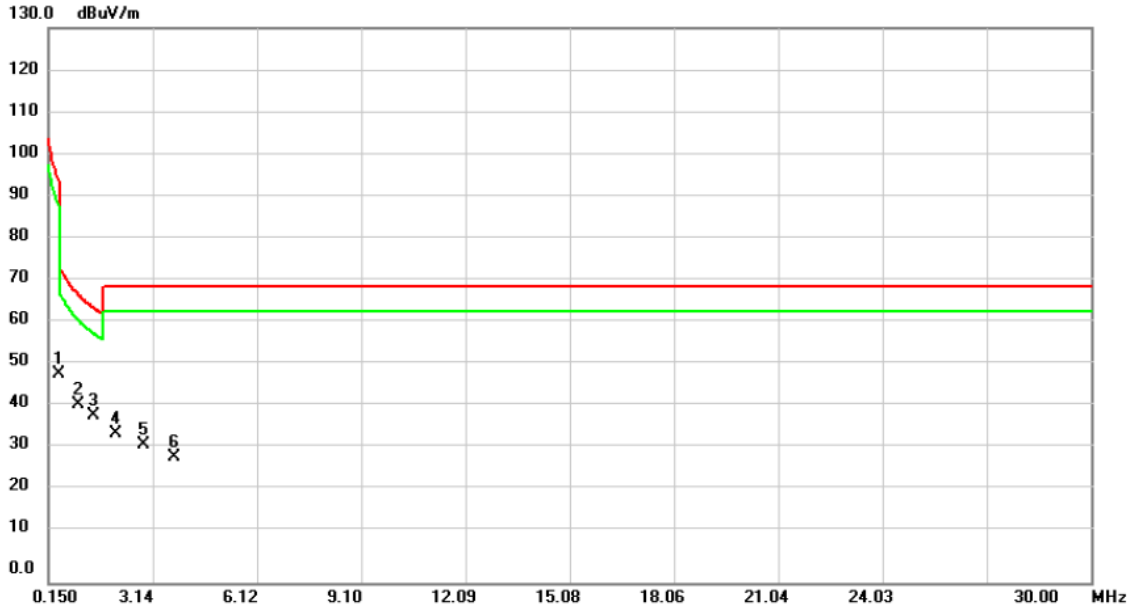
Ant 90˚



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0422	41.81	13.78	55.59	115.10	-59.51	peak	

Test Mode:	UNII-1/TX A Mode_θ=90°

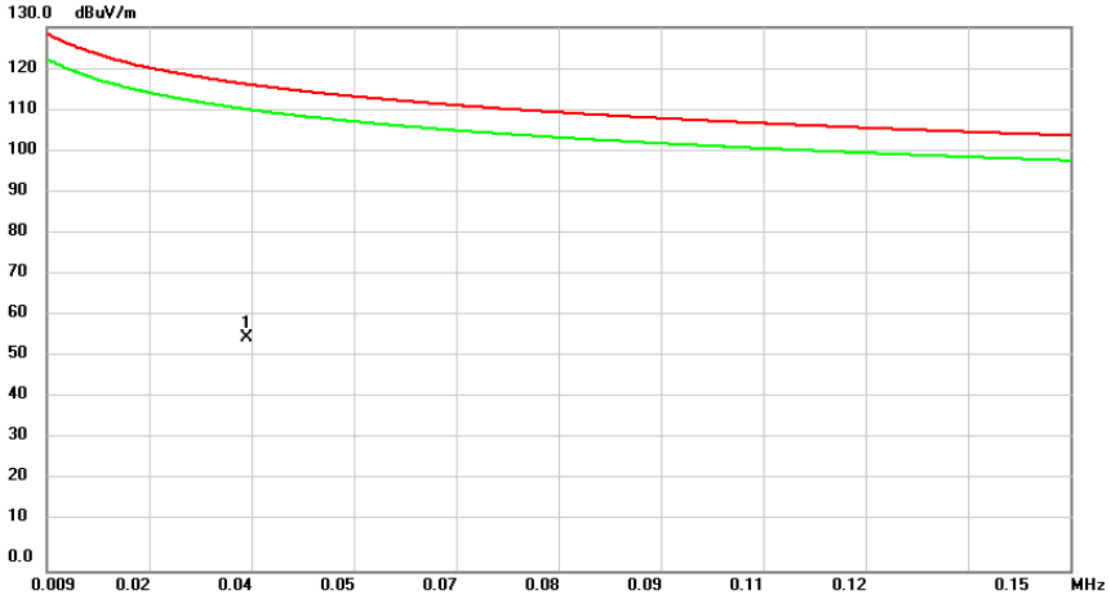
Ant 90˚



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.4485	37.06	11.80	48.86	94.57	-45.71	peak	
2		0.9858	29.83	11.99	41.82	67.73	-25.91	peak	
3	*	1.4334	27.49	11.80	39.29	64.48	-25.19	peak	
4		2.0604	23.36	11.52	34.88	69.54	-34.66	peak	
5		2.8664	21.25	11.16	32.41	69.54	-37.13	peak	
6		3.7320	18.24	11.21	29.45	69.54	-40.09	peak	

Test Mode:	UNII-3/TX A Mode_θ=90°

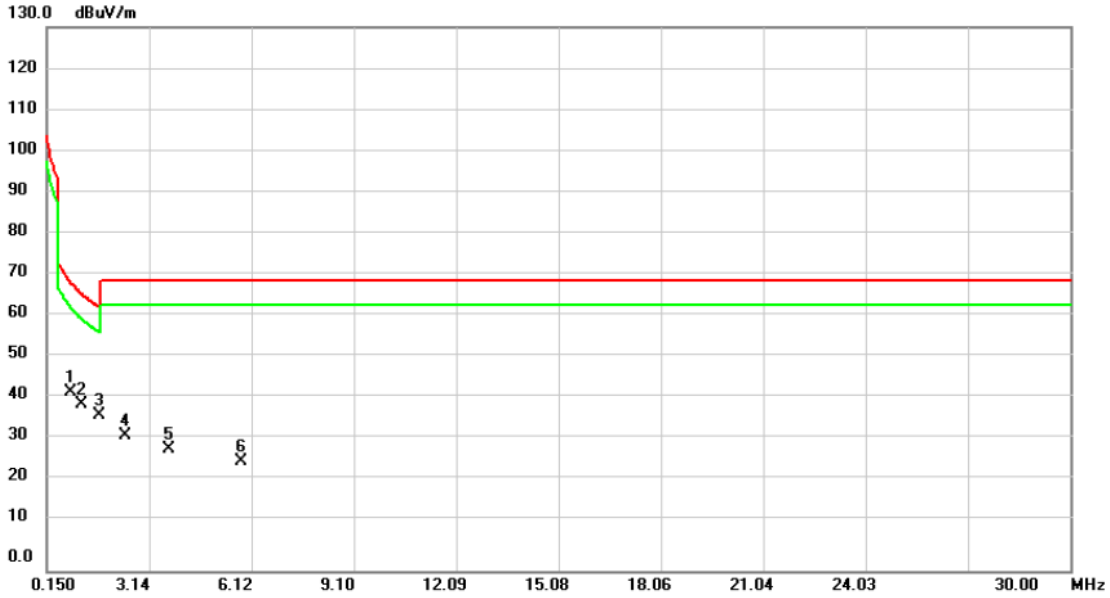
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0366	41.45	14.34	55.79	116.33	-60.54	peak	

Test Mode:	UNII-3/TX A Mode_θ=90°

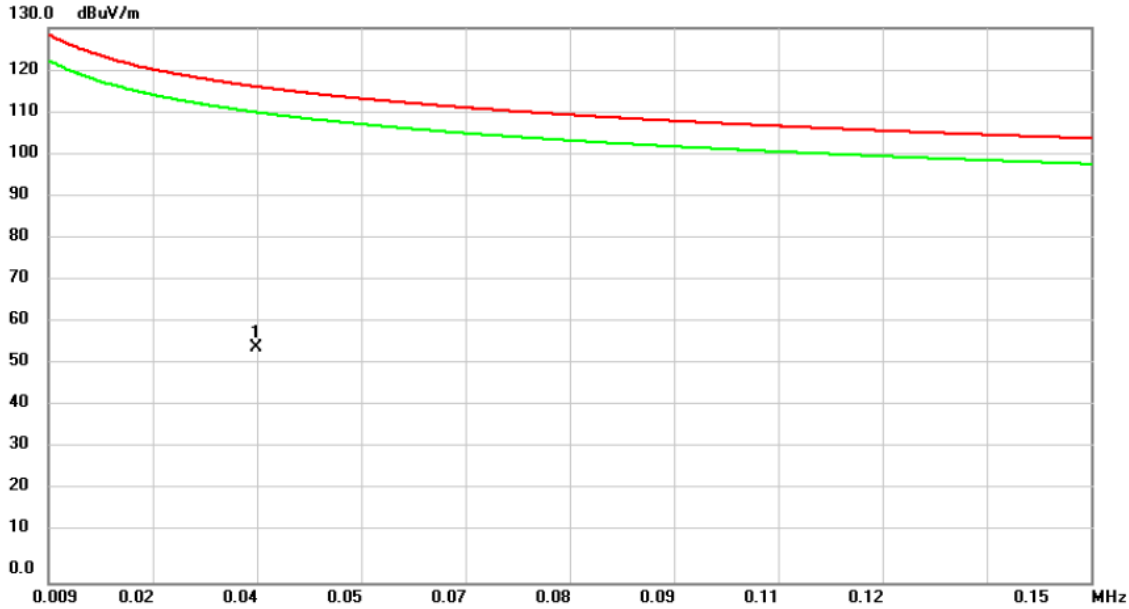
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.8660	30.84	11.95	42.79	68.85	-26.06	peak	
2		1.1650	28.03	11.93	39.96	66.28	-26.32	peak	
3	*	1.7020	25.41	11.68	37.09	62.98	-25.89	peak	
4		2.4483	20.86	11.35	32.21	69.54	-37.33	peak	
5		3.7021	17.86	11.21	29.07	69.54	-40.47	peak	
6		5.8215	14.67	11.38	26.05	69.54	-43.49	peak	

Test Mode:	UNII-3/TX A Mode_θ=90°

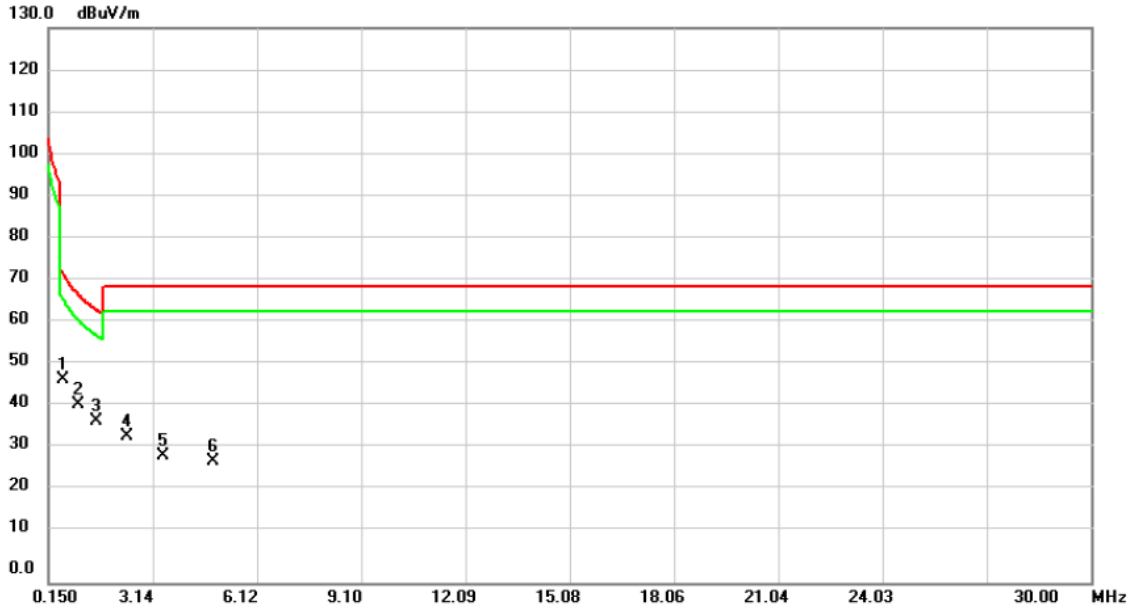
Ant 90˚



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0371	40.81	14.29	55.10	116.22	-61.12	peak	

Test Mode:	UNII-3/TX A Mode_θ=90°

Ant 90˚

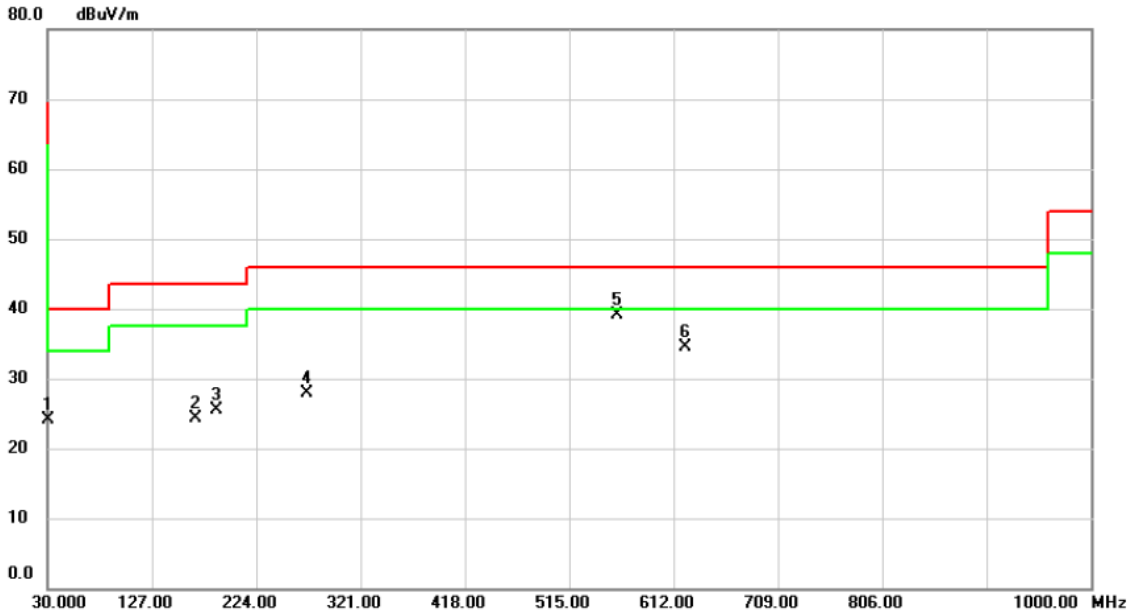


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.5675	35.78	11.83	47.61	72.52	-24.91	peak	
2		0.9858	29.83	11.99	41.82	67.73	-25.91	peak	
3		1.5230	26.24	11.76	38.00	63.95	-25.95	peak	
4		2.3887	22.98	11.38	34.36	69.54	-35.18	peak	
5		3.4333	18.66	11.16	29.82	69.54	-39.72	peak	
6		4.8662	16.94	11.38	28.32	69.54	-41.22	peak	

ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)

Test Mode:	UNII-1/TX A Mode_θ=90°

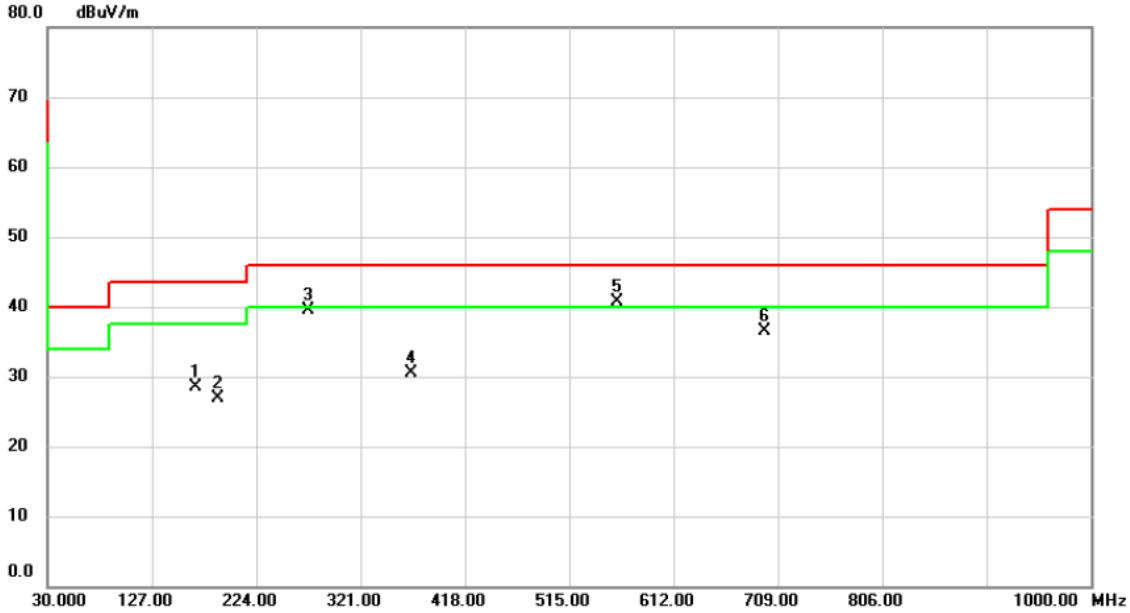
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		30.9700	33.25	-9.13	24.12	40.00	-15.88	peak	
2		167.7400	32.96	-8.59	24.37	43.50	-19.13	peak	
3		187.1400	35.56	-10.12	25.44	43.50	-18.06	peak	
4		270.5600	36.34	-8.42	27.92	46.00	-18.08	peak	
5	*	559.6200	40.60	-1.47	39.13	46.00	-6.87	peak	
6		622.6700	34.71	-0.24	34.47	46.00	-11.53	peak	

Test Mode:	UNII-1/TX A Mode_θ=90°

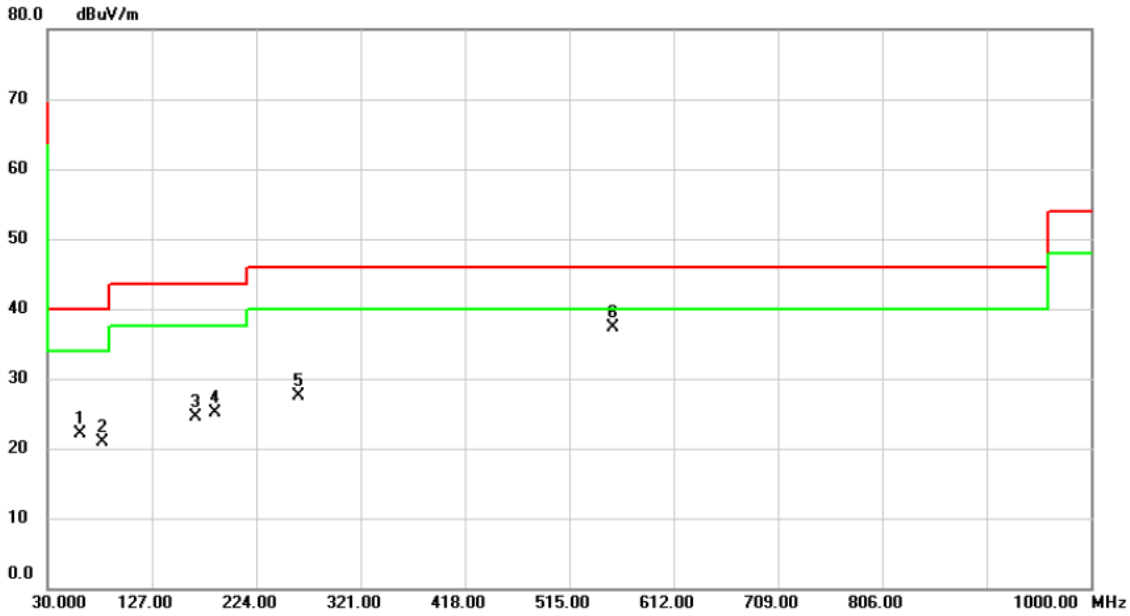
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		167.7400	37.17	-8.59	28.58	43.50	-14.92	peak	
2		188.1100	37.11	-10.20	26.91	43.50	-16.59	peak	
3		272.5000	47.79	-8.34	39.45	46.00	-6.55	peak	
4		368.5300	36.22	-5.76	30.46	46.00	-15.54	peak	
5	*	559.6200	42.24	-1.47	40.77	46.00	-5.23	peak	
6		696.3900	35.81	0.79	36.60	46.00	-9.40	peak	

Test Mode:	UNII-3/TX A Mode_θ=90°

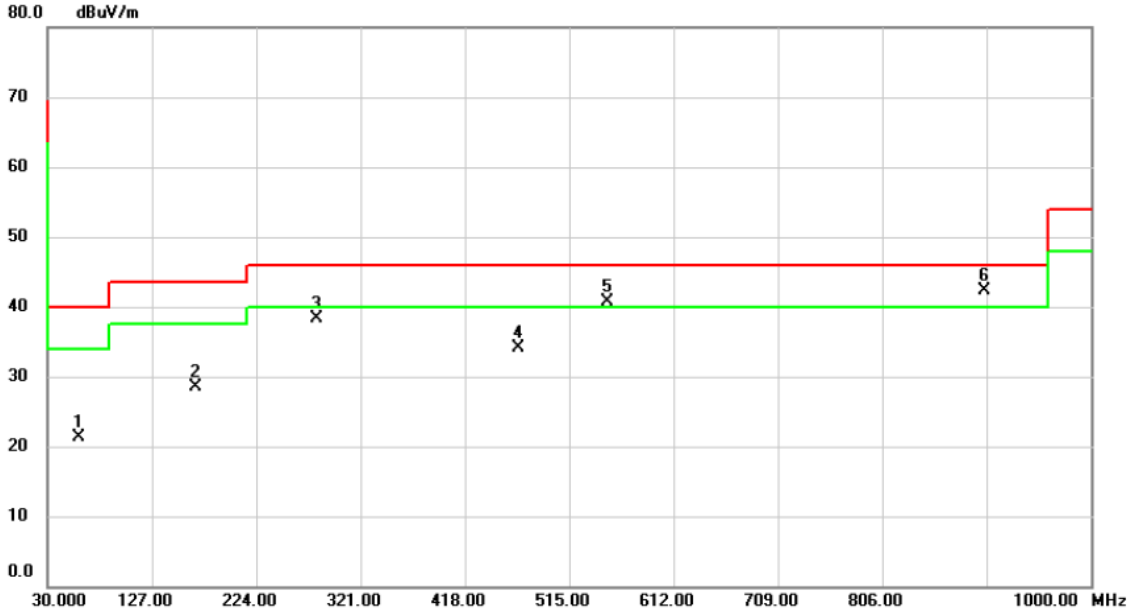
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		60.0700	30.72	-8.61	22.11	40.00	-17.89	peak	
2		81.4100	32.95	-12.06	20.89	40.00	-19.11	peak	
3		167.7400	33.08	-8.59	24.49	43.50	-19.01	peak	
4		186.1700	35.11	-10.06	25.05	43.50	-18.45	peak	
5		263.7700	36.13	-8.64	27.49	46.00	-18.51	peak	
6	*	555.7400	38.84	-1.57	37.27	46.00	-8.73	peak	

Test Mode:	UNII-3/TX A Mode_θ=90°

Horizontal

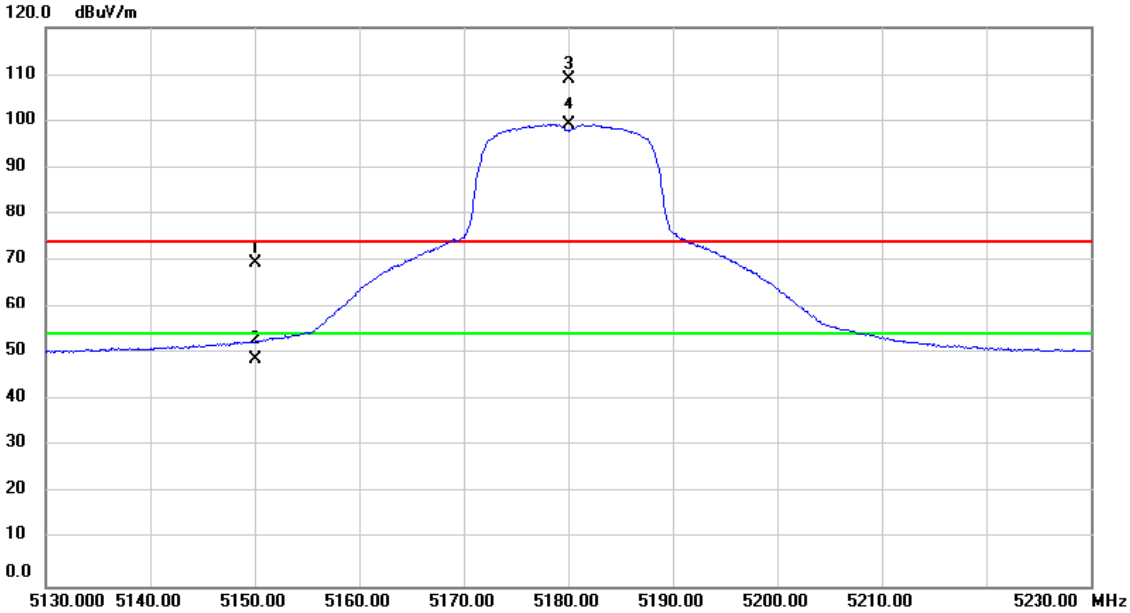


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		59.1000	29.93	-8.57	21.36	40.00	-18.64	peak	
2		167.7400	37.03	-8.59	28.44	43.50	-15.06	peak	
3		280.2600	46.40	-8.02	38.38	46.00	-7.62	peak	
4		467.4700	37.31	-3.27	34.04	46.00	-11.96	peak	
5	!	550.8900	42.43	-1.70	40.73	46.00	-5.27	peak	
6	*	901.0600	38.25	4.13	42.38	46.00	-3.62	peak	

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5180MHz_θ=90°

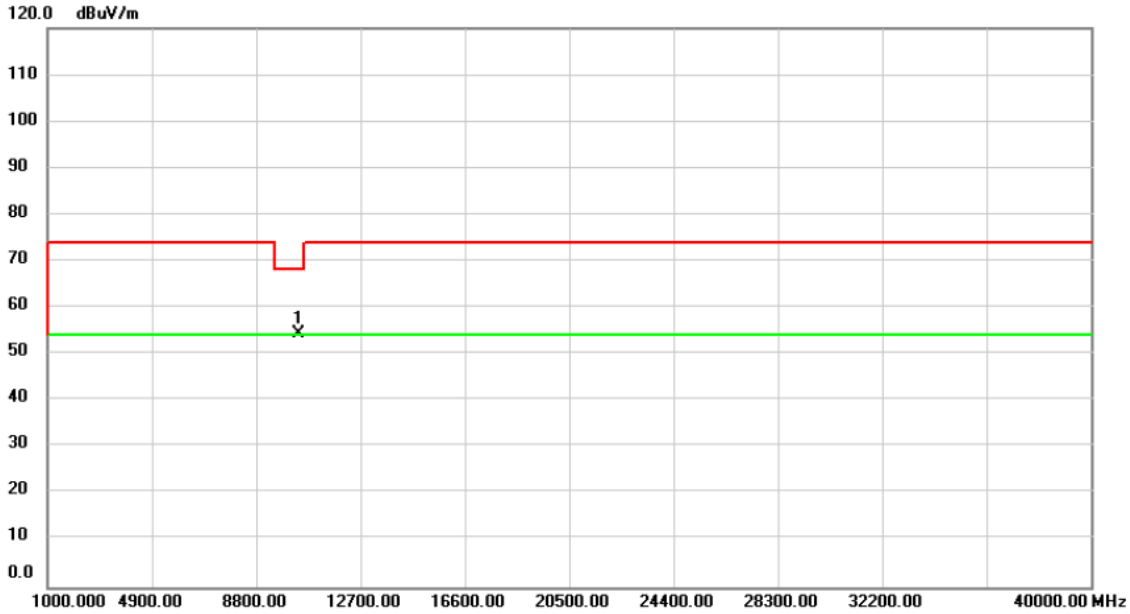
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5150.000	31.99	37.54	69.53	74.00	-4.47	peak	
2		5150.000	11.33	37.54	48.87	54.00	-5.13	AVG	
3	X	5180.000	71.55	37.58	109.13	74.00	35.13	peak	No Limit
4	*	5180.000	61.67	37.58	99.25	54.00	45.25	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5180MHz_θ=90°

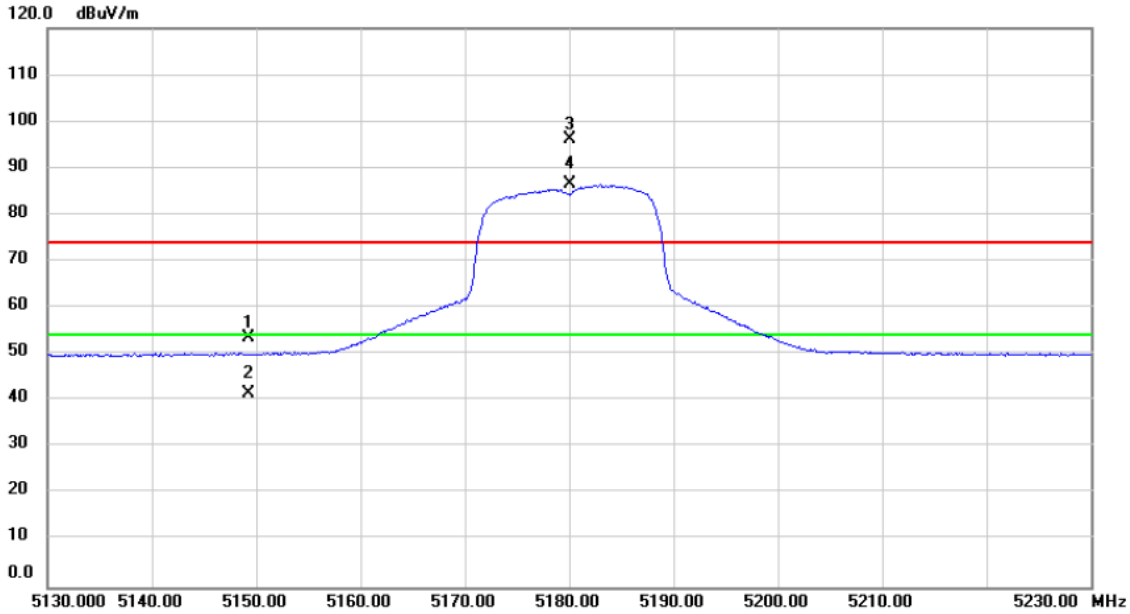
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10360.00	52.68	1.92	54.60	68.20	-13.60	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5180MHz_θ=90°

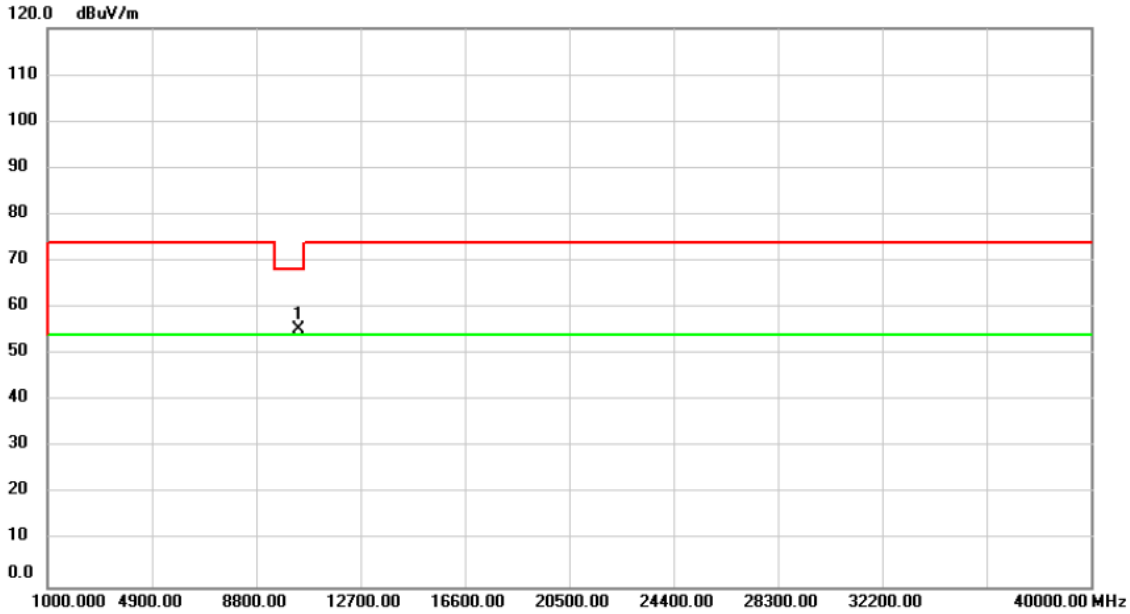
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5149.320	15.95	37.54	53.49	74.00	-20.51	peak	
2		5149.320	4.11	37.54	41.65	54.00	-12.35	AVG	
3	X	5180.000	58.48	37.58	96.06	74.00	22.06	peak	No Limit
4	*	5180.000	48.85	37.58	86.43	54.00	32.43	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5180MHz _θ=90°

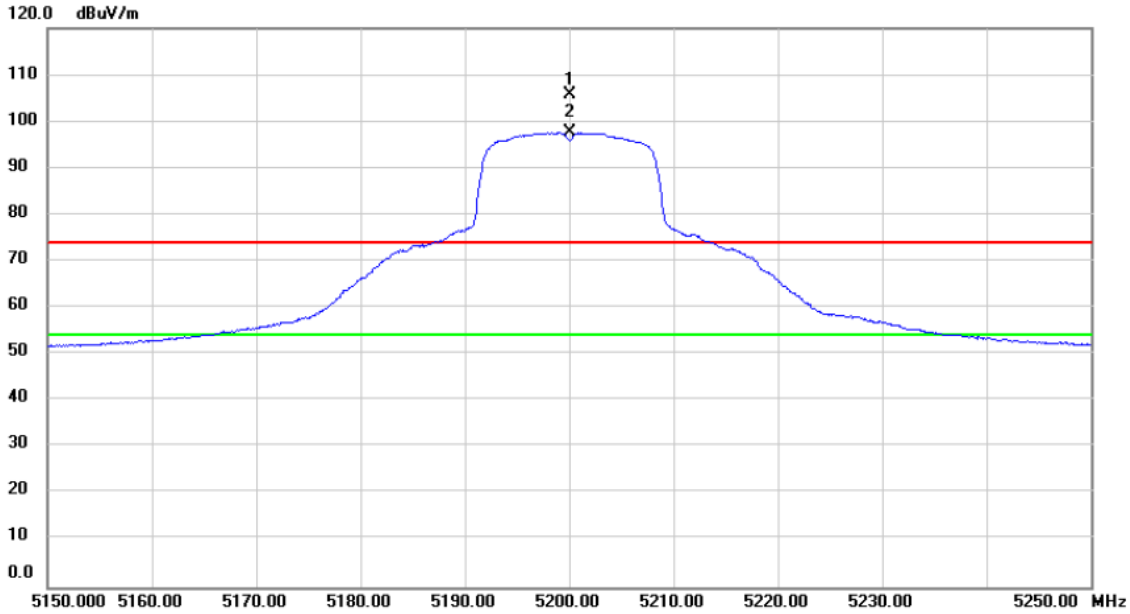
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10360.00	53.54	1.92	55.46	68.20	-12.74	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5200MHz_θ=90°

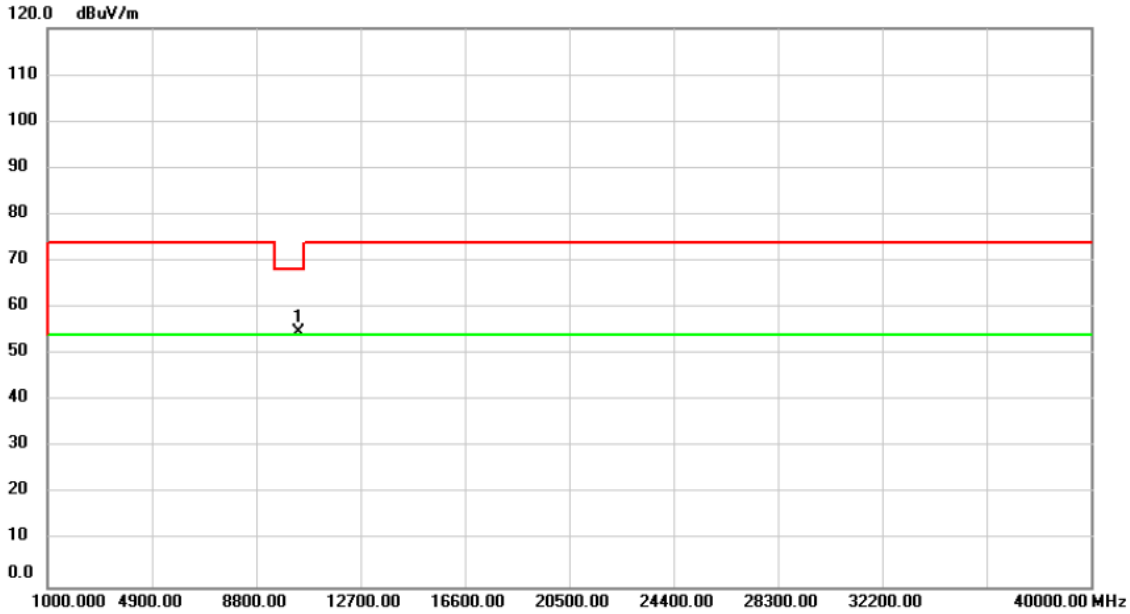
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	5200.000	68.06	37.60	105.66	74.00	31.66	peak	No Limit
2	*	5200.000	59.99	37.60	97.59	54.00	43.59	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5200MHz_θ=90°

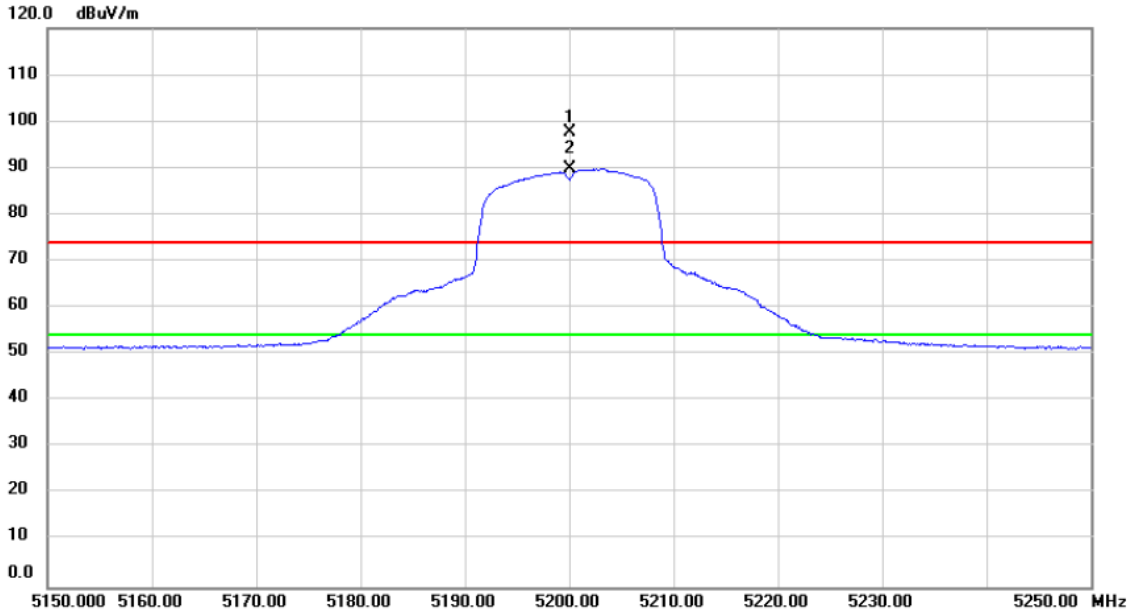
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10400.00	52.94	1.95	54.89	68.20	-13.31	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5200MHz_θ=90°

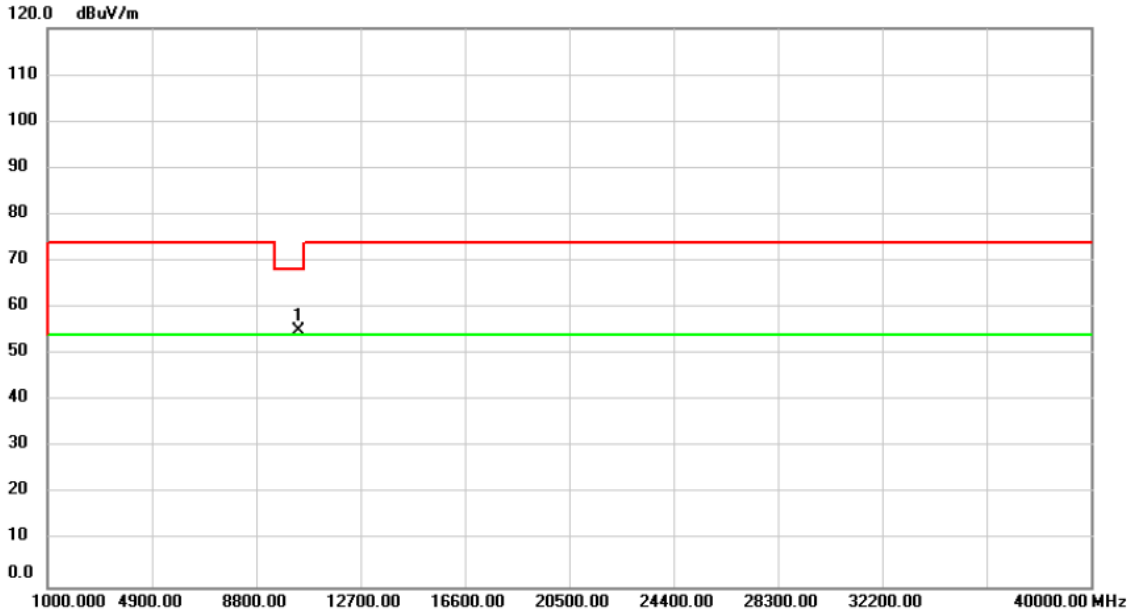
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	5200.000	60.20	37.60	97.80	74.00	23.80	peak	No Limit
2	*	5200.000	52.15	37.60	89.75	54.00	35.75	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5200MHz_θ=90°

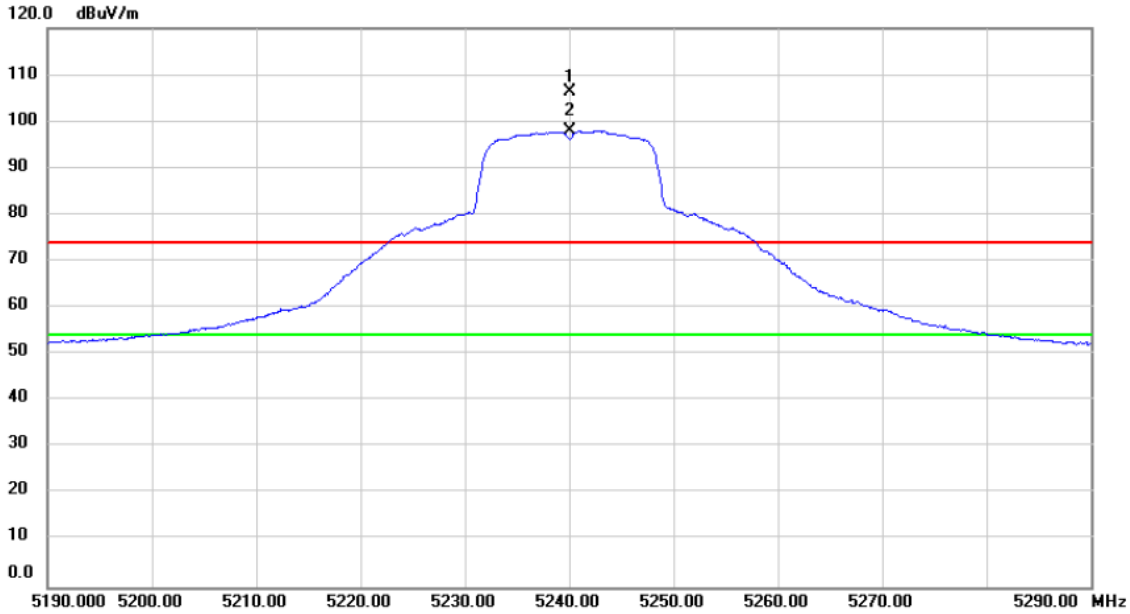
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10400.00	53.03	1.95	54.98	68.20	-13.22	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5240MHz_θ=90°

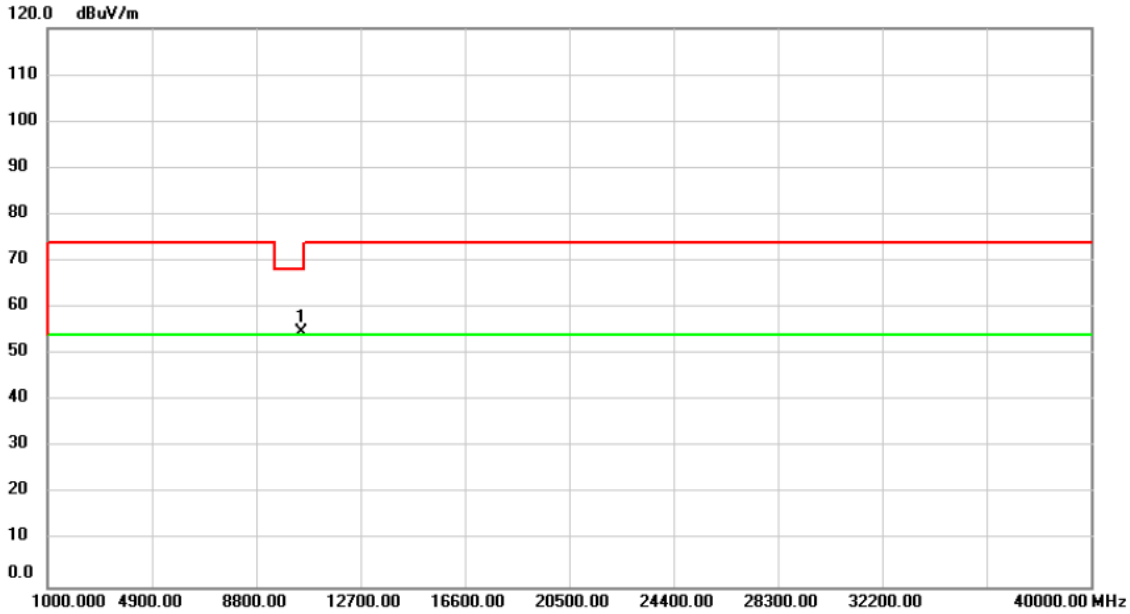
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	5240.000	68.77	37.64	106.41	74.00	32.41	peak	No Limit
2	*	5240.000	60.29	37.64	97.93	54.00	43.93	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5240MHz_θ=90°

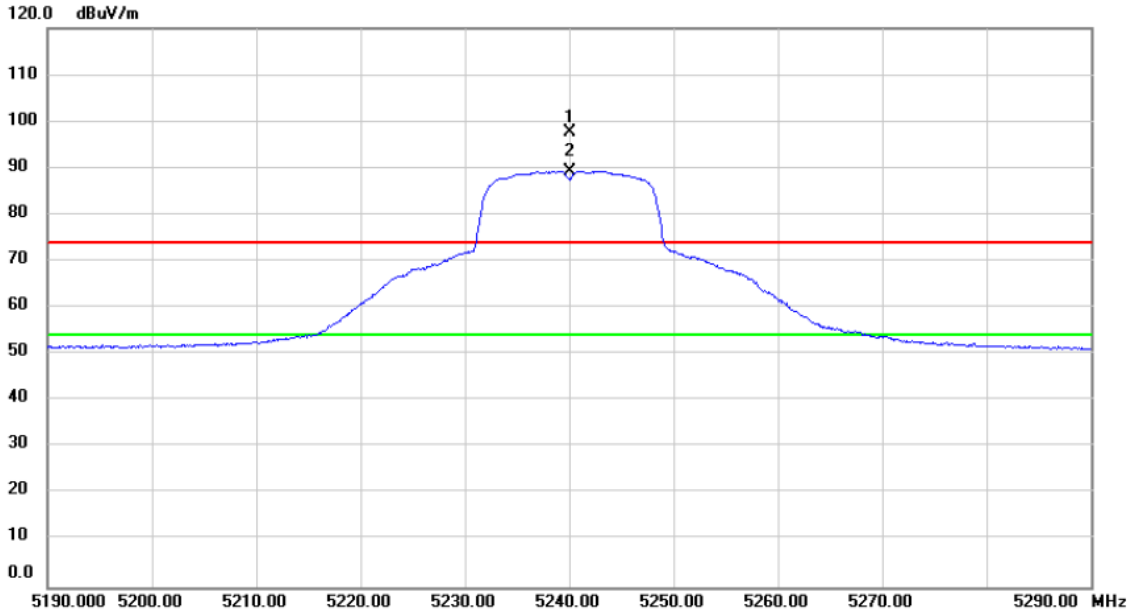
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10480.00	52.87	1.96	54.83	68.20	-13.37	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5240MHz_θ=90°

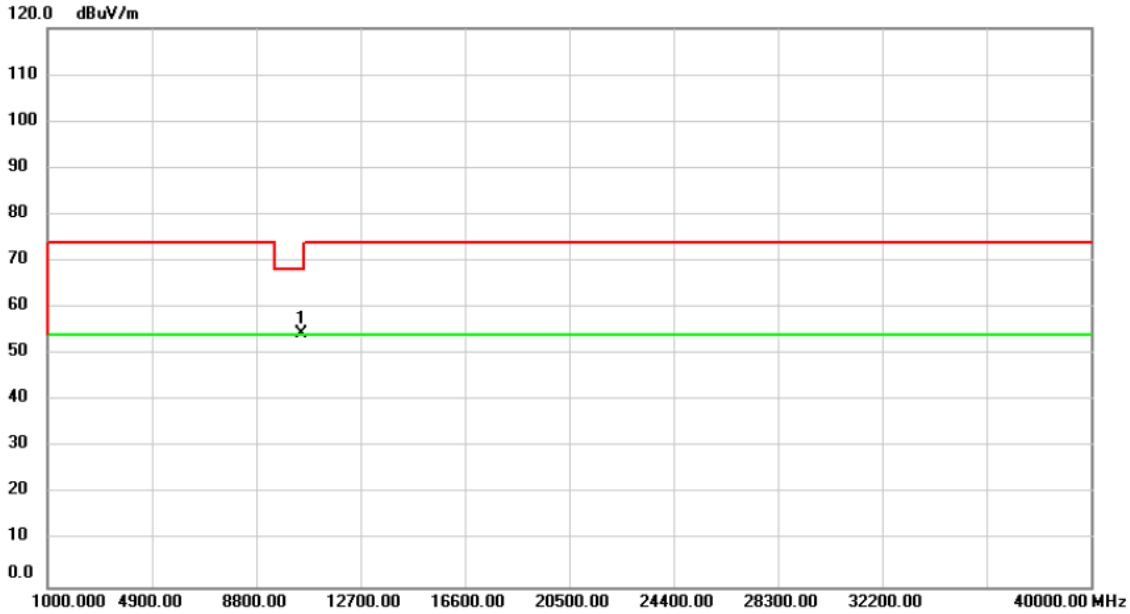
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	5240.000	59.93	37.64	97.57	74.00	23.57	peak	No Limit
2	*	5240.000	51.64	37.64	89.28	54.00	35.28	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX A Mode 5240MHz_θ=90°

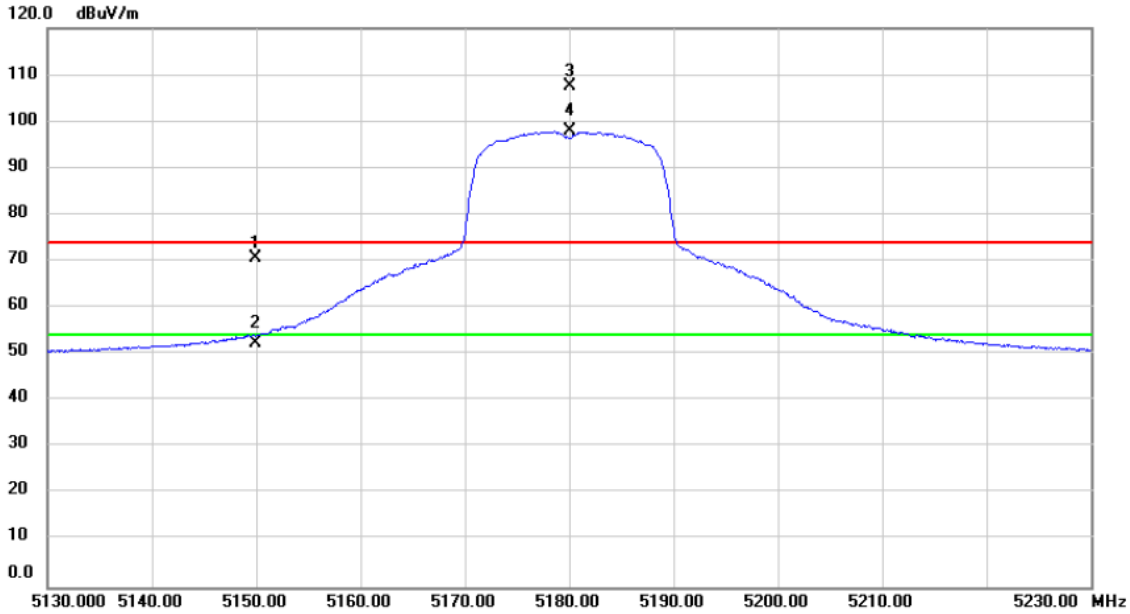
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10480.00	52.39	1.96	54.35	68.20	-13.85	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5180MHz_θ=90°

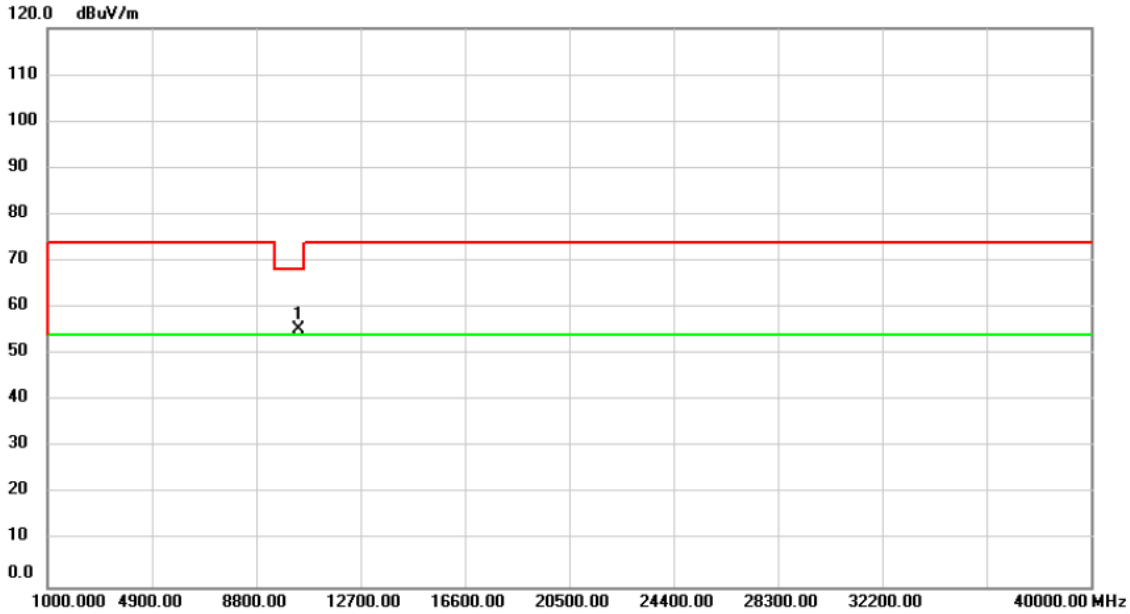
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5149.960	33.14	37.54	70.68	74.00	-3.32	peak	
2		5149.960	14.67	37.54	52.21	54.00	-1.79	AVG	
3	X	5180.000	70.06	37.58	107.64	74.00	33.64	peak	No Limit
4	*	5180.000	60.24	37.58	97.82	54.00	43.82	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5180MHz_θ=90°

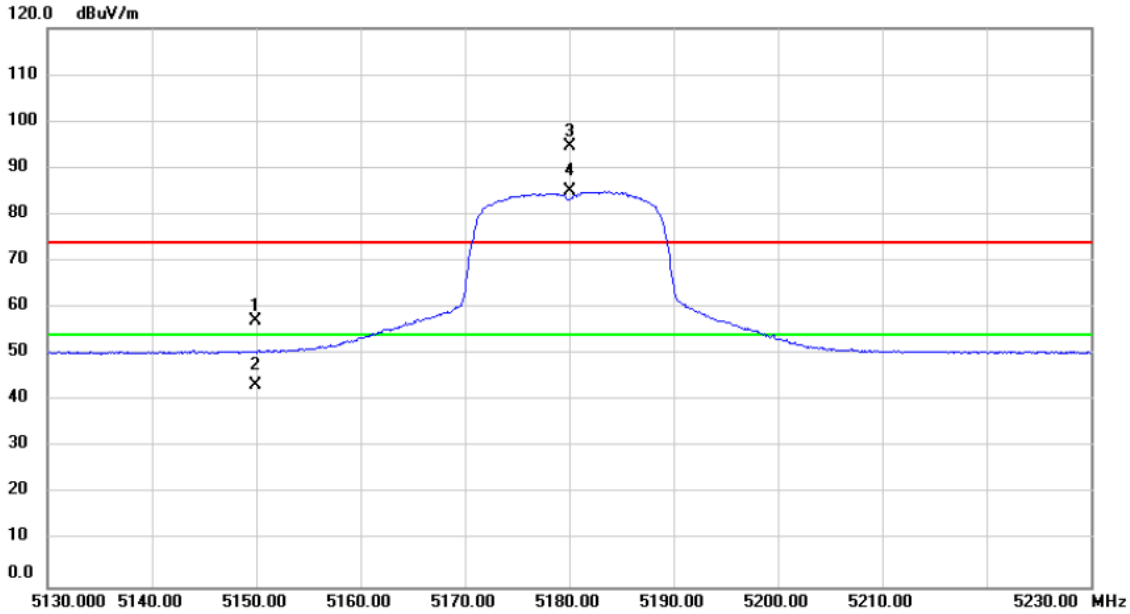
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10360.00	53.57	1.92	55.49	68.20	-12.71	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5180MHz_θ=90°

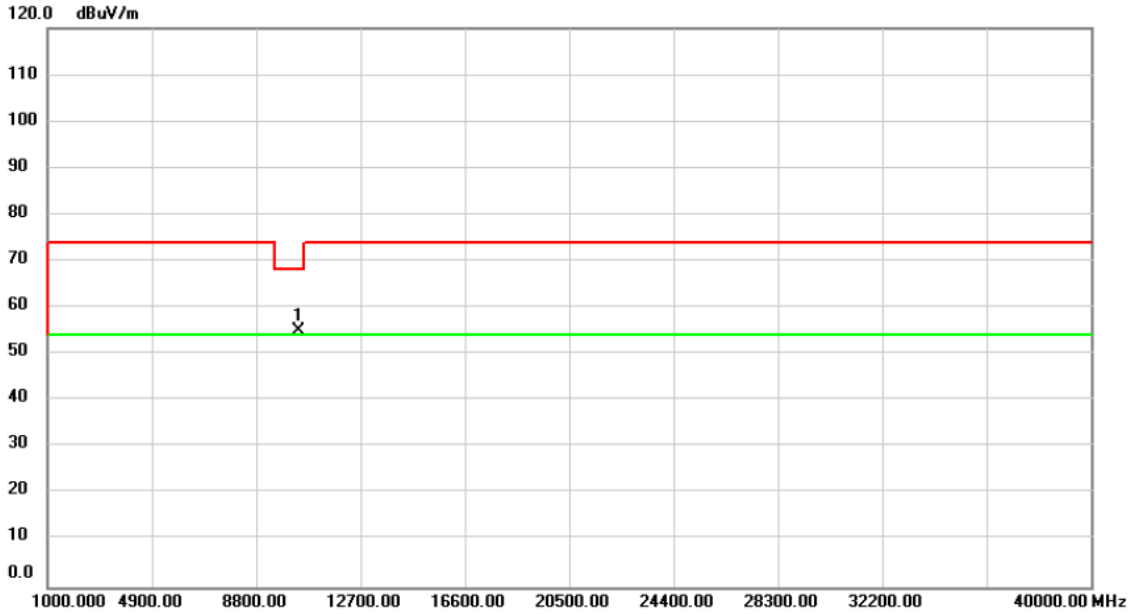
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5149.960	19.65	37.54	57.19	74.00	-16.81	peak	
2		5149.960	5.66	37.54	43.20	54.00	-10.80	AVG	
3	X	5180.000	56.96	37.58	94.54	74.00	20.54	peak	No Limit
4	*	5180.000	47.44	37.58	85.02	54.00	31.02	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5180MHz_θ=90°

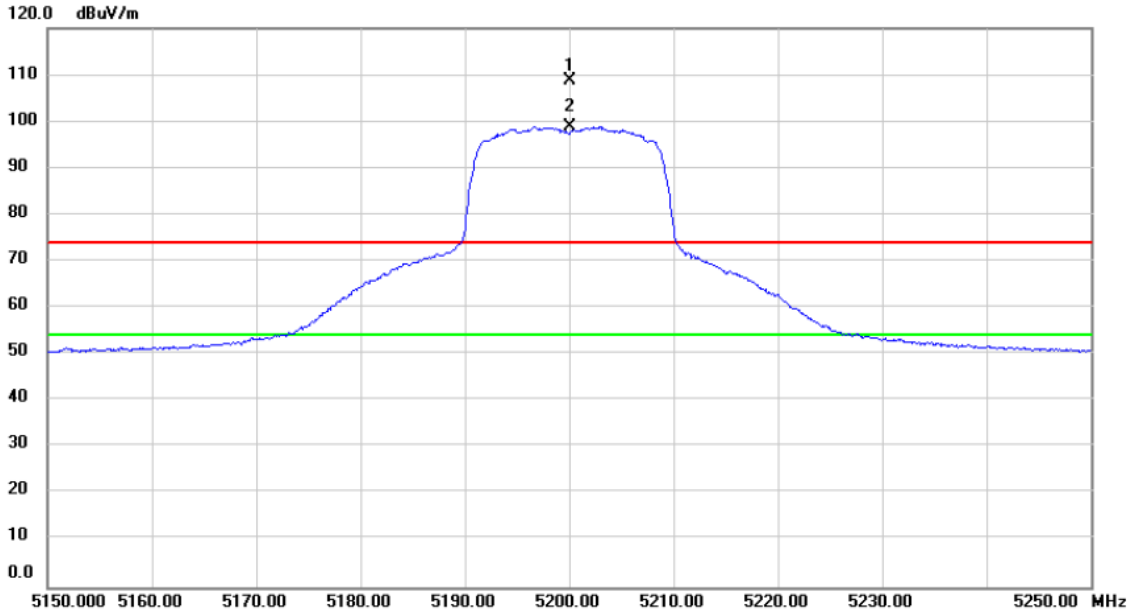
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10360.00	53.14	1.92	55.06	68.20	-13.14	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5200MHz_θ=90°

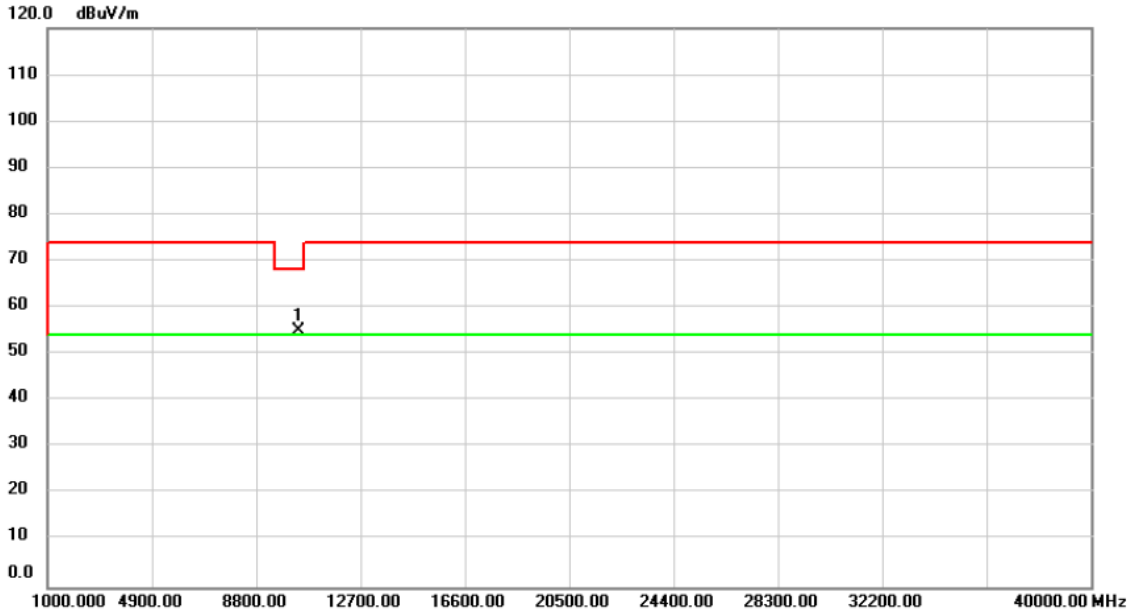
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	5200.000	71.21	37.60	108.81	74.00	34.81	peak	No Limit
2	*	5200.000	61.38	37.60	98.98	54.00	44.98	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5200MHz_θ=90°

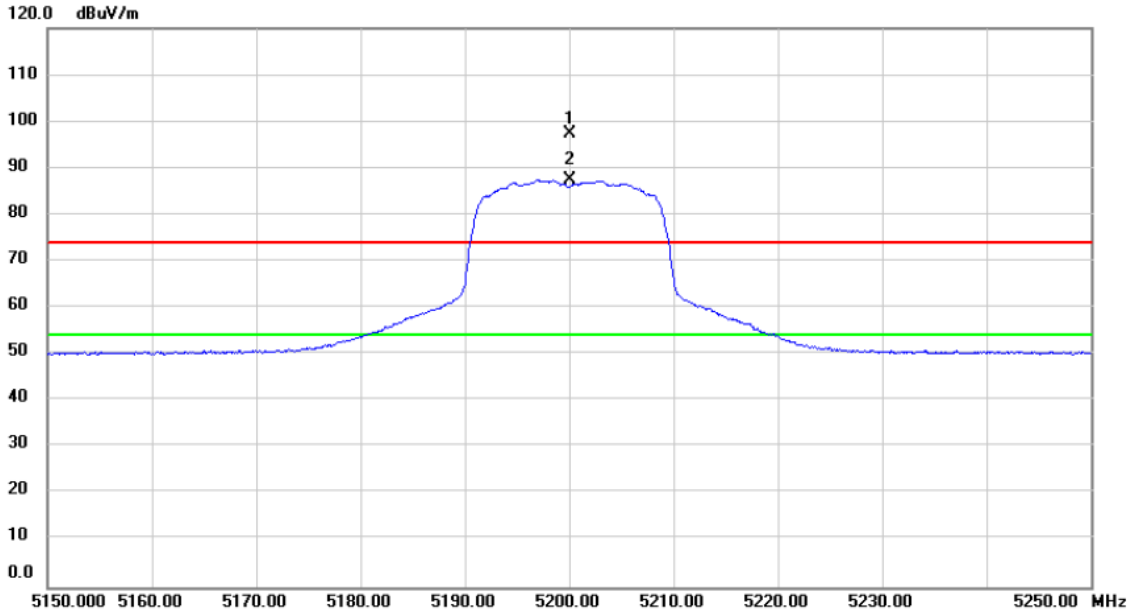
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10400.00	53.08	1.95	55.03	68.20	-13.17	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5200MHz_θ=90°

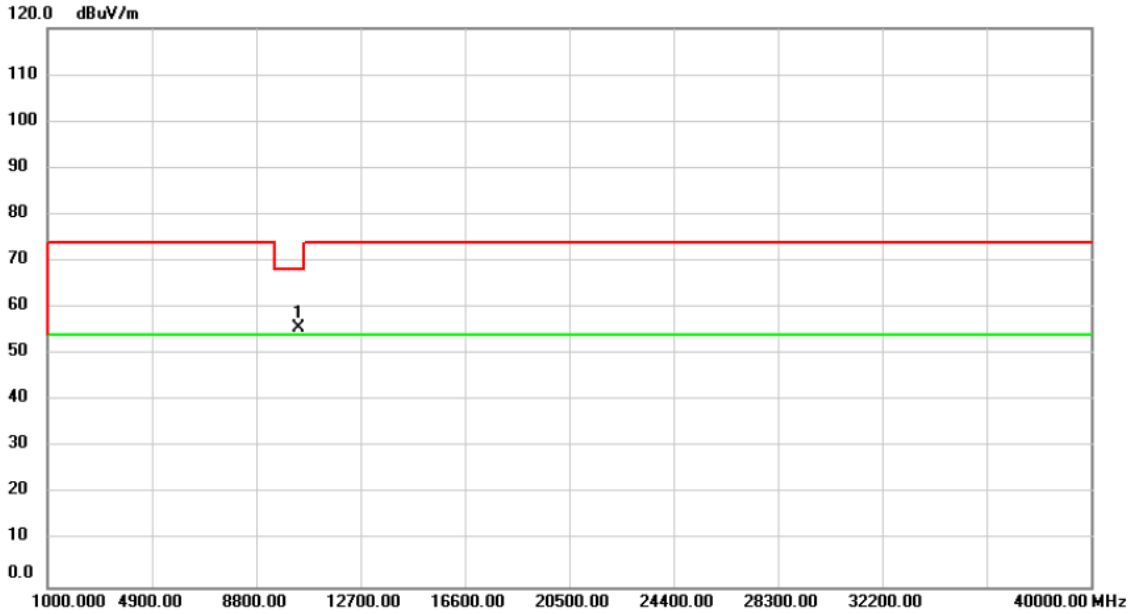
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	5200.000	59.81	37.60	97.41	74.00	23.41	peak	No Limit
2	*	5200.000	49.90	37.60	87.50	54.00	33.50	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5200MHz_θ=90°

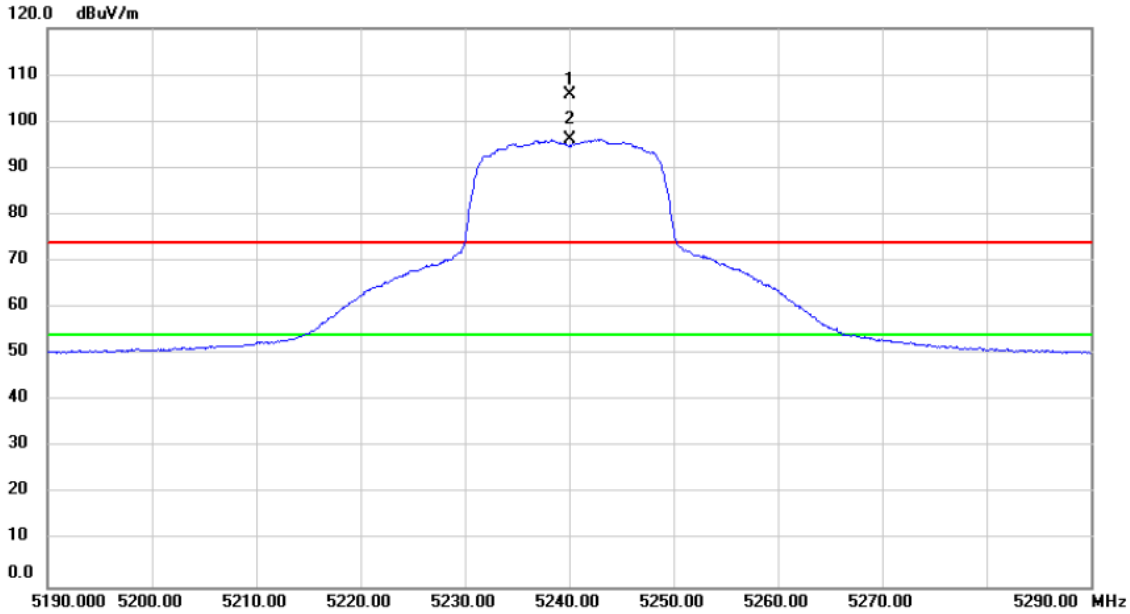
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10400.00	53.60	1.95	55.55	68.20	-12.65	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5240MHz_θ=90°

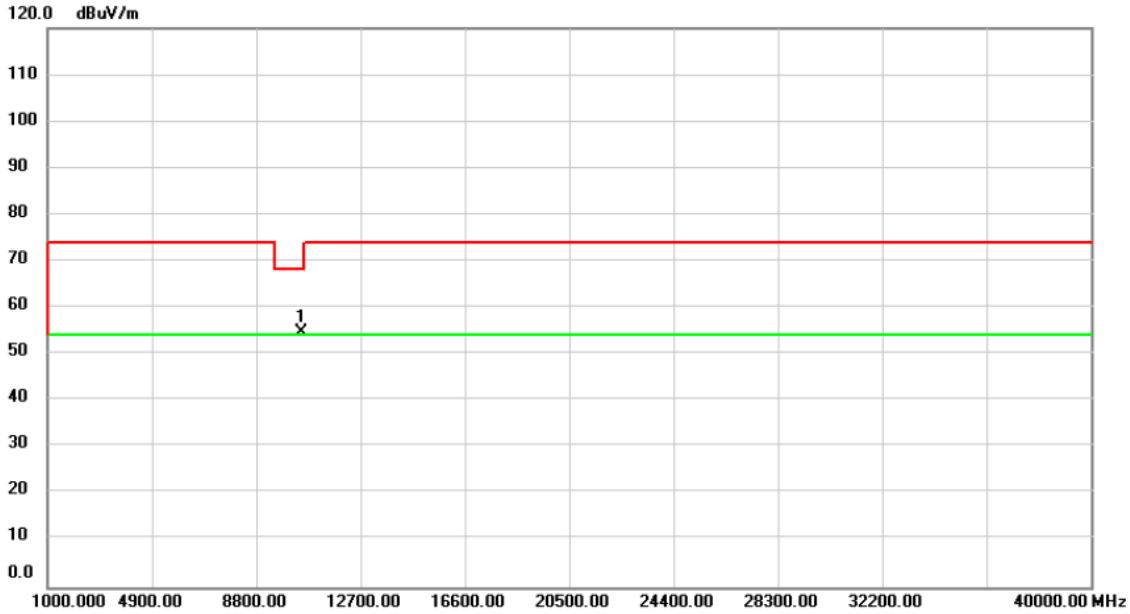
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	5240.000	67.98	37.64	105.62	74.00	31.62	peak	No Limit
2	*	5240.000	58.55	37.64	96.19	54.00	42.19	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5240MHz_θ=90°

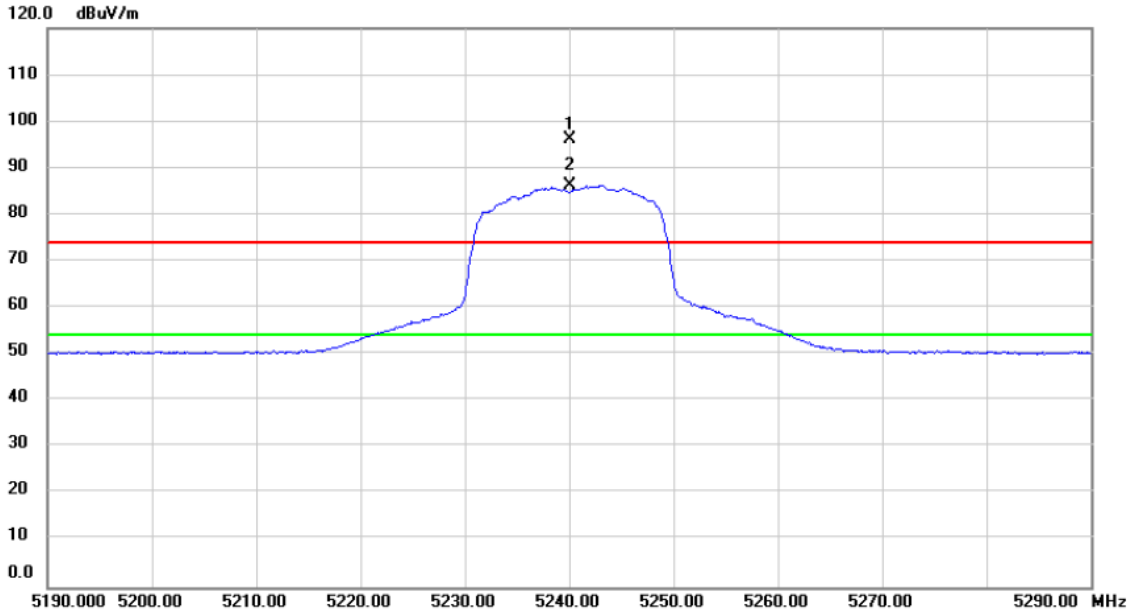
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10480.00	52.94	1.96	54.90	68.20	-13.30	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5240MHz_θ=90°

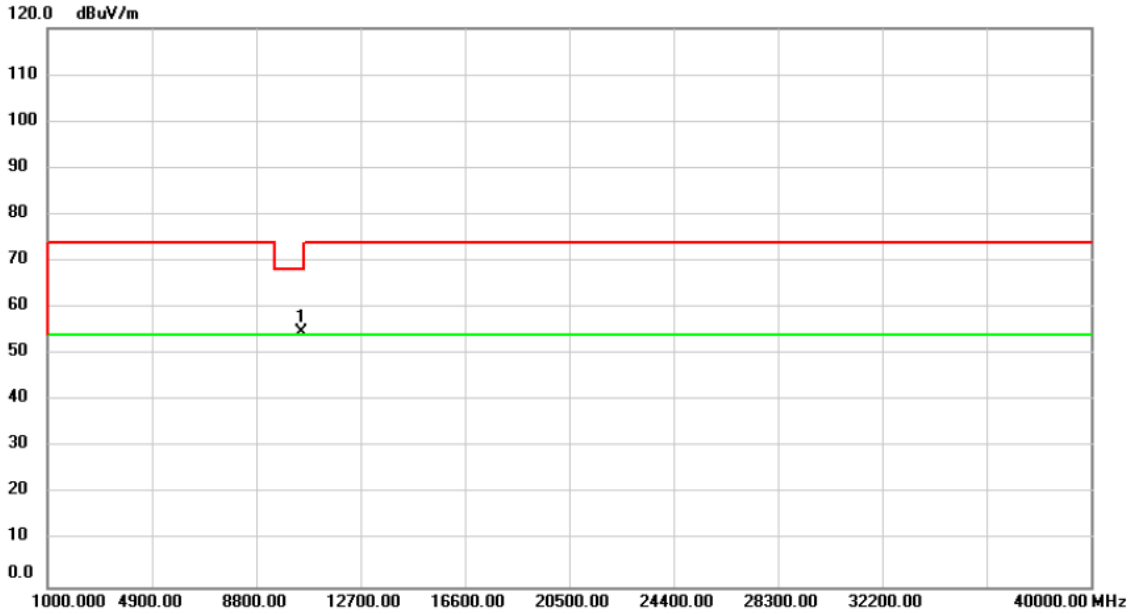
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	5240.000	58.50	37.64	96.14	74.00	22.14	peak	No Limit
2	*	5240.000	48.60	37.64	86.24	54.00	32.24	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT20) Mode 5240MHz_θ=90°

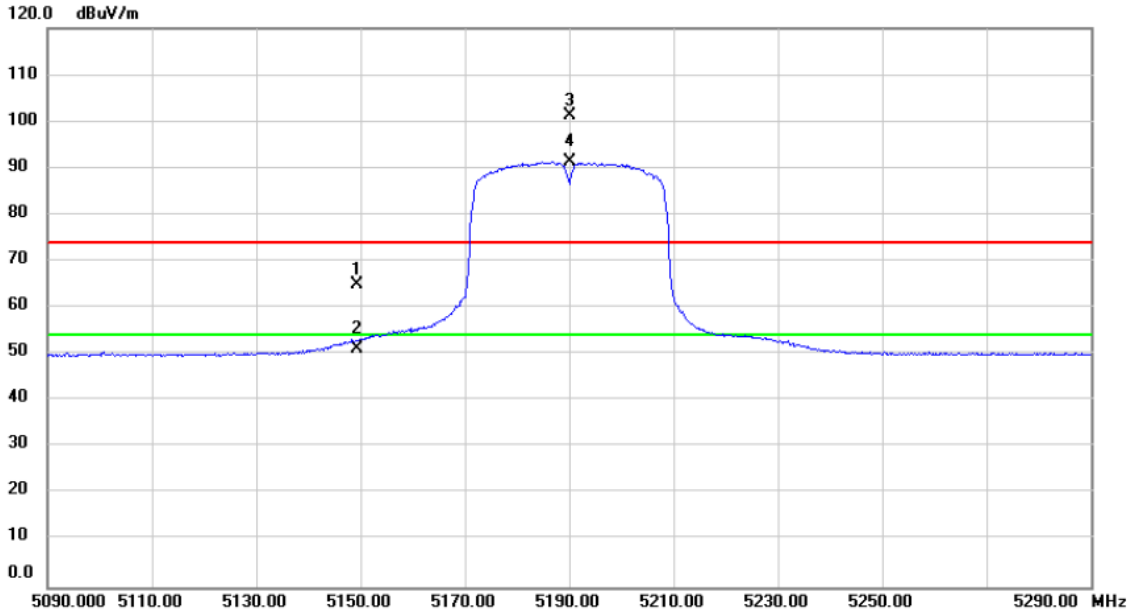
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10480.00	52.94	1.96	54.90	68.20	-13.30	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT40) 5190MHz_θ=90°

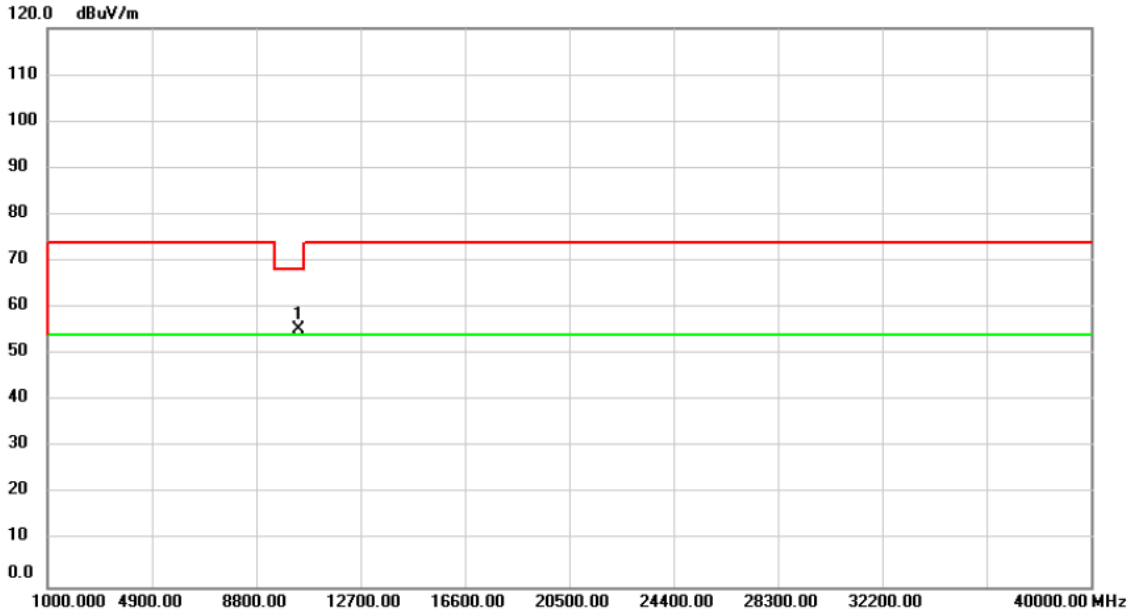
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5149.460	27.43	37.54	64.97	74.00	-9.03	peak	
2		5149.460	13.69	37.54	51.23	54.00	-2.77	AVG	
3	X	5190.000	63.76	37.58	101.34	74.00	27.34	peak	No Limit
4	*	5190.000	53.81	37.58	91.39	54.00	37.39	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT40) 5190MHz_θ=90°

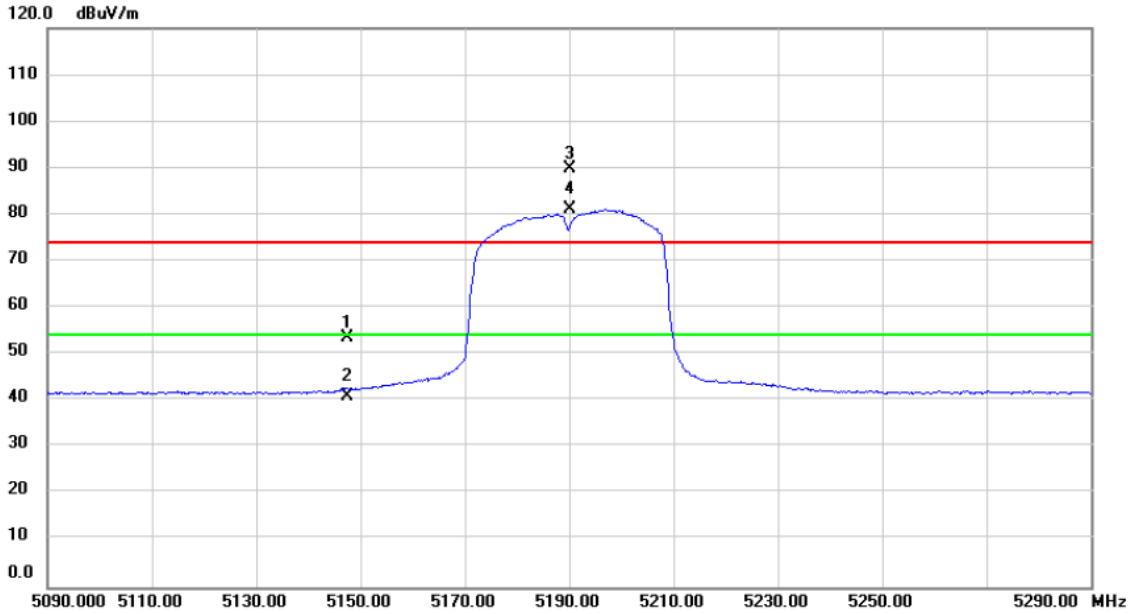
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10380.00	53.38	1.94	55.32	68.20	-12.88	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT40) 5190MHz_θ=90°

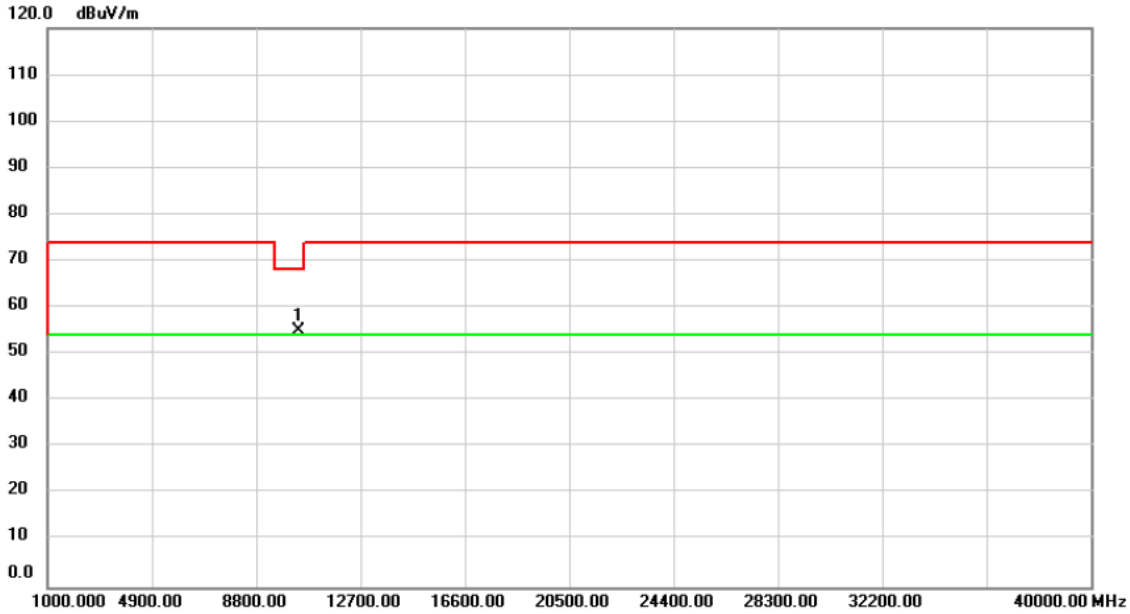
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5147.480	16.15	37.54	53.69	74.00	-20.31	peak	
2		5147.480	3.36	37.54	40.90	54.00	-13.10	AVG	
3	X	5190.000	52.41	37.58	89.99	74.00	15.99	peak	No Limit
4	*	5190.000	43.52	37.58	81.10	54.00	27.10	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT40) 5190MHz_θ=90°

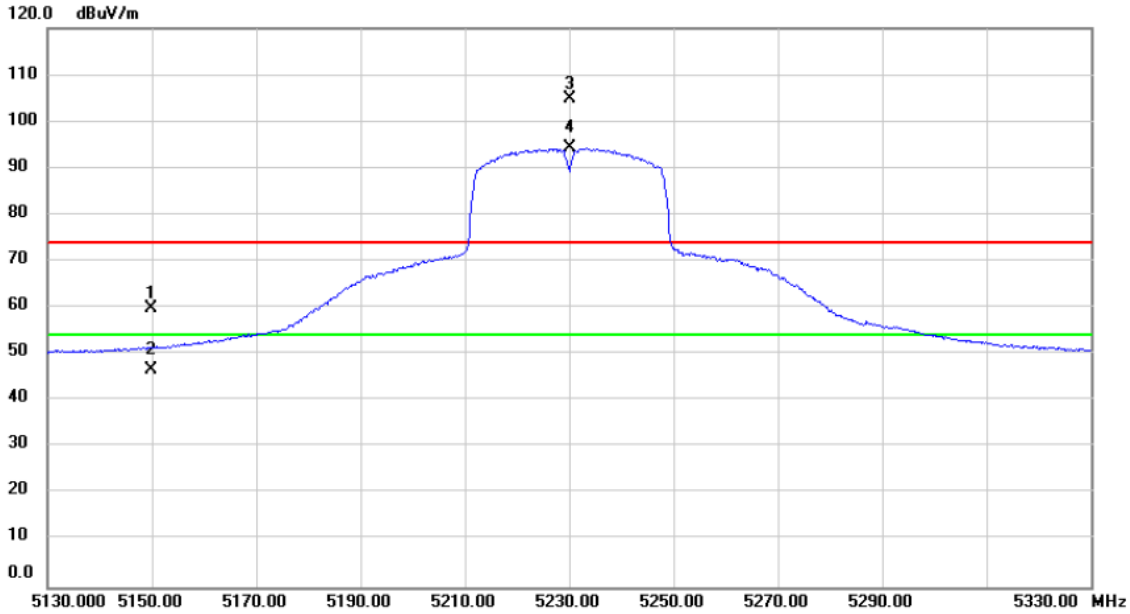
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10380.00	53.05	1.94	54.99	68.20	-13.21	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT40) 5230MHz_θ=90°

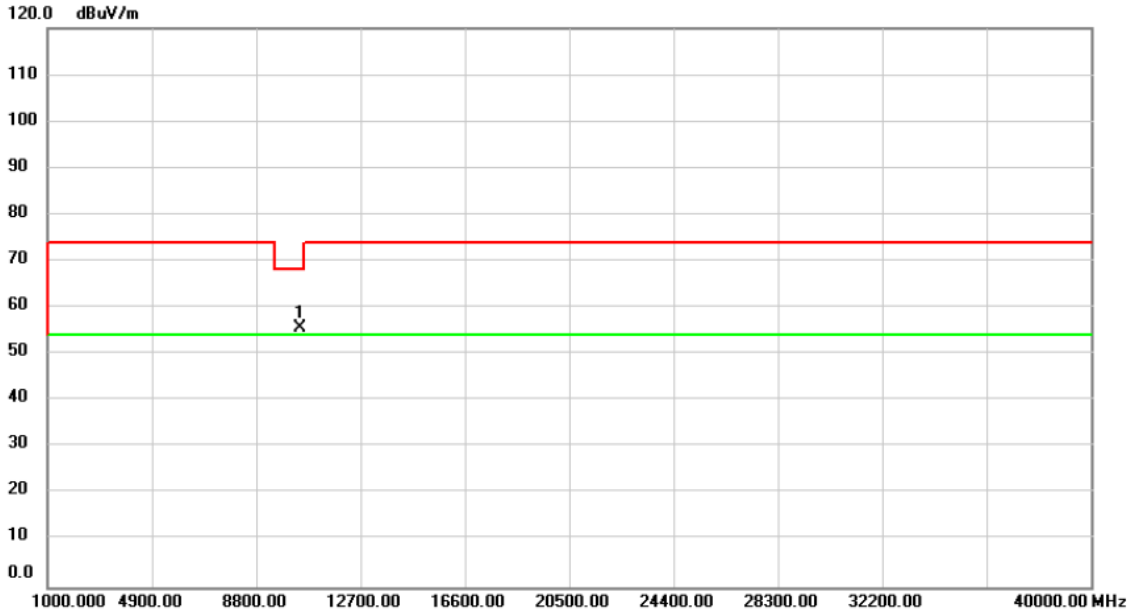
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5149.960	22.45	37.54	59.99	74.00	-14.01	peak	
2		5149.960	9.09	37.54	46.63	54.00	-7.37	AVG	
3	X	5230.000	67.19	37.63	104.82	74.00	30.82	peak	No Limit
4	*	5230.000	56.67	37.63	94.30	54.00	40.30	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT40) 5230MHz_θ=90°

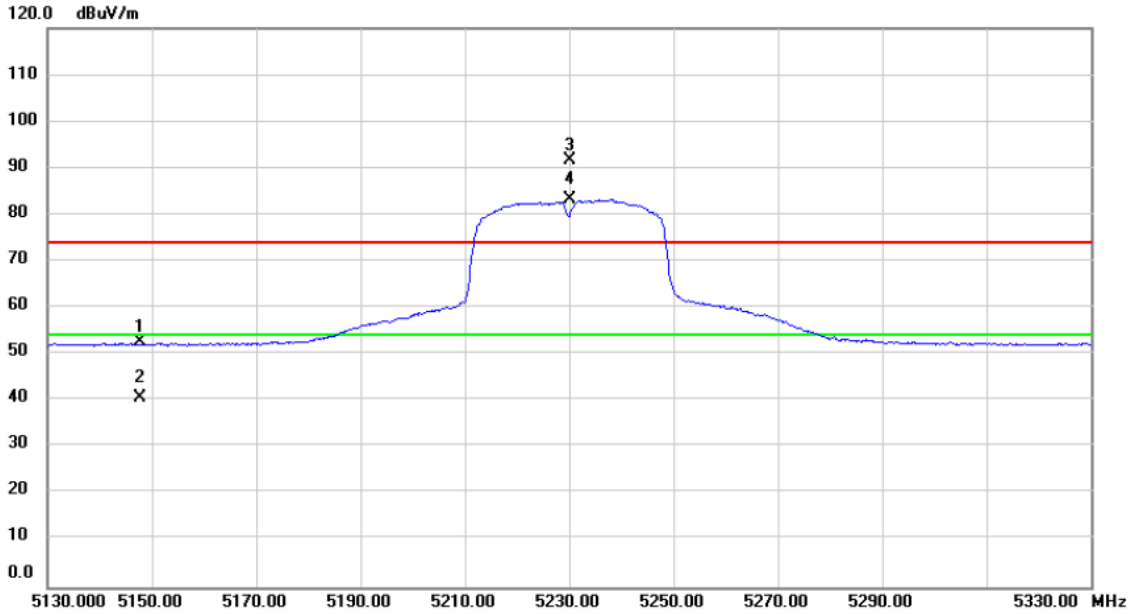
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10460.00	53.59	1.96	55.55	68.20	-12.65	peak	

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT40) 5230MHz_θ=90°

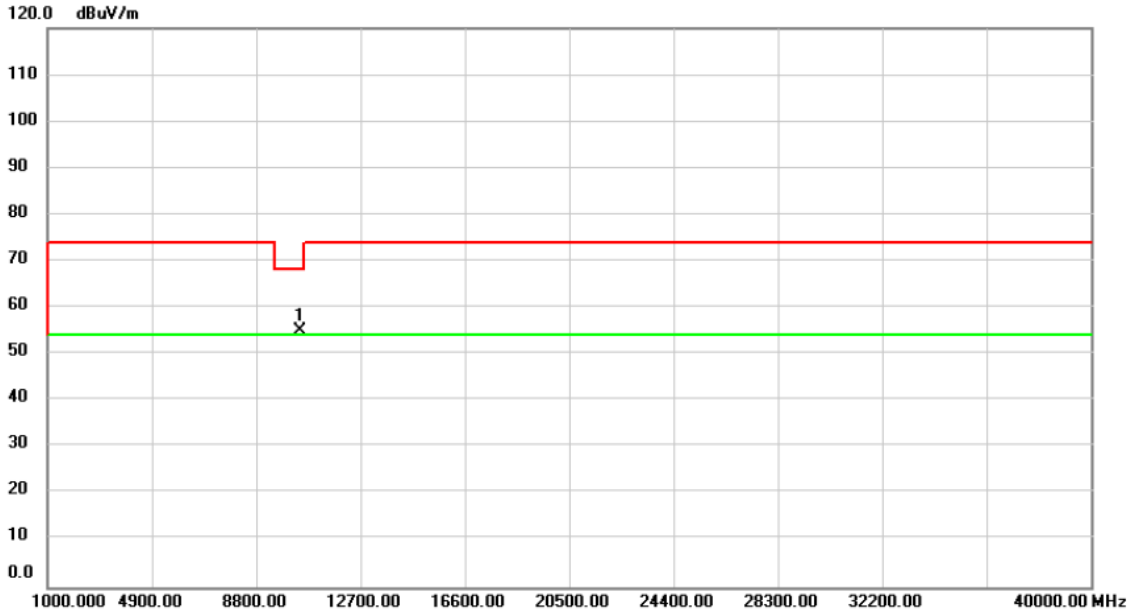
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5147.720	15.08	37.54	52.62	74.00	-21.38	peak	
2		5147.720	3.01	37.54	40.55	54.00	-13.45	AVG	
3	X	5230.000	54.12	37.63	91.75	74.00	17.75	peak	No Limit
4	*	5230.000	45.69	37.63	83.32	54.00	29.32	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-1/ TX AC(VHT40) 5230MHz_θ=90°

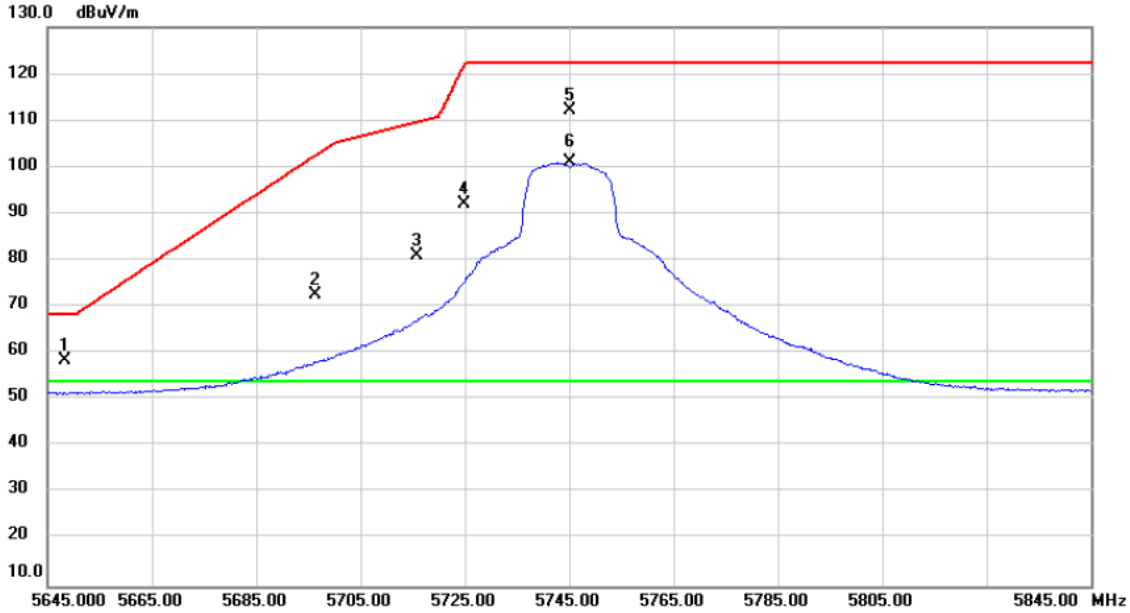
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	10460.00	53.10	1.96	55.06	68.20	-13.14	peak	

Orthogonal Axis:	X
Test Mode:	UNII-3/TX A Mode 5745MHz_θ=90°

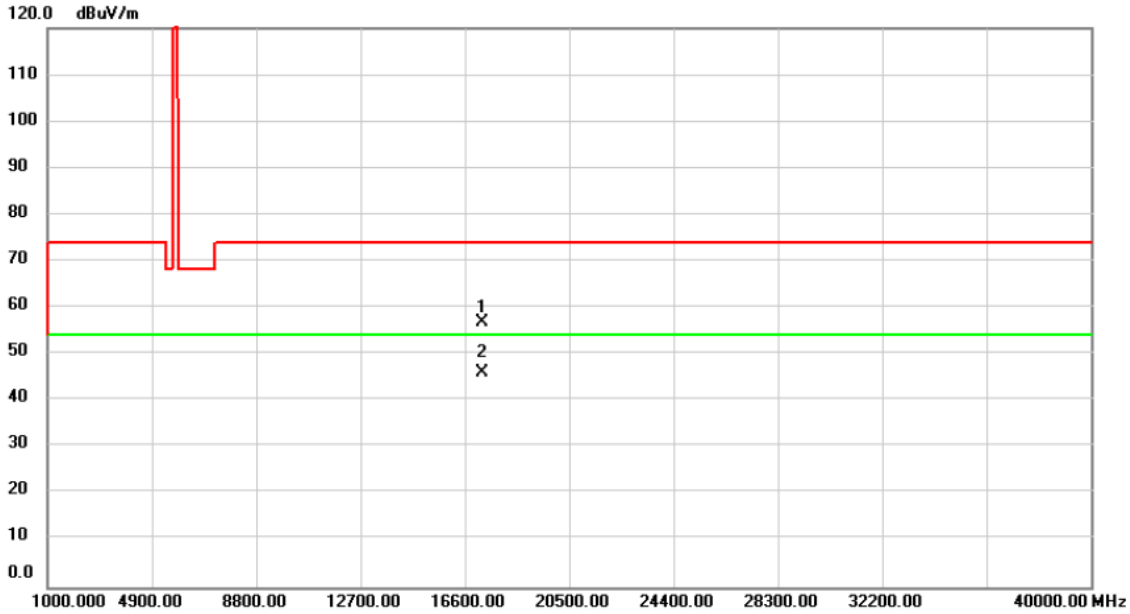
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5648.430	20.22	38.33	58.55	68.20	-9.65	peak	
2		5696.350	34.22	38.45	72.67	102.51	-29.84	peak	
3		5715.700	42.49	38.51	81.00	109.60	-28.60	peak	
4		5724.820	53.43	38.53	91.96	121.79	-29.83	peak	
5		5745.000	73.51	38.58	112.09	122.20	-10.11	peak	No Limit
6	*	5745.000	62.33	38.58	100.91	54.00	46.91	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-3/TX A Mode 5745MHz_θ=90°

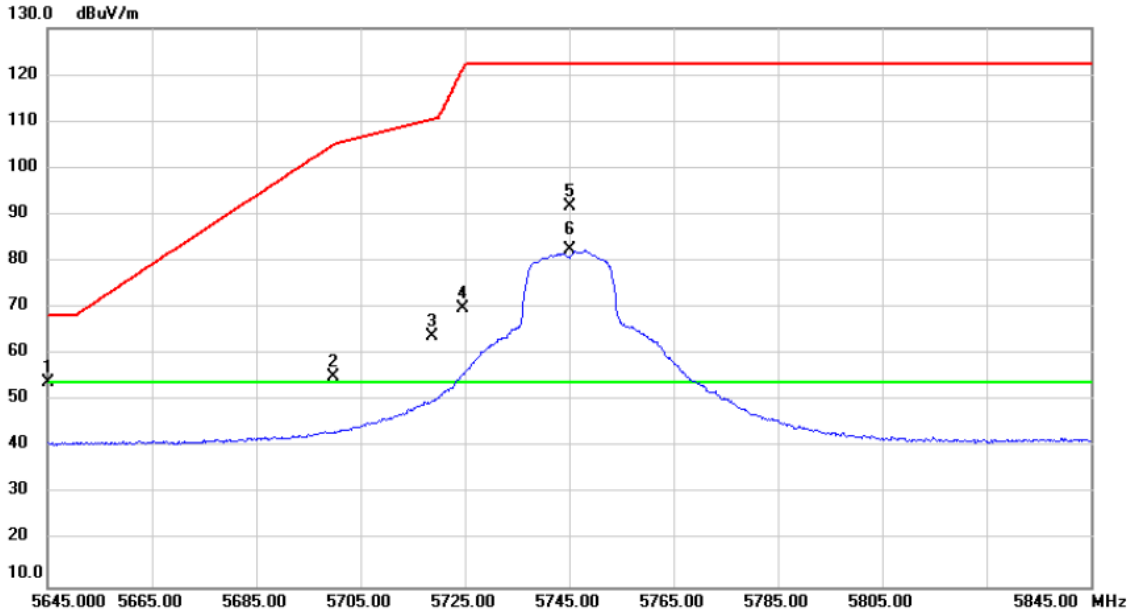
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		17235.00	48.99	7.98	56.97	74.00	-17.03	peak	
2	*	17235.00	38.01	7.98	45.99	54.00	-8.01	AVG	

Orthogonal Axis:	X
Test Mode:	UNII-3/TX A Mode 5745MHz_θ=90°

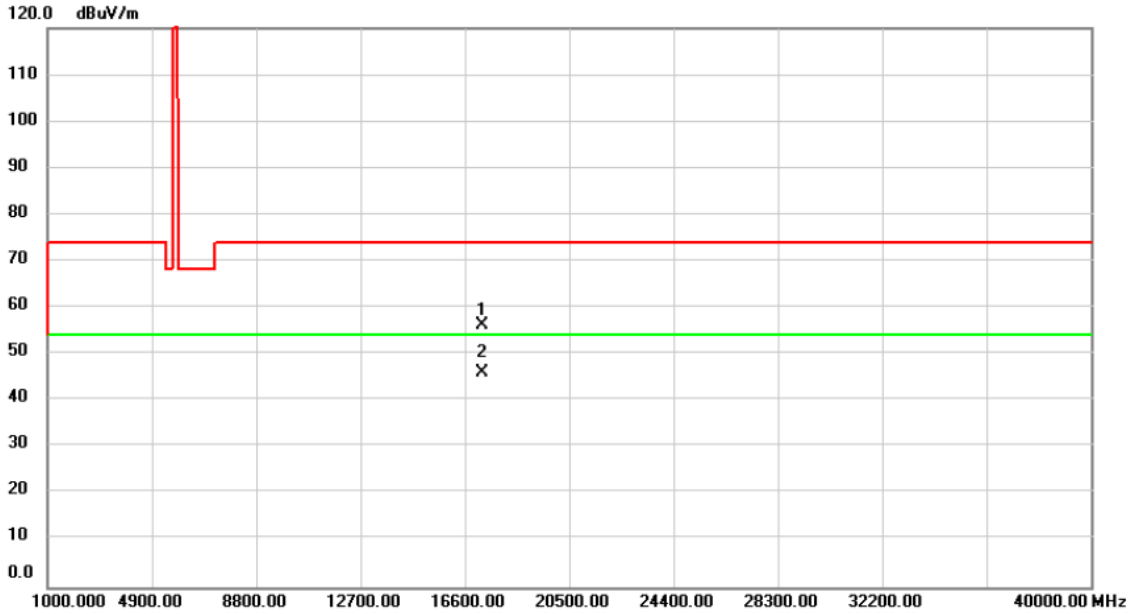
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5645.190	15.63	38.31	53.94	68.20	-14.26	peak	
2		5699.800	16.66	38.46	55.12	105.05	-49.93	peak	
3		5718.680	25.39	38.51	63.90	110.43	-46.53	peak	
4		5724.535	31.42	38.53	69.95	121.14	-51.19	peak	
5		5745.000	53.23	38.58	91.81	122.20	-30.39	peak	No Limit
6	*	5745.000	43.77	38.58	82.35	54.00	28.35	AVG	No Limit

Orthogonal Axis:	X
Test Mode:	UNII-3/TX A Mode 5745MHz_θ=90°

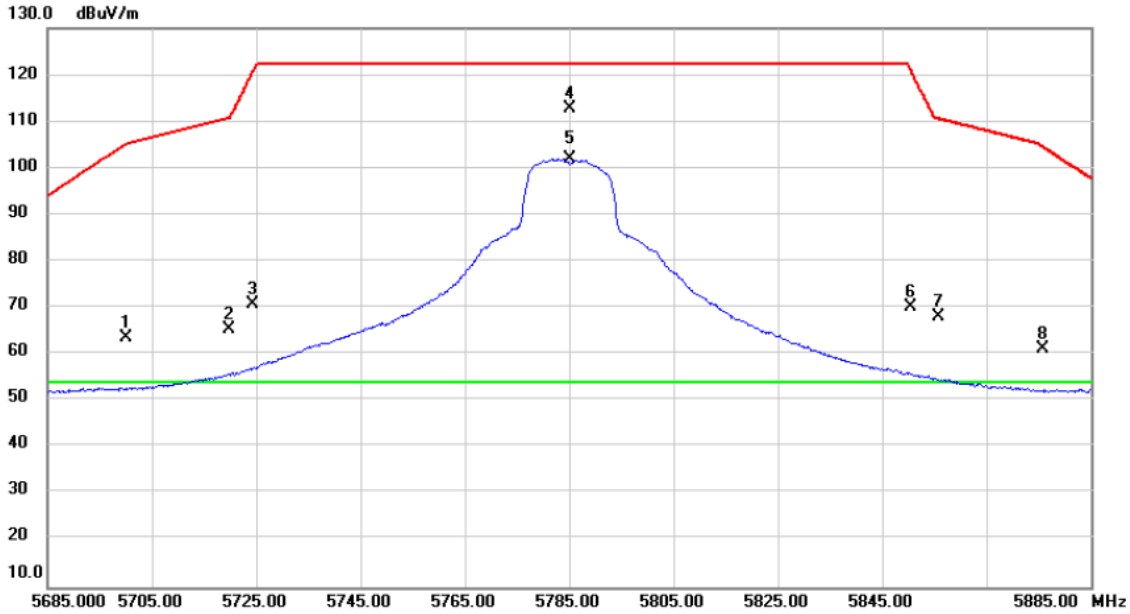
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		17235.00	48.31	7.98	56.29	74.00	-17.71	peak	
2	*	17235.00	38.05	7.98	46.03	54.00	-7.97	AVG	

Orthogonal Axis:	X
Test Mode:	UNII-3/TX A Mode 5785MHz_θ=90°

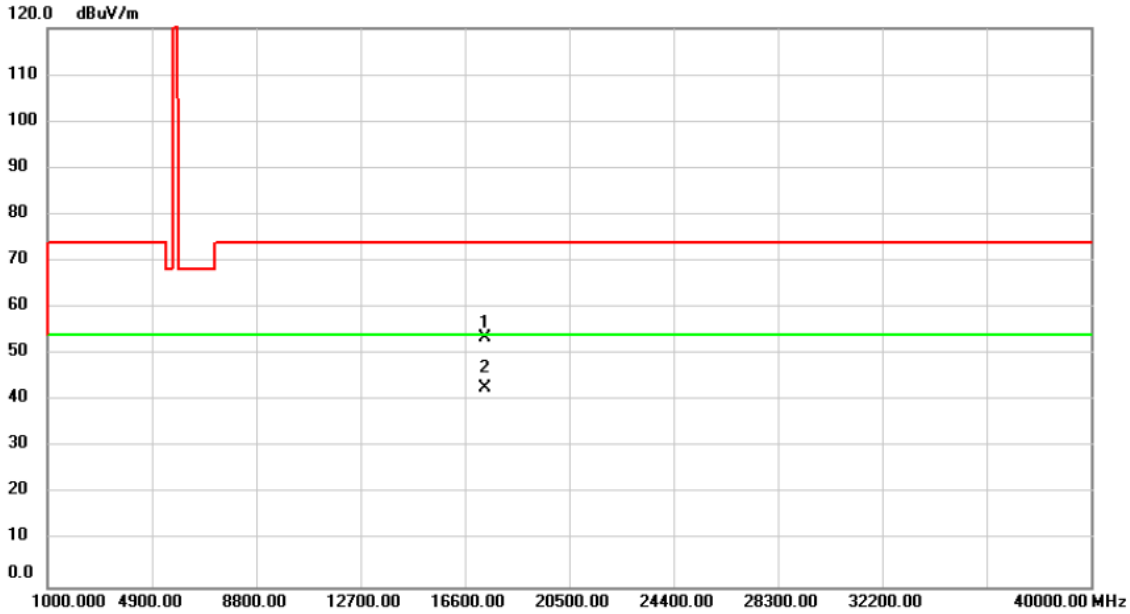
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5700.000	25.12	38.46	63.58	105.20	-41.62	peak	
2		5719.860	26.78	38.52	65.30	110.76	-45.46	peak	
3		5724.370	32.11	38.53	70.64	120.76	-50.12	peak	
4		5785.000	74.18	38.70	112.88	122.20	-9.32	peak	No Limit
5	*	5785.000	63.29	38.70	101.99	54.00	47.99	AVG	No Limit
6		5850.550	31.20	38.87	70.07	120.95	-50.88	peak	
7		5855.700	29.12	38.89	68.01	110.60	-42.59	peak	
8		5875.890	22.11	38.94	61.05	104.54	-43.49	peak	

Orthogonal Axis:	X
Test Mode:	UNII-3/TX A Mode 5785MHz_θ=90°

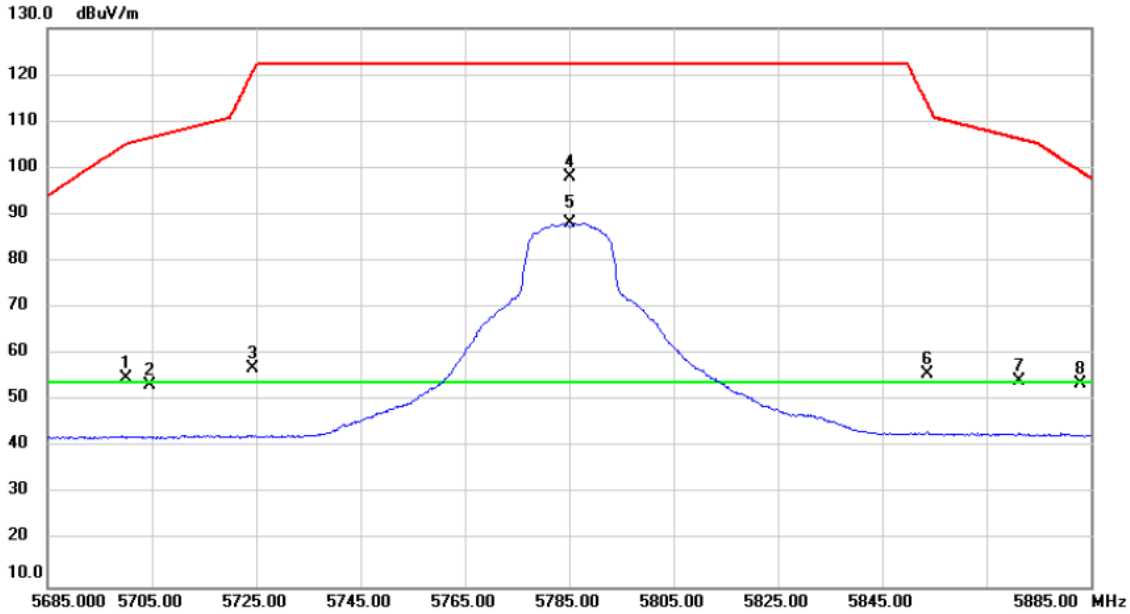
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		17355.00	45.04	8.60	53.64	74.00	-20.36	peak	
2	*	17355.00	34.26	8.60	42.86	54.00	-11.14	AVG	

Orthogonal Axis:	X
Test Mode:	UNII-3/TX A Mode 5785MHz_θ=90°

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		5700.000	16.40	38.46	54.86	105.20	-50.34	peak	
2		5704.540	14.87	38.48	53.35	106.47	-53.12	peak	
3		5724.375	18.46	38.53	56.99	120.78	-63.79	peak	
4		5785.000	59.34	38.70	98.04	122.20	-24.16	peak	No Limit
5	*	5785.000	49.55	38.70	88.25	54.00	34.25	AVG	No Limit
6		5853.795	16.77	38.89	55.66	113.55	-57.89	peak	
7		5871.360	15.26	38.93	54.19	106.22	-52.03	peak	
8		5882.900	14.71	38.96	53.67	99.33	-45.66	peak	