

**ELECTROMAGNETIC EMISSIONS
COMPLIANCE TEST REPORT**

Applicant: silex technology, Inc.
2-3-1 Hikaridai, Seika-cho, Soraku-gun, Kyoto 619-0237,
Japan

Manufacturer: silex technology, Inc.
2-3-1 Hikaridai, Seika-cho, Soraku-gun, Kyoto 619-0237,
Japan

Product Name: AP-800AX

Brand Name: Silex Technology

Model No.: AP-800AX

Model Difference: N/A

Report Number: TERF2303000755ER

FCC ID N6C-AP800AX

IC: 4908A-AP800AX

Date of EUT Received: March 29, 2023

Date of Test: March 29, 2023 ~ May 16, 2023

Issue Date: July 20, 2023

Approved By _____

Blue Yang**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.247 and & 15.407, ISED RSS-247.

The results of this report relate only to the sample identified in this report.

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2303000755ER	00	Original.	July 20, 2023	Susan Lin	

Note:

- The remark "*" indicates modification of the report upon requests from certification body.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	AP-800AX
Brand Name:	Silex Technology
Model No.:	AP-800AX
Model Difference:	N/A
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	000001814
Power Supply:	12Vdc
Test Software (Name/Version):	QRCT v4.0.211.0

1.2 Modulation & Data Rate

Modulation type:	64QAM, 16QAM, QPSK, BPSK for OFDM
	256QAM for OFDM in 802.11ac
	256QAM, 1024QAM for OFDMA in 802.11ax
Transition Rate:	802.11 a: 6 - 54 Mbps
	802.11 n_20MHz: up to 144.4 Mbps
	802.11 n_40MHz: up to 300 Mbps
	802.11 ac_20MHz: up to 173.4 Mbps
	802.11 ac_40MHz: up to 400 Mbps
	802.11 ac_80MHz: up to 866.6 Mbps
	802.11 ax_20MHz: up to 286.8 Mbps
	802.11 ax_40MHz: up to 573.6 Mbps
	802.11 ax_80MHz: up to 1201 Mbps

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1.3 Antenna Designation

Antenna Type	Ch0/Ch1	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)	Directional Gain (dBi)
Dipole	Ch0	ANTDP-039A0	5150~5250	1.1	4.11
			5250~5350	1.1	4.11
			5470~5725	1.2	4.21
			5725~5850	1.3	4.31
	Ch1		5150~5250	1.1	4.11
			5250~5350	1.1	4.11
			5470~5725	1.2	4.21
			5725~5850	1.3	4.31

Note:

1. Pre-scanned was done on the above antennas, measurements were demonstrated by using the antenna with the highest gain as the worst case scenarios.
2. Antenna information is provided by the applicant.

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1.4 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407
 FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01
 FCC KDB 662911 D01 Multiple Transmitter Output v02r01
 RSS-247 issue 2 Feb. 2017
 RSS-Gen, Issue 5 April 2018
 ANSI C63.10:2013

1.5 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
Conducted G				

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

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1.6 Special Accessories

There are no special accessories used while test was conducted.

1.7 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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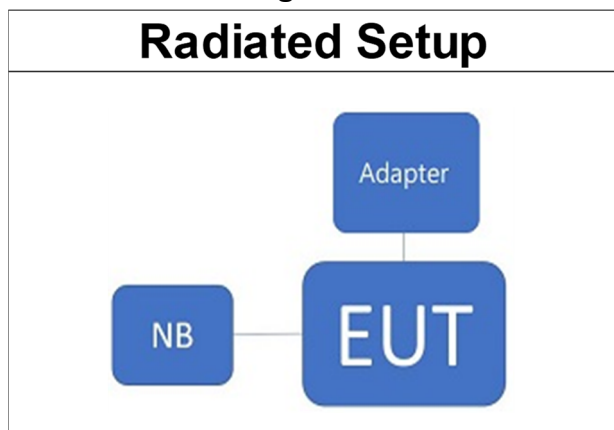
2.4 Measurement Results Explanation Example

2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

2.5 Test Configuration



2.6 Control Unit(s)

Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	DELL	Latitude 5590	3R9FST2	N/A	N/A
Adapter	ADAPTER	ATS036T-A120	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULT

FCC Rules	ISED Rules	Description Of Test	Result
§15.205 §15.209 §15.407(b)	RSS-247 §6.2.1~ 4 (2)	Undesirable Radiated Emissions	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case. The given UE is pre-scanned among below modes.

Test mode

Final test modes are considering the modulation and worse data rate as below table.

Modulation	Data Rate
802.11b + 802.11a	1M + 6M

Note:

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
Undesignable radiated emission measurement	+/- 1.68 dB
Temperature	+/- 0.7 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/-	2.8	dB
			9kHz~30MHz
	+/-	4.82	dB
			30MHz - 1000MHz
Polarization: Horizontal	+/-	4.37	dB
			1GHz - 18GHz
	+/-	4.21	dB
			18GHz - 40GHz
Polarization: Horizontal	+/-	2.8	dB
			9kHz~30MHz
	+/-	4.54	dB
			30MHz - 1000MHz
Polarization: Horizontal	+/-	4.37	dB
			1GHz - 18GHz
Polarization: Horizontal	+/-	4.21	dB
			18GHz - 40GHz

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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6 UNDESIRABLE RADIATED EMISSION MEASUREMENT

6.1 Standard Applicable

$EIRP = (E \cdot d)^2 / 30$, where E is the field strength in V/m, d is the measurement distance (3m), $EIRP$ is the equivalent isotropically radiated power in Watts.

6.1.1 5150~5850 MHz

Applicable to	Operation Freq. (MHz)	EIRP		Field Strength @ 3m (dBμV/m)
		Freq. (MHz)	Limits (dBm/MHz)	
15.407(b)(1) RSS-247 §6.2.1.2	5150~5250	f ≤ 5150 f ≥ 5350	PK: -27	PK: 68.2
15.407(b)(2) RSS-247 §6.2.2.2	5250~5350			
15.407(b)(3) RSS-247 §6.2.3.2	5475~5725	f ≤ 5470 f ≥ 5725		
15.407(b)(4)(i) RSS-247 §6.2.4.2	5725~5850	at 75 MHz or more above or below the band edge	PK:-27	PK: 68.2
		increasing linearly from 75~25MHz above or below the band edge	PK:-27~10	PK: 68.2~105.2
		increasing linearly from 25~5MHz above or below the band edge	PK:10~15.6	PK: 105.2~110.8
		increasing linearly from 5~0 MHz above or below the band edge	PK: 15.6~27	PK:110.8~122.2

6.1.2 Spurious Emission

Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

- The lower limit shall apply at the transition frequencies.

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6.2 Measurement Equipment Used:

Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Horn Antenna	SCHWARZBECK	BBHA9170	184	12/30/2022	12/29/2023
Horn Antenna	SCHWARZBECK	BBHA9120D	1441	09/27/2022	09/26/2023
Spectrum Analyzer	Agilent	E4446A	MY51100003	10/28/2022	10/27/2023
Pre-Amplifier	EMC Instruments	EMC118A45SEE	980868	12/13/2022	12/12/2023
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2022	10/26/2023
Filter 5150-5350 MHz	Micro-Tronics	BRM50703	1	12/13/2022	12/12/2023
High Pass Filter	WI	WHKX4.0/18G-10SS	22	12/13/2022	12/12/2023
Coaxial Cable	Huber Suhner	SUCOFLEX 104PEA	MY4251/4PEA	12/13/2022	12/12/2023
Coaxial Cable	EMC Instruments	EMC 107-SM-SM-500	221104	12/13/2022	12/12/2023
Coaxial Cable	EMC Instruments	EMC 107-SM-SM-1000	221103	12/13/2022	12/12/2023
Coaxial Cable	EMC Instruments	EMC 107-SM-SM-1500	221110	12/13/2022	12/12/2023
Coaxial Cable	EMC Instruments	EMC 107-SM-SM-8000	221109	12/13/2022	12/12/2023
Site Cal	SGS	SAC 3	N/A	01/01/2023	12/31/2023
Test Software	audix	e3	Ver. 9 210322	N.C.R	N.C.R

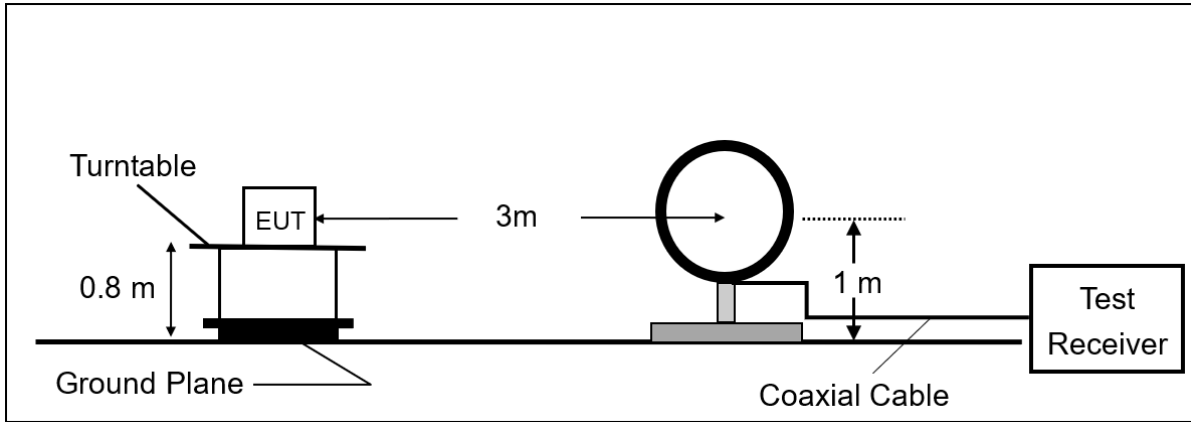
NOTE: N.C.R refers to Not Calibrated Required.

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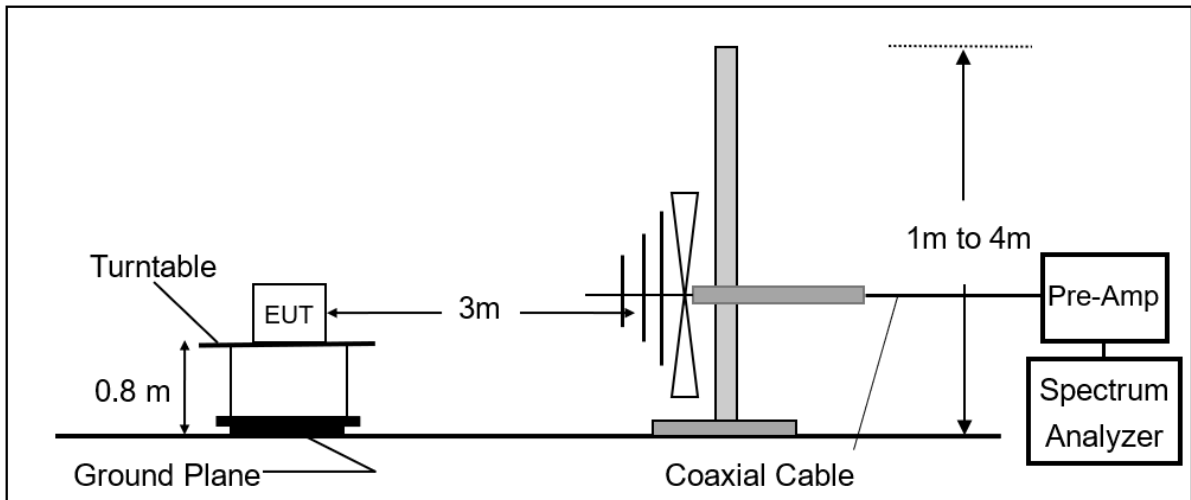
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6.3 Test Setup

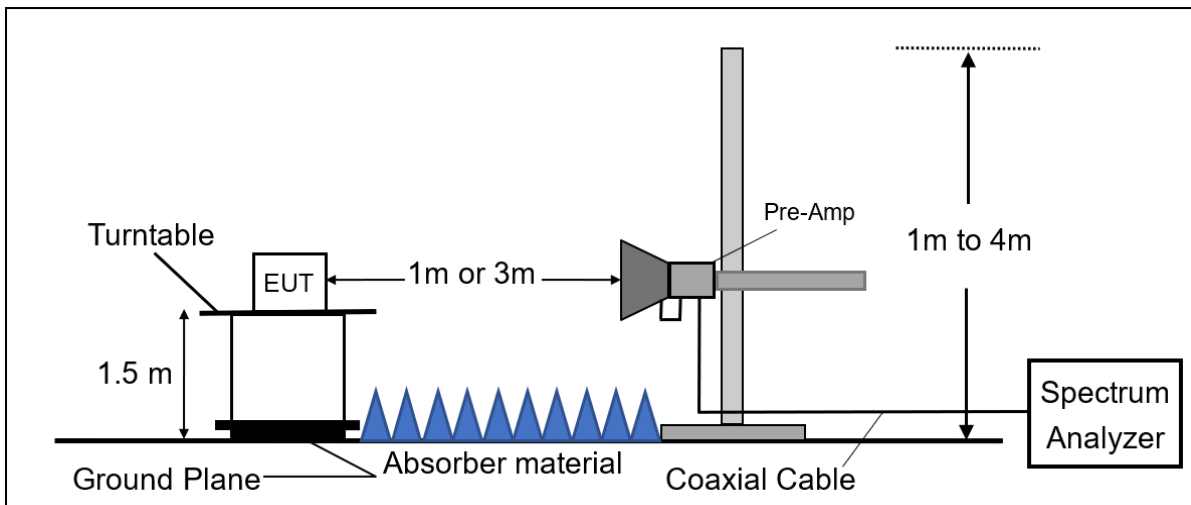
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz



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



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6.4 Measurement Procedure

1. The testing follows FCC KDB 789033 D02.
2. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plane.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. Set the spectrum analyzer as RBW=100 kHz and VBW=300 kHz for Peak Detector (PK) at frequency between 30MHz and 1 GHz
6. Use receiver mode as RBW=120 kHz for Quasi-peak (QP) at frequency between 30MHz and 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Maximum Emission Measurements at frequency above 1 GHz.
8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Emission Measurements at frequency above 1 GHz.
9. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
10. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
11. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
12. Repeat above procedures until all frequency measured were complete.

6.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where *FS* = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

*The limit of the emission level is expressed in dBuV/m, which converts 20*log(uV/m)*

$$Actual\ FS(dB\mu V/m) = SPA.\ Reading\ level(dB\mu V) + Factor(dB)$$

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$$\text{Factor(dB)} = \text{Antenna Factor(dB}\mu\text{V/m)} + \text{Cable Loss(dB)} - \text{Pre_Amplifier Gain(dB)}$$

6.6 Test Results of Radiated Spurious Emissions from 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) & RSS-GEN §6.13.2 was not reported.

Pre-scan was done at frequency 5.47 GHz and 5.85 GHz for bandedge measurement of straddle channels 138, 142 and 144 which was 20dB lower than the limit per 15.31(o) & RSS-GEN §6.13.2 was not reported.

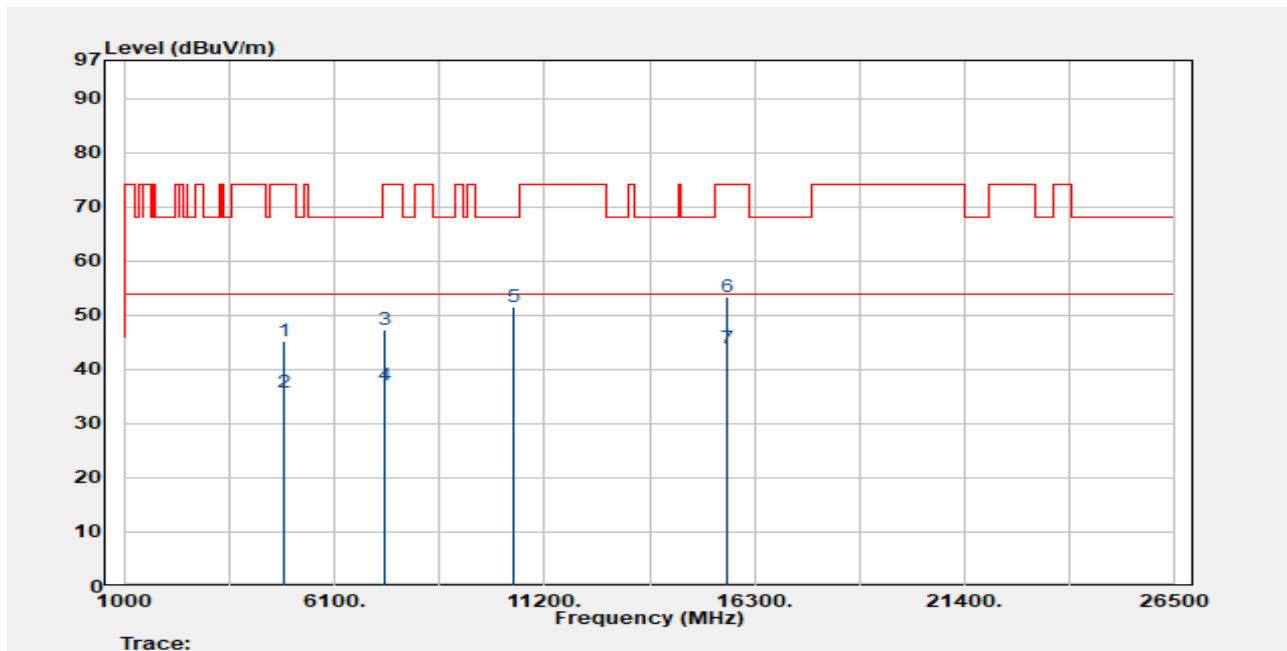
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6.7 Radiated Spurious Emission Measurement Result

6.7.1 Spurious Emission

Report Number	:TERF2303000755ER	Test Site	:SAC 3
Operation Mode	:802.11b + 802.11a	Test Date	:2023-05-16
Test Frequency	:2437 MHz + 5220 MHz	Temp./Humi.	:24.2/58
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:H Plane	Engineer	:Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4874.000	Peak	45.39	-0.29	45.10	74.00	-28.90
4874.000	Average	36.07	-0.29	35.78	54.00	-18.22
7311.000	Peak	41.55	5.79	47.34	74.00	-26.66
7311.000	Average	31.20	5.79	36.99	54.00	-17.01
10440.000	Peak	42.14	9.37	51.51	68.20	-16.69
15660.000	Peak	44.68	8.78	53.47	74.00	-20.53
15660.000	Average	35.18	8.78	43.96	54.00	-10.04

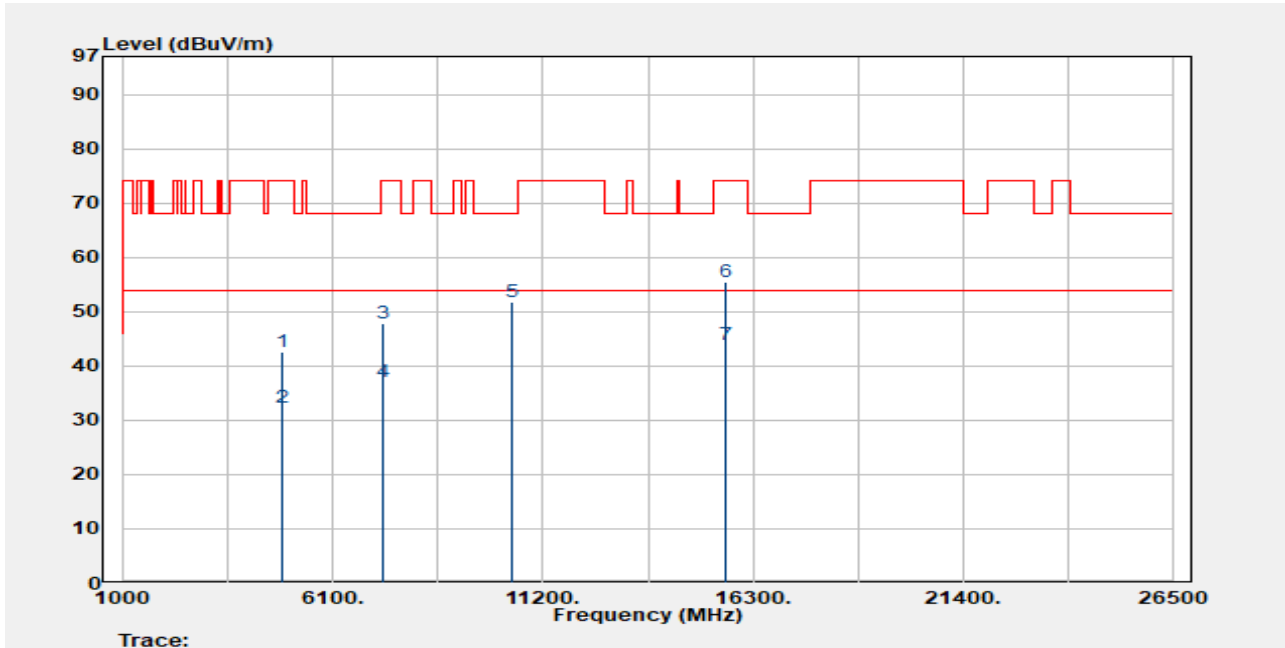
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Report Number :TERF2303000755ER
 Operation Mode :802.11b + 802.11a
 Test Frequency :2437 MHz + 5220 MHz
 Test Mode :Tx
 EUT Pol :H Plane

Test Site :SAC 3
 Test Date :2023-05-16
 Temp./Humi. :24.2/58
 Antenna Pol. :Horizontal
 Engineer :Nick Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4874.000	Peak	42.81	-0.29	42.51	74.00	-31.49
4874.000	Average	32.70	-0.29	32.41	54.00	-21.59
7311.000	Peak	42.01	5.79	47.80	74.00	-26.20
7311.000	Average	31.24	5.79	37.03	54.00	-16.97
10440.000	Peak	42.37	9.37	51.75	68.20	-16.45
15660.000	Peak	46.59	8.78	55.37	74.00	-18.63
15660.000	Average	35.16	8.78	43.94	54.00	-10.06

~ End of Report ~

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