

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## PARTIAL REPORT

OF

**Applicant:** Microsoft Corporation  
One Microsoft Way, Redmond, WA 98052-6399 USA  
**Product Name:** Portable Computing Device  
**Brand Name:** Microsoft  
**Model No.:** 1901  
**Model Difference:** N/A  
**FCC ID:** C3K1901  
**Report Number:** ER/2019/90109  
**FCC Rule Part:** §15.407, Cat: NII, §15.247, Cat: DSS, DTS  
**Issue Date:** Jan. 22, 2020  
**Date of Test:** Sep. 30, 2019 ~ Dec. 26, 2019  
**Date of EUT Received:** Sep. 30, 2019  
**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. 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 tested as described in this report is in compliance with conducted and radiated emission limits.

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

Approved By:

*Jazz Huang*  
Jazz Huang / Asst. Supervisor



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## Revision History

Report Number	Revision	Description	Issue Date	Remark
ER/2019/90109	Rev.00	Original.	Jan. 22, 2020	Revised By: Karen Huang

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## Contents

1	GENERAL INFORMATION	4
2	SYSTEM TEST CONFIGURATION	6
3	SUMMARY OF TEST RESULT	8
4	DESCRIPTION OF TEST MODES	9
5	MEASUREMENT UNCERTAINTY	14
6	RADIATED EMISSION MEASUREMENT	15

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## 1 GENERAL INFORMATION

### 1.1 Product Description

General:

Product Name:	Portable Computing Device	
Brand Name:	Microsoft	
Model No.:	1901	
Model Difference:	N/A	
HW Version (Product):	EV2	
SW Version (Product):	Windows 10 Pro	
HW Version (Radio):	EV2	
SW Version (Radio):	99.0.49.7/21.60.1.1	
Radio Test Tool & Version:	DRTU 11.1941.0-10270	
Power Supply:	7.66Vdc from Rechargeable Lithium-Ion Polymer Battery or 15V from AC/DC Adapter	
	Battery:	Model No.: DYNU01, Supplier: DYNAPACK
	Adapter:	Model No.: 1735, Supplier: LITEON

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## 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247  
FCC KDB 558074 D01 DTS Meas. Guidance v05r01  
KDB 558074 D01 v05 DSS Meas. Guidance  
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  
ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

## 1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 (TAF code 0513)

FCC Registration Numbers: TW0001

## 1.4 Special Accessories

AC Adapter is used while the test is conducted and there is no other accessory attached. This is the worst case condition.

## 1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT is configured to operate in a continuous transmission mode. EUT placement and various angles were checked to find worst mode where the emission characteristics are maximized.

### 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 (Simultaneous case)

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 plan. 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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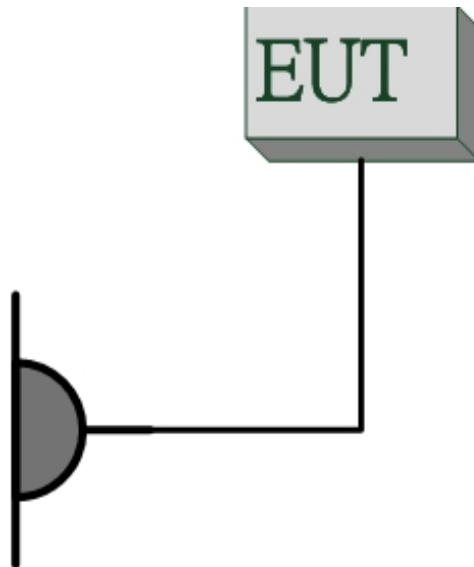
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## 2.4 Configuration of Tested System

**Fig. 2-1 Radiated Emission Configuration**



**Table 2-1 Equipment Used in Tested System**

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A
2	WLAN Test Software	N/A	N/A	N/A	N/A	N/A

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### 3 SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.407(b)	Undesirable Radiated Emissions	Compliant
§15.205 §15.209 §15.247(d)	Spurious Emission	Compliant

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## 4 DESCRIPTION OF TEST MODES

### 4.1 Operated in 2400 ~ 2483.5MHz Band

13 channels are provided for 802.11b, 802.11g and 802.11n\_HT20 / ax\_HE20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	8	2447 MHz
2	2417 MHz	9	2452 MHz
3	2422 MHz	10	2457 MHz
4	2427 MHz	11	2462 MHz
5	2432 MHz	12	2467 MHz
6	2437 MHz	13	2472 MHz
7	2442 MHz		

9 channels are provided for 802.11n\_HT40 / ax\_HE40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422 MHz	8	2447 MHz
4	2427 MHz	9	2452 MHz
5	2432 MHz	10	2457 MHz
6	2437 MHz	11	2462 MHz
7	2442 MHz		

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## 4.2 Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

CH	FREQUENCY	CH	FREQUENCY	CH	FREQUENCY	CH	FREQUENCY
0	2402 MHz	20	2422 MHz	40	2442 MHz	70	2462 MHz
1	2403 MHz	21	2423 MHz	41	2443 MHz	71	2463 MHz
2	2404 MHz	22	2424 MHz	42	2444 MHz	72	2464 MHz
3	2405 MHz	23	2425 MHz	43	2445 MHz	73	2465 MHz
4	2406 MHz	24	2426 MHz	44	2446 MHz	74	2466 MHz
5	2407 MHz	25	2427 MHz	45	2447 MHz	75	2467 MHz
6	2408 MHz	26	2428 MHz	46	2448 MHz	76	2468 MHz
7	2409 MHz	27	2429 MHz	47	2449 MHz	77	2469 MHz
8	2410 MHz	28	2430 MHz	48	2450 MHz	78	2470 MHz
9	2411 MHz	29	2431 MHz	49	2451 MHz	79	2471 MHz
10	2412 MHz	30	2432 MHz	50	2452 MHz	70	2472 MHz
11	2413 MHz	31	2433 MHz	51	2453 MHz	71	2473 MHz
12	2414 MHz	32	2434 MHz	52	2454 MHz	72	2474 MHz
13	2415 MHz	33	2435 MHz	53	2455 MHz	73	2475 MHz
14	2416 MHz	34	2436 MHz	54	2456 MHz	74	2476 MHz
15	2417 MHz	35	2437 MHz	55	2457 MHz	75	2477 MHz
16	2418 MHz	36	2438 MHz	56	2458 MHz	76	2478 MHz
17	2419 MHz	37	2439 MHz	57	2459 MHz	77	2479 MHz
18	2420 MHz	38	2440 MHz	58	2460 MHz	78	2480 MHz
19	2421 MHz	39	2441 MHz	59	2461 MHz		

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### 4.3 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

4 channels are provided for 802.11a, 802.11n\_HT20, 802.11ac\_VHT20 / ax\_HE20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n\_HT40, 802.11ac\_VHT40 / ax\_HE40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac\_VHT80 / ax\_HE80

CHANNEL	FREQUENCY
42	5210 MHz

1 channel is provided for 802.11ac\_VHT160 / ax\_HE160

CHANNEL	FREQUENCY
50	5250 MHz

Operated band in 5250 MHz ~5350 MHz:

4 channels are provided for 802.11a, 802.11n\_HT20, 802.11ac\_VHT20 / ax\_HE20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n\_HT40, 802.11ac\_VHT40 / ax\_HE40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac\_VHT80 / ax\_HE80

CHANNEL	FREQUENCY
58	5290 MHz

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Operated band in 5470 MHz ~5725 MHz:

11 channels are provided for 802.11a, 802.11n\_HT20, 802.11ac\_VHT20 / ax\_HE20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz	144	5720 MHz

5 channels are provided for 802.11n\_HT40, 802.11ac\_VHT40 / ax\_HE40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz	142	5710 MHz

3 channels are provided for 802.11ac\_VHT80 / ax\_HE80

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
106	5530 MHz	138	5690 MHz
122	5610 MHz		

1 channel is provided for 802.11ac\_VHT160 / ax\_HE160

CHANNEL	FREQUENCY
114	5570 MHz

Operated band in 5725 MHz ~5850 MHz:

5 channels are provided for 802.11a, 802.11n\_HT20, 802.11ac\_VHT20 / ax\_HE20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n\_HT40, 802.11ac\_VHT40 / ax\_HE40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac\_VHT80 / ax\_HE80

CHANNEL	FREQUENCY
155	5775 MHz

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#### 4.4 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.
4. For 802.11n HT and VHT modes, the HT emission testing was considered as a worst case scenario and was performed at power levels, per transmit chain, greater than or equal to the maximum power in any HT mode.
5. For MIMO modes, the 2TX emission testing was considered as a worst case scenario and was performed at power levels, per transmit chain, greater than or equal to the maximum power in any 1TX mode.
6. The EUT is supporting BT, BLE and 802.11 a/b/g/n/ac/ax mode, pre-scanned on simultaneous radiated emission on above available combinations, the worst case was reported on this report.

The field strength of radiation emission was measured as EUT stand-up position (H, E1 mode) and lie down position (E2 mode), the worst case E2 position was reported.

#### 4.5 Simultaneous Radiated Emission Test Mode

**Mode 1:** BT BR + WLAN 5G

**Mode 2:** BLE (1M) + WLAN 5G

**Mode 3:** BLE (2M) + WLAN 5G

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 0.96 dB
Peak Power Spectral Density Measurement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

### Radiated Spurious Emission:

Measurement uncertainty (Polarization : <b>Vertical</b> )	9kHz-30MHz: +/-2.87dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : <b>Horizontal</b> )	9kHz-30MHz: +/-2.87dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

### 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 RADIATED EMISSION MEASUREMENT

### 6.1 Standard Applicable

#### For NII

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

1. For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
2. For transmitters operating in the 5.725-5.85 GHz band: 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 25 MHz 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 27 dBm/MHz at the band edge.

APPLICABLE TO	LIMIT	
FCC KDB 789033 D02 General UNII Test Procedures New Rules	FIELD STRENGTH AT 3m	
	PK: 74 (dBμV/m)	AV 54 (dBμV/m)
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1) RSS-247 6.2.1.2	PK: -27 (dBm/MHz)	PK: 68.3 (dBμV/m)
15.407(b)(2) RSS-247 6.2.2.2		
15.407(b)(3) RSS-247 6.2.3.2		
15.407(b)(4)(i) RSS-247 6.2.4.2	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
*1 beyond 75 MHz or more above of the bandedge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		

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

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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:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level ( μV/m)

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**For DTS & DSS,**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 limit as below.

And according to §15.33(a) (1) for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

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:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m)

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## 6.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWAZBECK	VULB9168	378	01/04/2019	01/03/2020
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/20/2019	08/19/2020
Horn Antenna	Schwarzbeck	BBHA9170	184	12/27/2018	12/26/2019
3m Site NSA	SGS	966 chamber	N/A	01/02/2019	01/01/2020
Loop Antenna	ETS.LINDGREN	6502	148045	10/15/2019	10/14/2020
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/22/2019	04/21/2020
EMI Test Receiver	R&S	ESCI 7	1166.5950.07	07/04/2019	07/03/2020
Pre-Amplifier	HP	8449B	3008A00578	01/02/2019	01/01/2020
Pre-Amplifier	HP	8447D	2944A07676	01/02/2019	01/01/2020
Pre-Amplifier	EMC Instruments	EMC184045B	980135	01/02/2019	01/01/2020
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M1	01/02/2019	01/01/2020
Filter 5150-5350 MHz	Micro-Tronics	BRM50703	1	01/02/2019	01/01/2020
High Pass Filter	WI	WHKX7.0/18G-8SS	45	01/02/2019	01/01/2020
High Pass Filter	WI	WHKX4.0/18G-10SS	22	01/01/2019	01/02/2020
Low Loss Cable	Huber Suhner	966 RX	9	01/02/2019	01/01/2020

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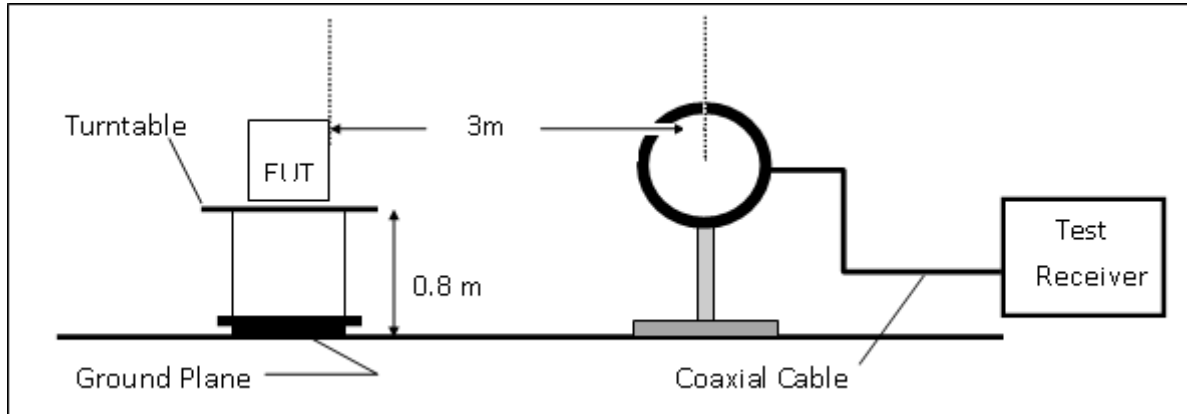
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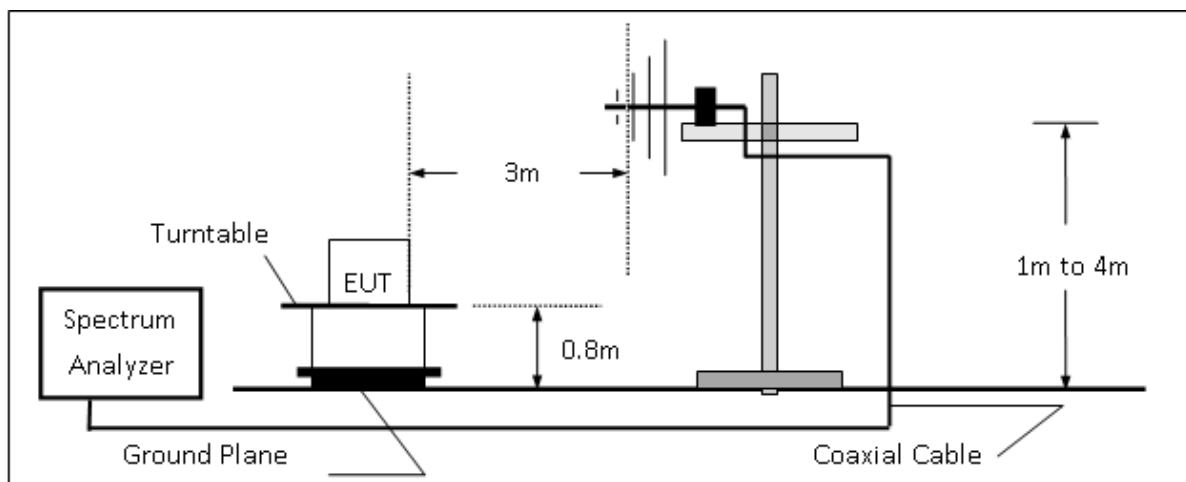
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## 6.3 Test SET-UP

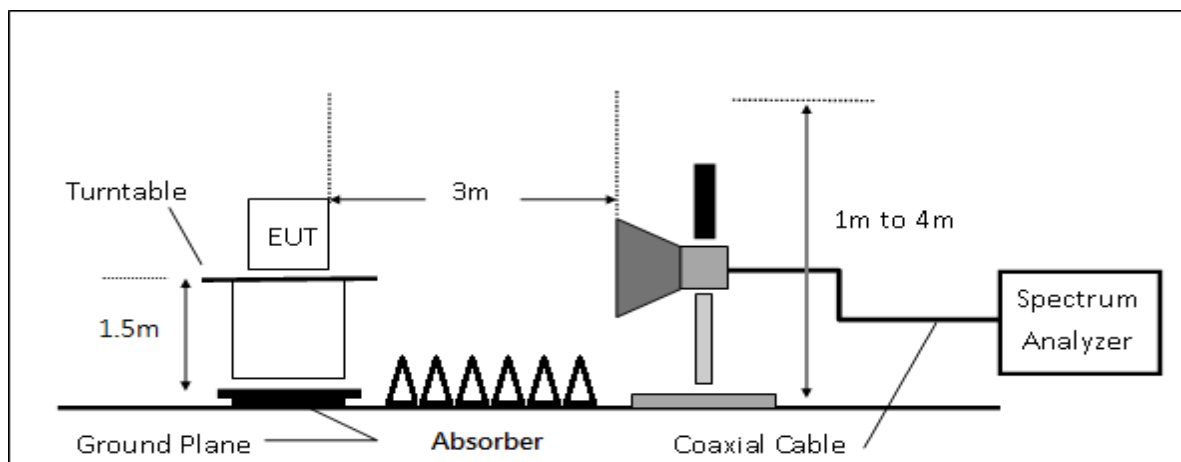
### (A) Radiated Emission Test Set-UP Frequency Below 30MHz.



### (B) Radiated Emission Test Set-UP, Frequency form 30MHz to 1000MHz



### (C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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#### 6.4 Measurement Procedure (Simultaneous case)

1. The testing follows the Measurement Procedure of ANSI C63.10:2013.
2. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plan.
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=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
6. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW  $\geq 1/T$  (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
8. 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.
9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
11. Repeat above procedures until all default test channel measured were complete.

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## 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  $20 \cdot \log(\mu V/m)$

Actual FS(dBuV/m) = SPA. Reading level(dBuV) + Factor(dB)

Factor(dB) = Antenna Factor(dBuV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

## 6.6 Test Results of Radiated Spurious Emissions form 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) was not reported.

## 6.7 Measurement Result

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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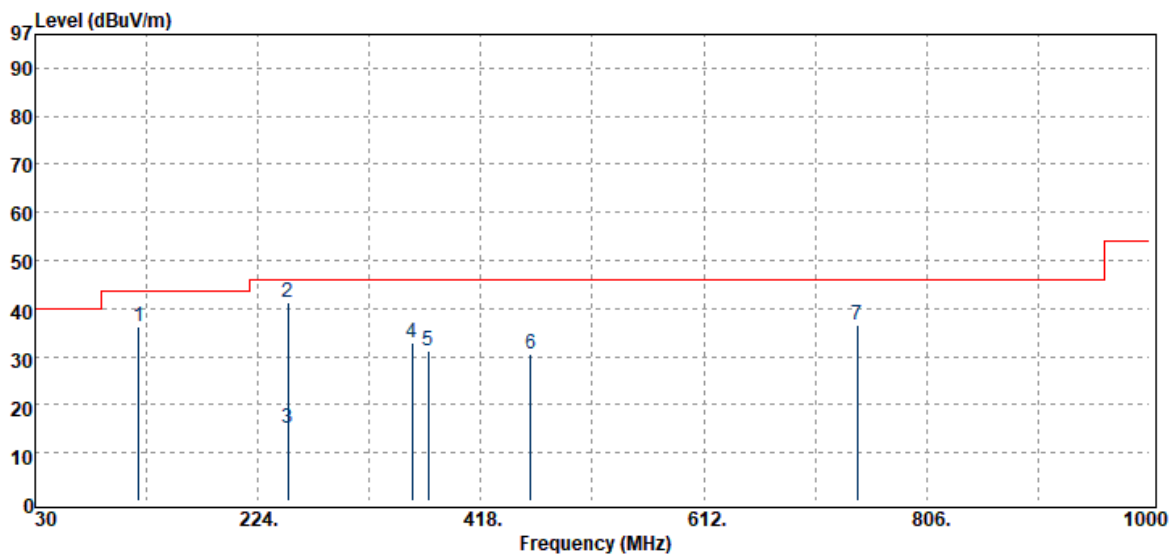
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## Radiated Spurious Emission Measurement Result

### WIFI+BT

Report Number :ER/2019/90109  
 Operation Mode :BT BR/802.11n 20  
 Test Channel :2480MHz/5220 MHz  
 Test Mode :Tx CH High/Tx CH44  
 EUT Pol :E2 Plane

Test Date :2019-11-15  
 Temp./Humi. :24.4/61  
 Antenna Pol. :VERTICAL  
 Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
120.21	Peak	46.42	-10.04	36.38	43.50	-7.12
250.19	Peak	49.20	-7.81	41.39	46.00	-4.61
250.19	QP	22.81	-7.81	15.00	46.00	-31.00
357.86	Peak	37.76	-4.96	32.80	46.00	-13.20
372.41	Peak	35.76	-4.56	31.20	46.00	-14.80
461.65	Peak	33.61	-3.18	30.43	46.00	-15.57
745.86	Peak	34.17	2.46	36.63	46.00	-9.37

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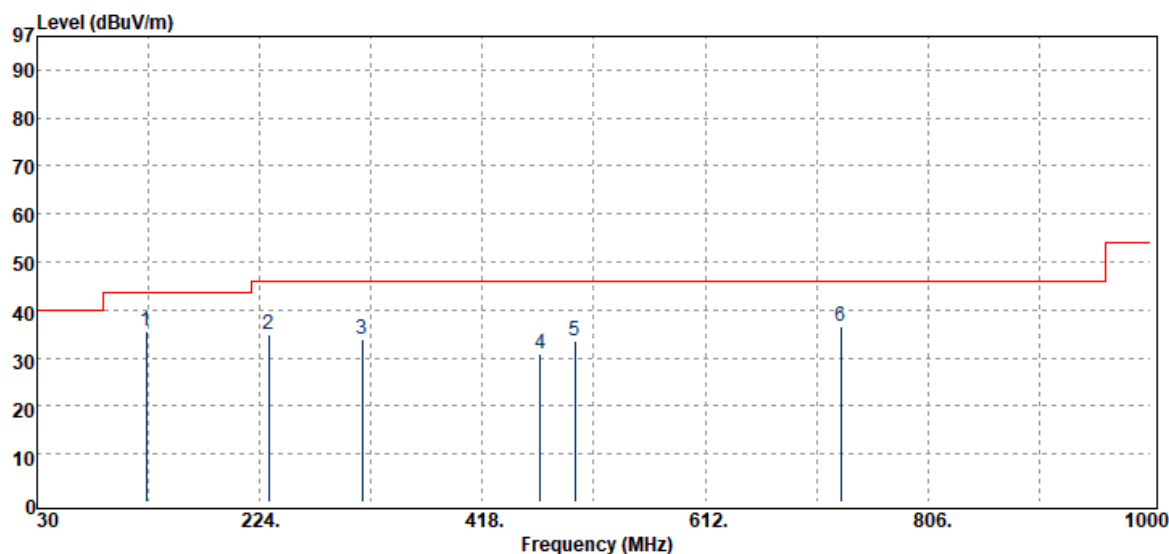
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Report Number :ER/2019/90109  
Operation Mode :BT BR/802.11n 20  
Test Channel :2480MHz/5220 MHz  
Test Mode :Tx CH High/Tx CH44  
EUT Pol :E2 Plane

Test Date :2019-11-15  
Temp./Humi. :24.4/61  
Antenna Pol. :HORIZONTAL  
Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
125.06	Peak	45.07	-9.57	35.50	43.50	-8.00
231.76	Peak	43.65	-8.68	34.97	46.00	-11.03
313.24	Peak	39.61	-5.83	33.78	46.00	-12.22
468.44	Peak	33.87	-3.01	30.86	46.00	-15.14
498.51	Peak	36.32	-2.64	33.68	46.00	-12.32
730.34	Peak	35.15	1.48	36.63	46.00	-9.37

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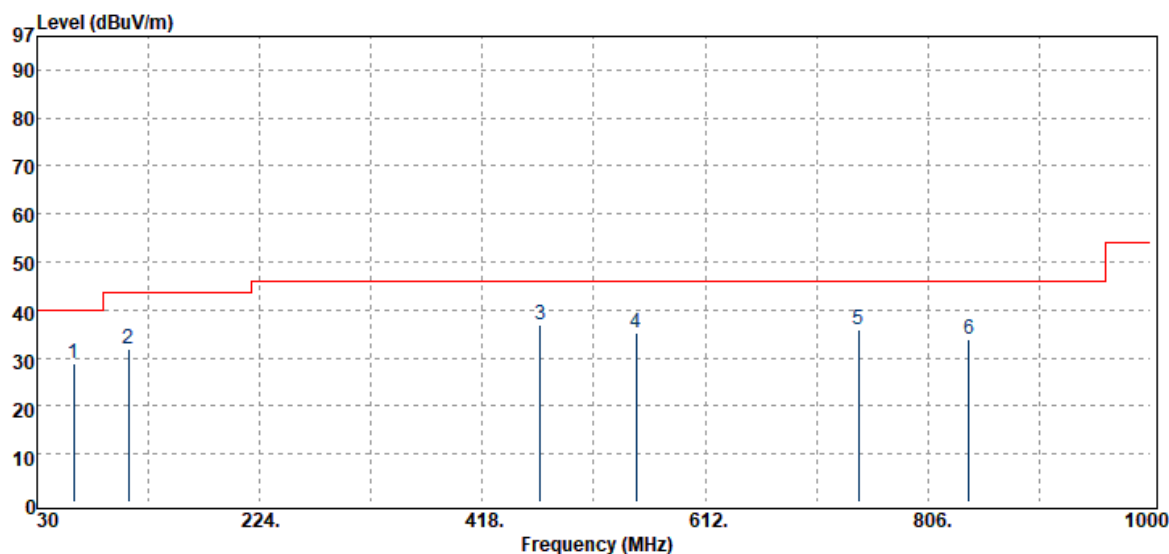
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Report Number :ER/2019/90109  
Operation Mode :BLE (1M)/802.11n 20  
Test Channel :2480MHz/5220 MHz  
Test Mode :Tx CH High/Tx CH44  
EUT Pol :E2 Plane

Test Date :2019-11-15  
Temp./Humi. :24.4/61  
Antenna Pol. :VERTICAL  
Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
62.01	Peak	37.45	-8.60	28.85	40.00	-11.15
109.54	Peak	42.69	-10.95	31.74	43.50	-11.76
468.44	Peak	40.06	-3.01	37.05	46.00	-8.95
551.86	Peak	36.76	-1.61	35.15	46.00	-10.85
745.86	Peak	33.33	2.46	35.79	46.00	-10.21
841.89	Peak	29.80	4.13	33.93	46.00	-12.07

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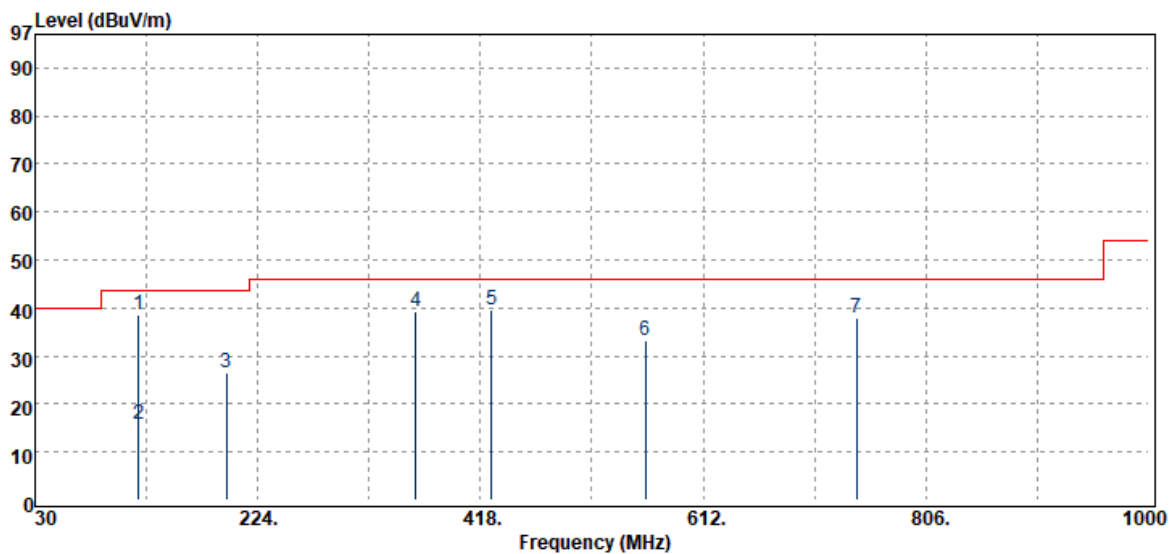
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Test Date :2019-11-15  
 Temp./Humi. :24.4/61  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
120.21	Peak	48.70	-10.04	38.66	43.50	-4.84
120.21	QP	25.87	-10.04	15.83	43.50	-27.67
196.84	Peak	36.18	-9.55	26.63	43.50	-16.87
361.74	Peak	44.28	-4.87	39.41	46.00	-6.59
427.70	Peak	43.36	-3.77	39.59	46.00	-6.41
561.56	Peak	34.57	-1.35	33.22	46.00	-12.78
745.86	Peak	35.31	2.46	37.77	46.00	-8.23

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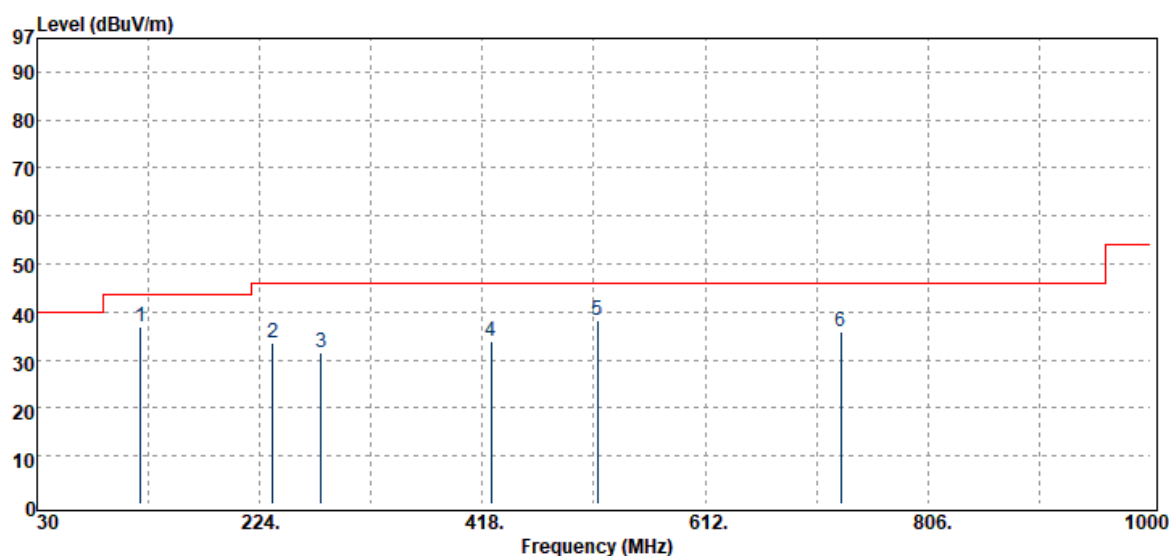
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Report Number :ER/2019/90109  
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 Test Channel :2480MHz/5220 MHz  
 Test Mode :Tx CH High/Tx CH44  
 EUT Pol :E2 Plane

Test Date :2019-11-15  
 Temp./Humi. :24.4/61  
 Antenna Pol. :VERTICAL  
 Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
120.21	Peak	47.10	-10.04	37.06	43.50	-6.44
235.64	Peak	41.93	-8.44	33.49	46.00	-12.51
277.35	Peak	38.00	-6.54	31.46	46.00	-14.54
425.76	Peak	37.80	-3.81	33.99	46.00	-12.01
517.91	Peak	40.34	-2.12	38.22	46.00	-7.78
730.34	Peak	34.42	1.48	35.90	46.00	-10.10

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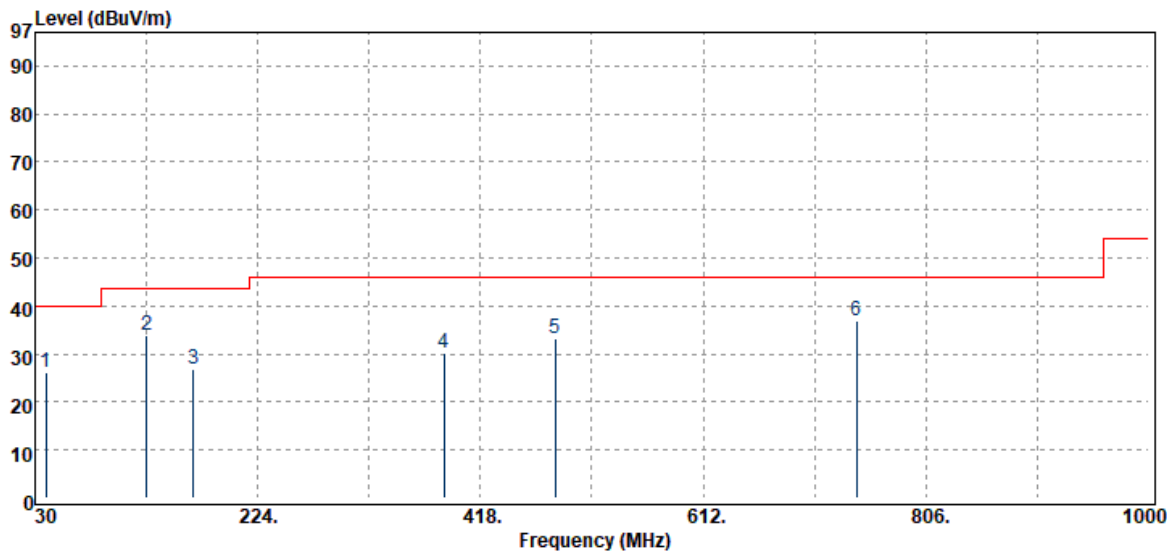
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EUT Pol :E2 Plane

Test Date :2019-11-15  
Temp./Humi. :24.4/61  
Antenna Pol. :HORIZONTAL  
Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
39.70	Peak	34.40	-8.31	26.09	40.00	-13.91
127.00	Peak	43.41	-9.34	34.07	43.50	-9.43
167.74	Peak	34.51	-7.61	26.90	43.50	-16.60
385.99	Peak	34.52	-4.26	30.26	46.00	-15.74
482.99	Peak	35.61	-2.51	33.10	46.00	-12.90
745.86	Peak	34.45	2.46	36.91	46.00	-9.09

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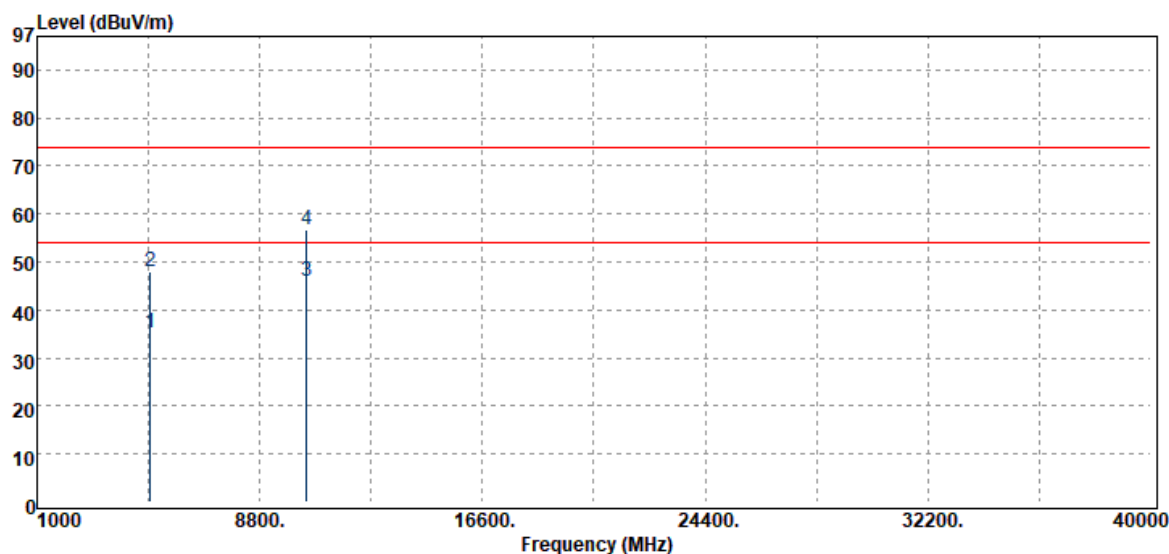
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Test Mode :Tx CH High/Tx CH44  
EUT Pol :E2 Plane

Test Date :2019-11-15  
Temp./Humi. :24.4/61  
Antenna Pol. :VERTICAL  
Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4960.00	Average	28.39	6.95	35.34	54.00	-18.66
4960.00	Peak	41.15	6.95	48.10	74.00	-25.90
10440.00	Average	27.42	18.53	45.95	54.00	-8.05
10440.00	Peak	38.24	18.53	56.77	74.00	-17.23

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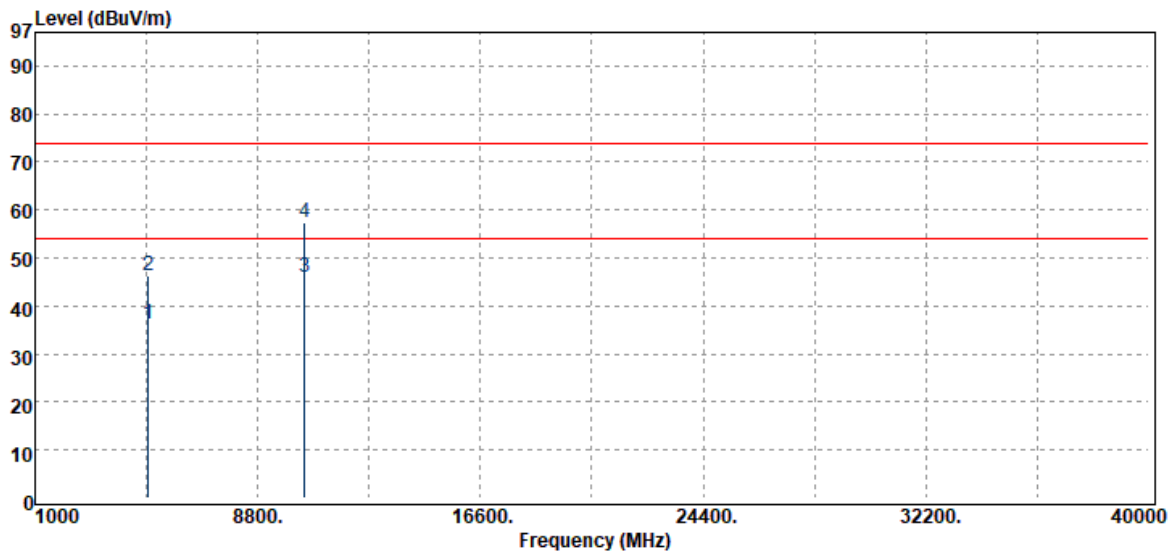
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Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4960.00	Average	29.16	6.95	36.11	54.00	-17.89
4960.00	Peak	39.42	6.95	46.37	74.00	-27.63
10440.00	Average	27.33	18.53	45.86	54.00	-8.14
10440.00	Peak	38.93	18.53	57.46	74.00	-16.54

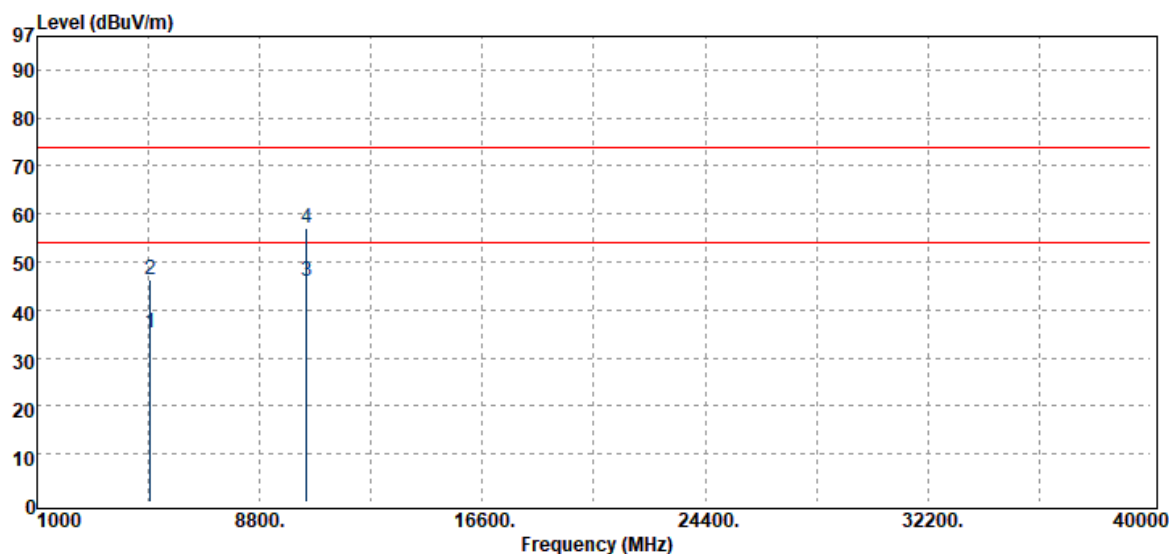
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Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4960.00	Average	28.20	6.95	35.15	54.00	-18.85
4960.00	Peak	39.52	6.95	46.47	74.00	-27.53
10440.00	Average	27.42	18.53	45.95	54.00	-8.05
10440.00	Peak	38.70	18.53	57.23	74.00	-16.77

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SGS Taiwan Ltd.

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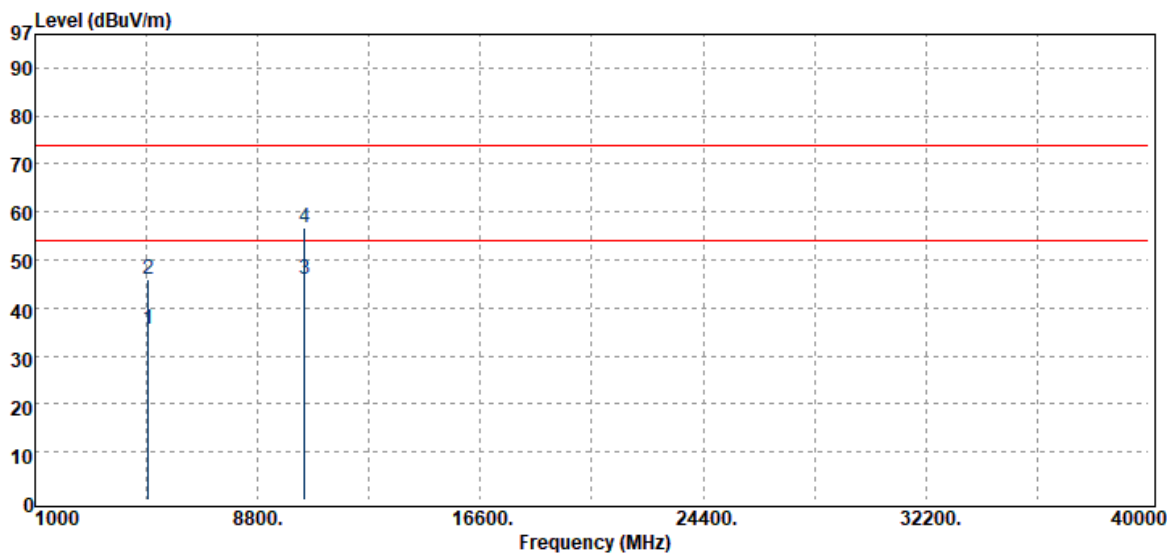
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Member of SGS Group

Report Number :ER/2019/90109  
 Operation Mode :BLE (1M)/802.11n 20  
 Test Channel :2480MHz/5220 MHz  
 Test Mode :Tx CH High/Tx CH44  
 EUT Pol :E2 Plane

Test Date :2019-11-15  
 Temp./Humi. :24.4/61  
 Antenna Pol. :HORIZONTAL  
 Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4960.00	Average	28.77	6.95	35.72	54.00	-18.28
4960.00	Peak	39.20	6.95	46.15	74.00	-27.85
10440.00	Average	27.38	18.53	45.91	54.00	-8.09
10440.00	Peak	38.25	18.53	56.78	74.00	-17.22

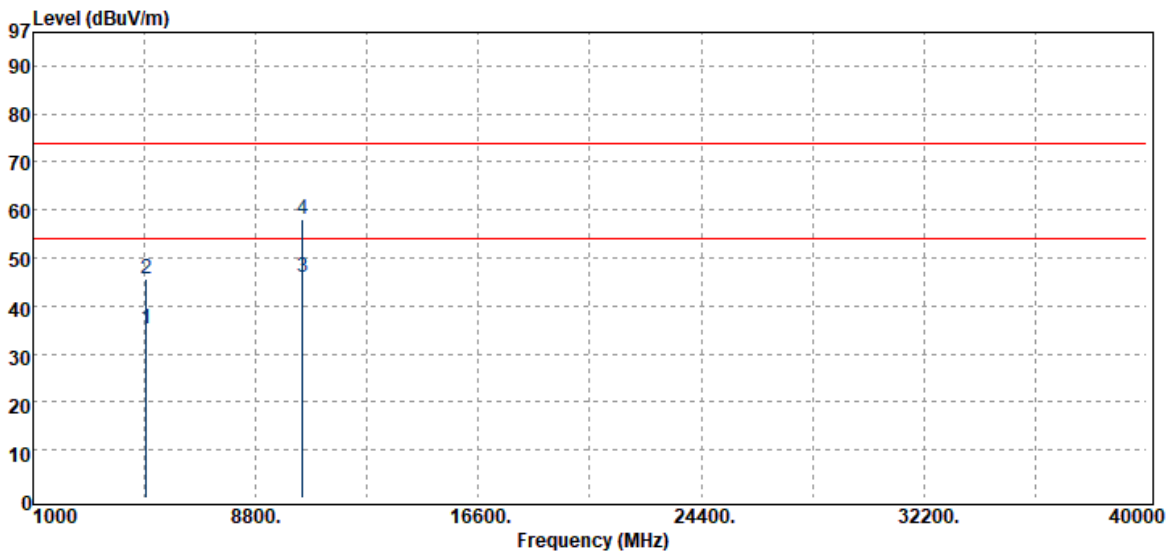
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Report Number :ER/2019/90109  
 Operation Mode :BLE (2M)/802.11n 20  
 Test Channel :2480MHz/5220 MHz  
 Test Mode :Tx CH High/Tx CH44  
 EUT Pol :E2 Plane

Test Date :2019-11-15  
 Temp./Humi. :24.4/61  
 Antenna Pol. :VERTICAL  
 Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4960.00	Average	28.45	6.95	35.40	54.00	-18.60
4960.00	Peak	38.65	6.95	45.60	74.00	-28.40
10440.00	Average	27.42	18.53	45.95	54.00	-8.05
10440.00	Peak	39.46	18.53	57.99	74.00	-16.01

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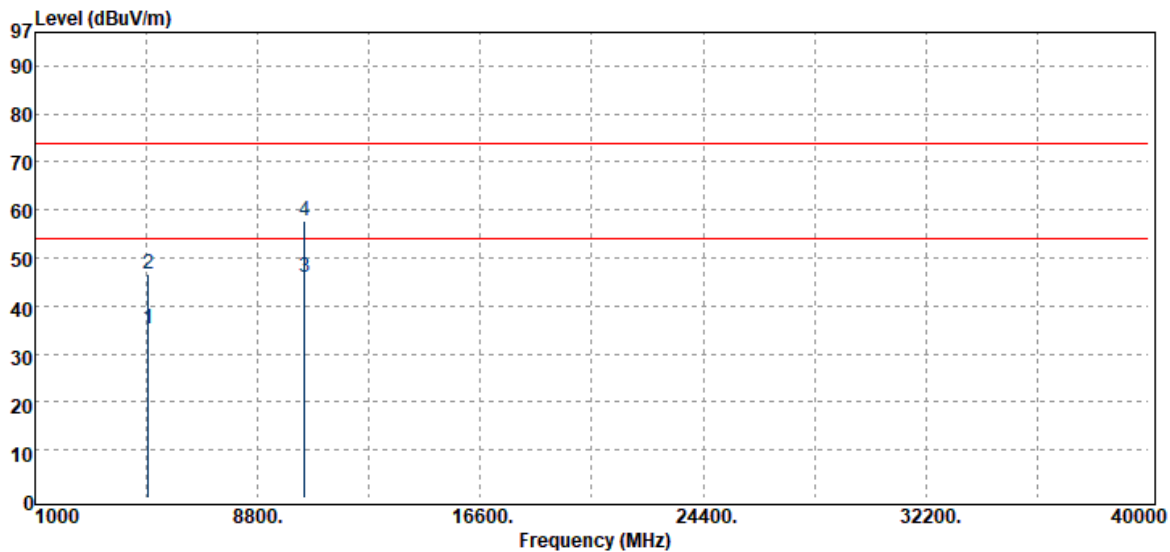
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Report Number :ER/2019/90109  
Operation Mode :BLE (2M)/802.11n 20  
Test Channel :2480MHz/5220 MHz  
Test Mode :Tx CH High/Tx CH44  
EUT Pol :E2 Plane

Test Date :2019-11-15  
Temp./Humi. :24.4/61  
Antenna Pol. :HORIZONTAL  
Engineer :Kane



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4960.00	Average	28.21	6.95	35.16	54.00	-18.84
4960.00	Peak	39.86	6.95	46.81	74.00	-27.19
10440.00	Average	27.32	18.53	45.85	54.00	-8.15
10440.00	Peak	39.23	18.53	57.76	74.00	-16.24

~ End of Report ~

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