

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS 247 CLASS II & IV PC REPORT

OF

Applicant: QUANTA COMPUTER INC
NO.188, WENHWA 2ND RD., GUISHAN DIST., TAOYUAN
CITY 33377, TAIWAN

Product Name: Intel Dual-Band Wireless-AC 7265

Brand Name: INTEL

Model No.: 7265NGW

Model Difference: N/A

Report Number: E2/2019/C0057

FCC ID: HFSGQE100

IC: 1787B-GQE100

FCC Rule Part: §15.247, Cat: DTS

IC RSS: RSS-247 issue 2 Feb 2017

Issue Date: Apr. 01, 2020


Date of Test: Dec. 13, 2019 ~ Mar. 31, 2020

Date of EUT Received: Dec. 13, 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:

Jim Chang / Manager



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Revision History

Report Number	Revision	Description	Issue Date	Remark
ER/2019/C0057	Rev.00	Original.	Apr. 01, 2020	Revised By: Stefanie Yu

Note:**1 、 Host Multiple Model numbers or Trademarks**

The variant model numbers are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.

2 、 Disclaimer

Variant information among host model numbers is provided by the applicant, test results of this report are applicable to the sample EUT received.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Meeting Computer System	
Brand Name:	N/A	
Model No. of Host:	GQE10A, GQE10C	
Model Difference:	For the marketing purpose	
Hardware Version:	N/A	
Software Version:	N/A	
Model No. of BT/WLAN Module:	7265NGW	
Class II & Class IV Permissive change:	Intel Dual-Band Wireless-AC 7265 installed in Meeting Computer System	
Power Supply:	19V from AC/DC Adapter	
	Adapter:	Model No.: PA-1900-92, Supplier: ASUS

Radio Technology:	Bluetooth LE Single mode
Frequency Range:	2402 – 2480MHz
Channel number:	40 channels
Modulation type:	GFSK
Antenna Designation:	Metal Antenna, Supplier: WNC Platform Name: 0WD, Gain: -1.3dBi

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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
RSS-247 issue 2 Feb. 2017
RSS-Gen. issue 5, Amendment 1, March 2019
ANSI C63.10:2013

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory (TAF code 0513)
No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

FCC Designation number: TW0002

ISED CAB identifier: TW0513

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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

Radiated emission below 30MHz is measured in a 9m*9m*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.

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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 Configuration of Tested System

Fig 2-1 Radiated Emission

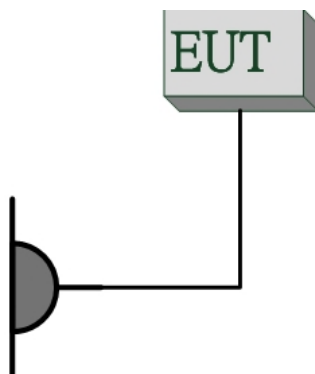


Table 2-1 Equipment Used in Tested System

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

3 SUMMARY OF TEST RESULTS

FCC Rules	ISED Rules	Description Of Test	Result
§15.205 §15.209 §15.247(d)	RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

40 channels are provided for Bluetooth LE

ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY
1	2402 MHz	15	2430 MHz	29	2458 MHz
2	2404 MHz	16	2432 MHz	30	2460 MHz
3	2406 MHz	17	2434 MHz	31	2462 MHz
4	2408 MHz	18	2436 MHz	32	2464 MHz
5	2410 MHz	19	2438 MHz	33	2466 MHz
6	2412 MHz	20	2440 MHz	34	2468 MHz
7	2414 MHz	21	2442 MHz	35	2470 MHz
8	2416MHz	22	2444 MHz	36	2472 MHz
9	2418 MHz	23	2446 MHz	37	2474 MHz
10	2420 MHz	24	2448 MHz	38	2476 MHz
11	2422 MHz	25	2450 MHz	39	2478 MHz
12	2424 MHz	26	2452 MHz	40	2480 MHz
13	2426 MHz	27	2454 MHz		
14	2428 MHz	28	2456 MHz		

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4.2 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 and receiving mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.

MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)
RADIATED EMISSION TEST (ABOVE 1 GHz)				
Bluetooth LE	2402 to 2480	2402, 2442, 2480	GFSK	1
Note: The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth LE Transmitter for channel Low, Mid and High, the worst case H position was reported.				

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5 MEASUREMENT UNCERTAINTY

Radiated Spurious Emission Measurement Uncertainty	
Polarization: Vertical	9kHz~30MHz: +-2.3dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB
Polarization: Horizontal	9kHz~30MHz: +-2.3dB
	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 BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

6.1 Standard Applicable

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 and RSS-Gen §8.9 Table 5 and 6 limit as below.

And according to §15.33(a) (1) & RSS-Gen §6.13.2.a 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

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	TESEQ	CBL 6112D	35240	09/09/2019	09/08/2020
Horn Antenna	Schwarzbeck	BBHA9170	185	08/07/2019	08/06/2020
Horn Antenna	Schwarzbeck	BBHA9120D	603	04/24/2019	04/23/2020
Loop Antenna	ETS.LINDGREN	6502	143303	04/25/2019	04/24/2020
EMI Test Receiver	R&S	ESU 40	100363	04/15/2019	04/14/2020
Pre-Amplifier	EMC Instruments	EMC330	980096	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC0011830	980199	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC184045B	980135	11/20/2019	11/19/2020
Attenuator	Woken	WATT-218FS-10	RF25	11/20/2019	11/19/2020
Highpass Filter	Micro Tronics	BRM50701-01	G008	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/20/2019	11/19/2020

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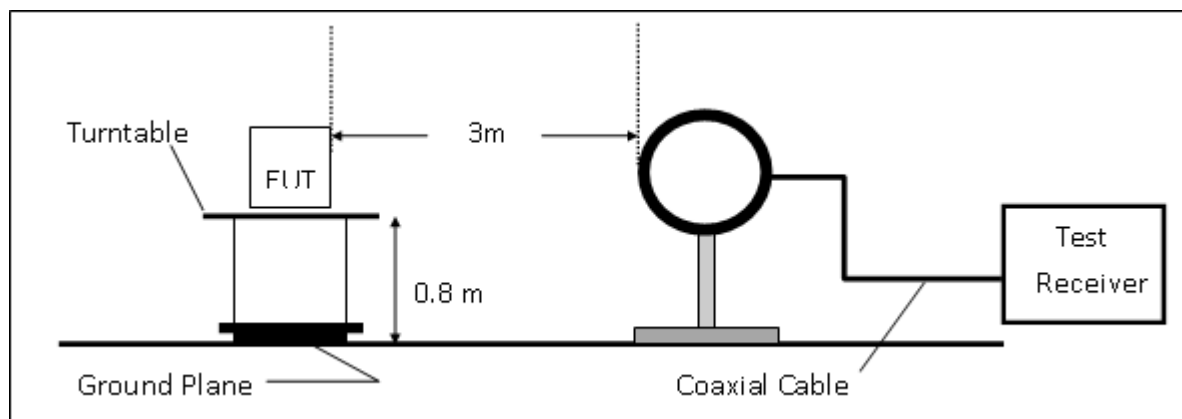
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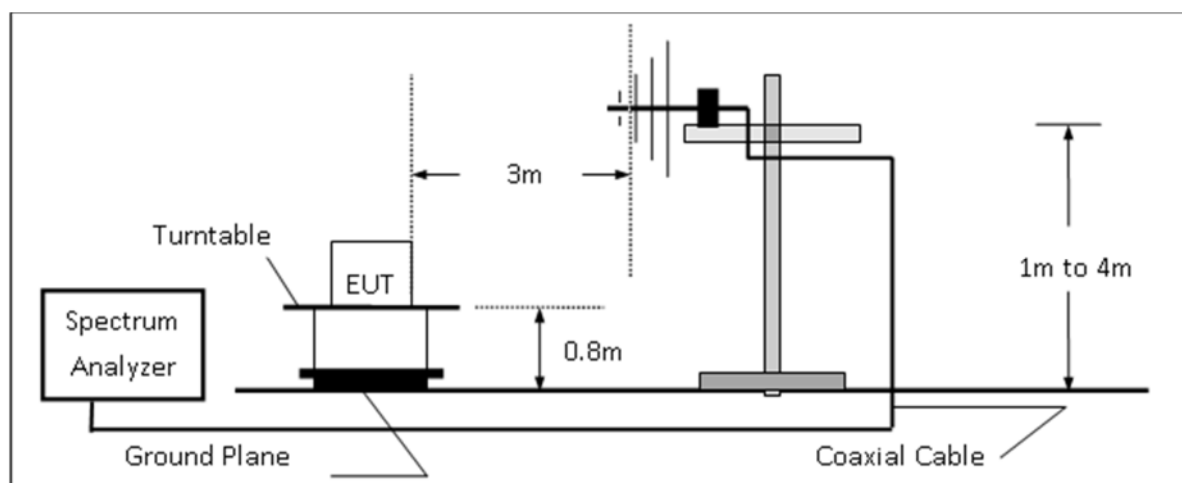
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6.3 Test SET-UP

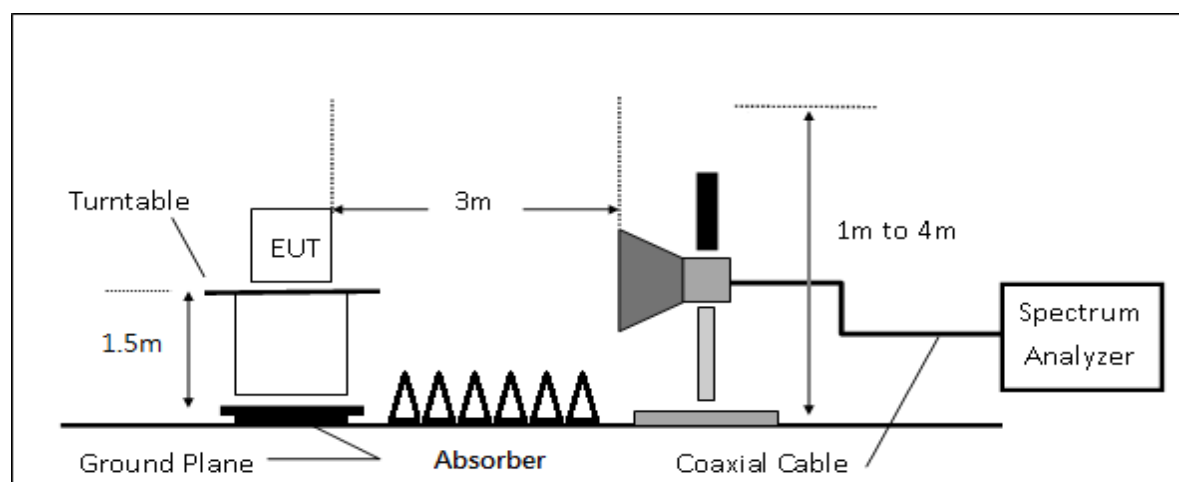
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
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 ≥ 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 $20 \cdot \log(uV/m)$

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.

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6.7 Measurement Result:

Radiated Band Edge Measurement Result

Report Number :E2/2019/C0057

Test Date :2019-12-30

Operation Mode :BLE 1M

Temp./Humi. :23.5/64

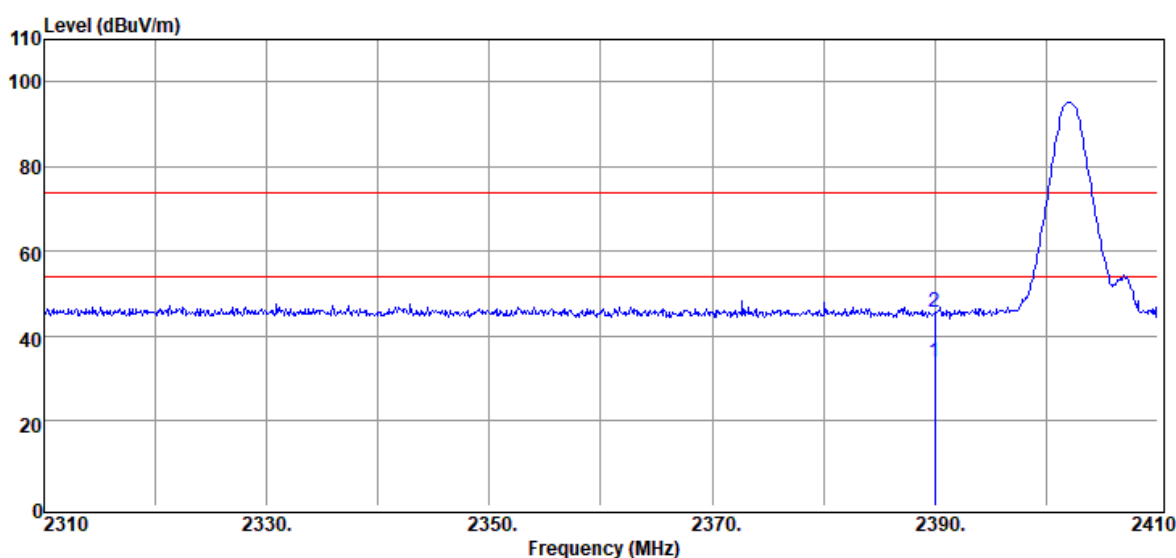
Test Frequency :2402 MHz

Antenna Pol. :VERTICAL

Test Mode :BE CH LOW

Engineer :Ashton

EUT Pol :H Plan



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2390.00	Average	29.71	4.34	34.05	54.00	-19.95
2390.00	Peak	41.19	4.34	45.53	74.00	-28.47

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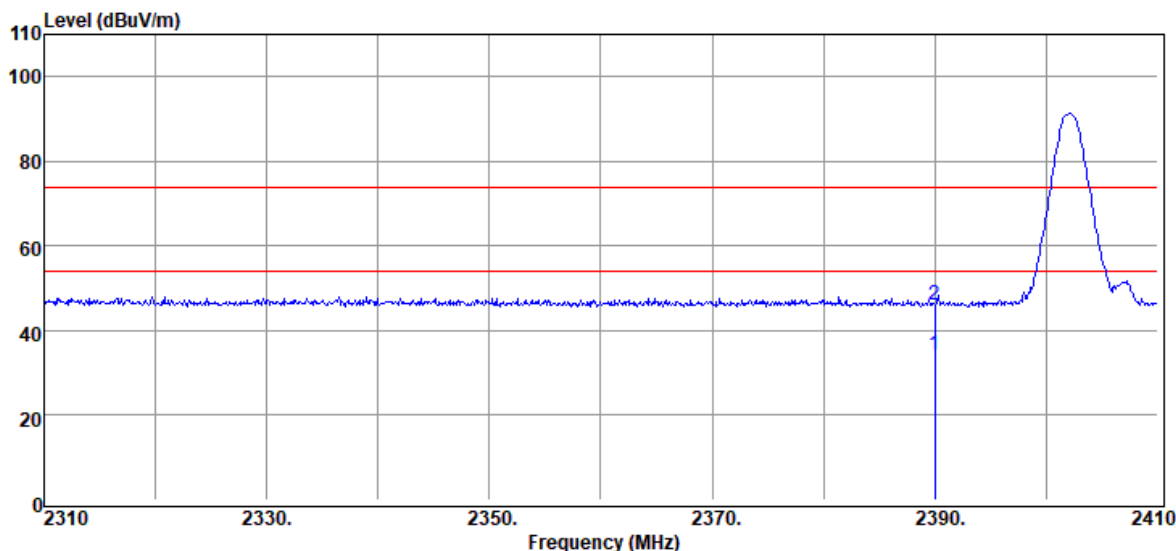
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Report Number :E2/2019/C0057
 Operation Mode :BLE 1M
 Test Frequency :2402 MHz
 Test Mode :BE CH LOW
 EUT Pol :H Plan

Test Date :2019-12-30
 Temp./Humi. :23.5/64
 Antenna Pol. :HORIZONTAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2390.00	Average	30.00	4.34	34.34	54.00	-19.66
2390.00	Peak	41.70	4.34	46.04	74.00	-27.96

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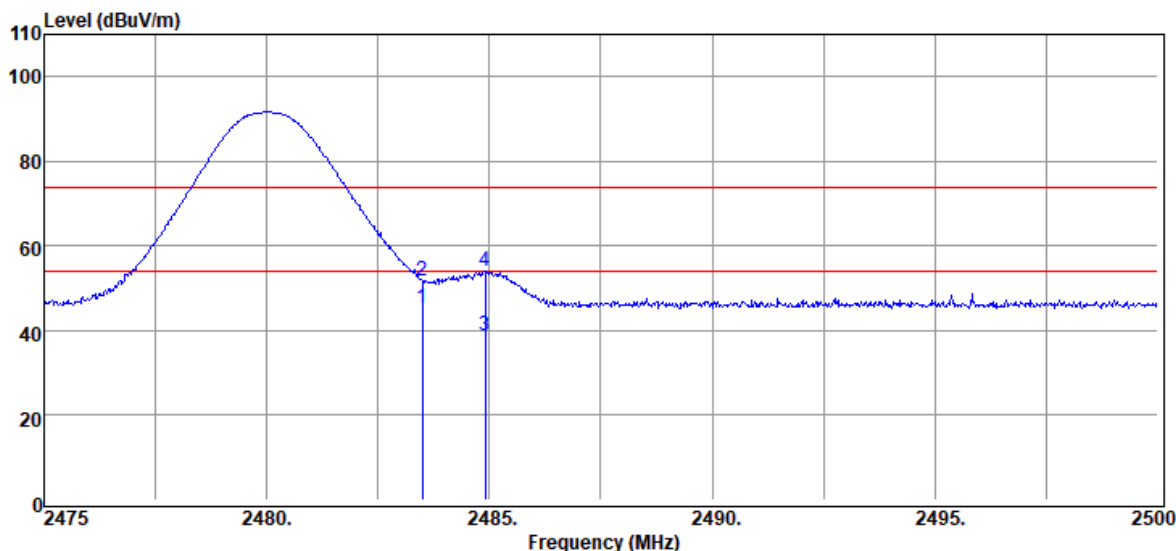
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Report Number :E2/2019/C0057
Operation Mode :BLE 1M
Test Frequency :2480 MHz
Test Mode :BE CH HIGH
EUT Pol :H Plan

Test Date :2019-12-30
Temp./Humi. :23.6/65
Antenna Pol. :VERTICAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	Average	40.95	4.53	45.48	54.00	-8.52
2483.50	Peak	47.32	4.53	51.85	74.00	-22.15
2484.90	Average	34.44	4.54	38.98	54.00	-15.02
2484.90	Peak	49.68	4.54	54.22	74.00	-19.78

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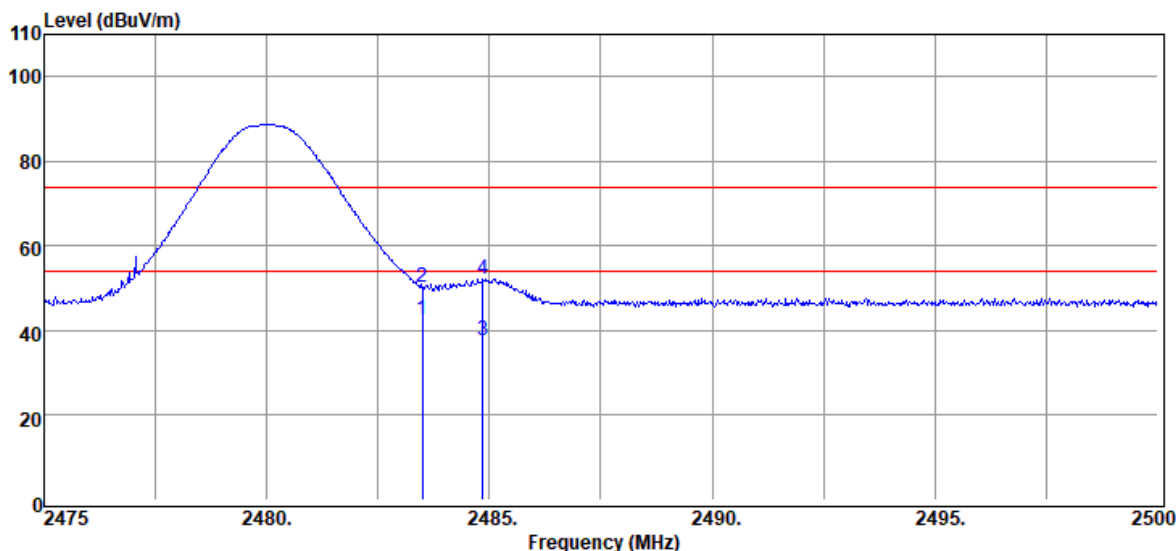
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Report Number :E2/2019/C0057
Operation Mode :BLE 1M
Test Frequency :2480 MHz
Test Mode :BE CH HIGH
EUT Pol :H Plan

Test Date :2019-12-30
Temp./Humi. :23.6/65
Antenna Pol. :HORIZONTAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
2483.50	Average	38.16	4.53	42.69	54.00	-11.31
2483.50	Peak	45.71	4.53	50.24	74.00	-23.76
2484.85	Average	33.33	4.54	37.87	54.00	-16.13
2484.85	Peak	47.59	4.54	52.13	74.00	-21.87

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Radiated Spurious Emission from 30MHz to 1000MHz

Report Number :E2/2019/C00057

Test Date :2020-03-31

Operation Mode :BLE 1M

Temp./Humi. :23.8/62

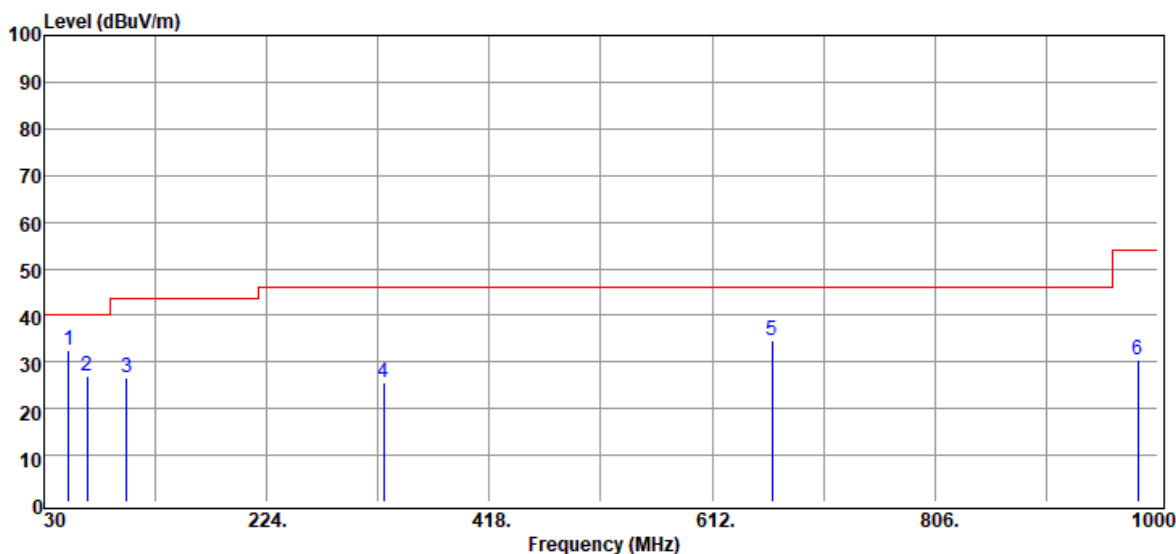
Test Frequency :2442 MHz

Antenna Pol. :VERTICAL

Test Mode :TX CH MID

Engineer :Ashton

EUT Pol :H Plan



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @ 3m dBuV/m	Margin dB
51.34	Peak	50.01	-17.43	32.58	40.00	-7.42
67.83	Peak	45.89	-18.94	26.95	40.00	-13.05
101.78	Peak	41.71	-15.21	26.50	43.50	-17.00
325.85	Peak	34.98	-9.50	25.48	46.00	-20.52
664.38	Peak	36.50	-1.94	34.56	46.00	-11.44
982.54	Peak	28.80	1.82	30.62	54.00	-23.38

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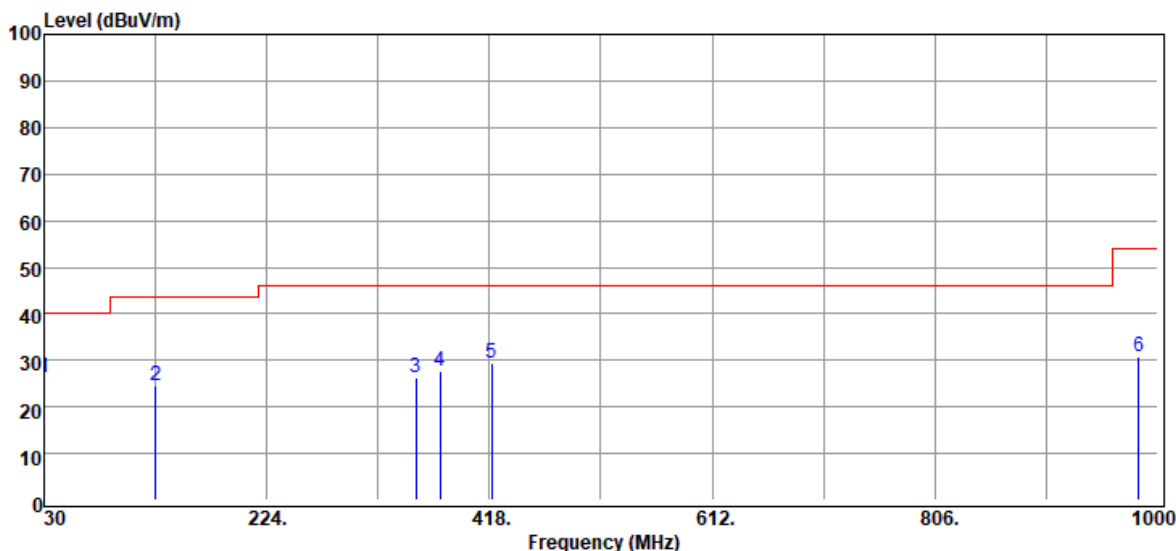
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Report Number :E2/2019/C00057
Operation Mode :BLE 1M
Test Frequency :2442 MHz
Test Mode :TX CH MID
EUT Pol :H Plan

Test Date :2020-03-31
Temp./Humi. :23.8/62
Antenna Pol. :HORIZONTAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
30.00	Peak	29.73	-3.33	26.40	40.00	-13.60
127.00	Peak	37.32	-12.79	24.53	43.50	-18.97
353.98	Peak	35.45	-9.05	26.40	46.00	-19.60
375.32	Peak	35.93	-8.28	27.65	46.00	-18.35
419.94	Peak	35.71	-6.31	29.40	46.00	-16.60
983.51	Peak	29.09	1.80	30.89	54.00	-23.11

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Radiated Spurious Emission above 1GHz

Report Number :E2/2019/C00057

Operation Mode :BLE 1M

Test Frequency :2402 MHz

Test Mode :TX CH LOW

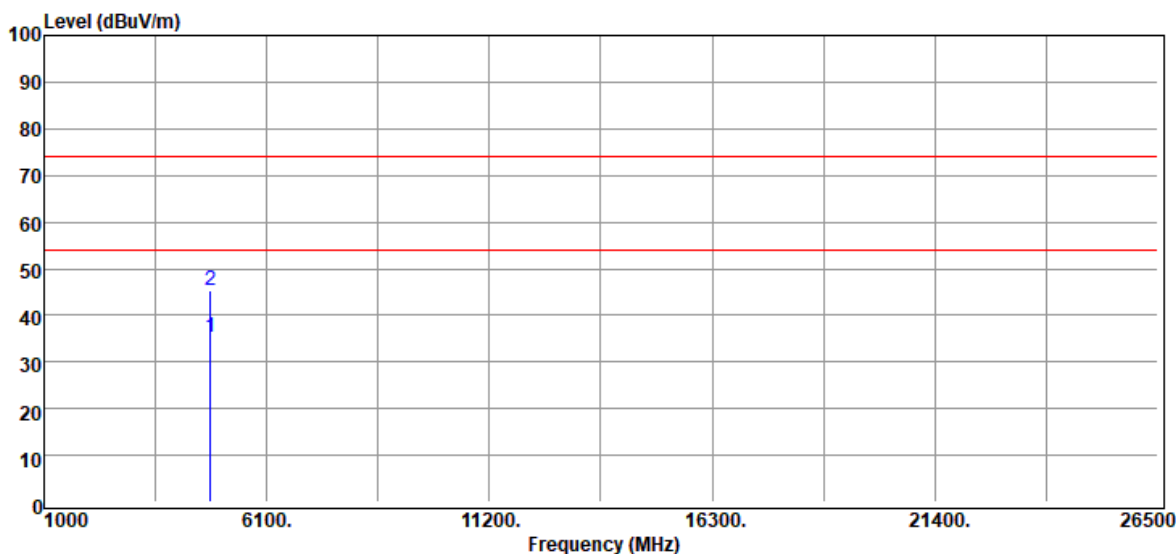
EUT Pol :H Plan

Test Date :2020-03-31

Temp./Humi. :23.9/57

Antenna Pol. :VERTICAL

Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4804.00	Average	21.25	14.07	35.32	54.00	-18.68
4804.00	Peak	31.43	14.07	45.50	74.00	-28.50

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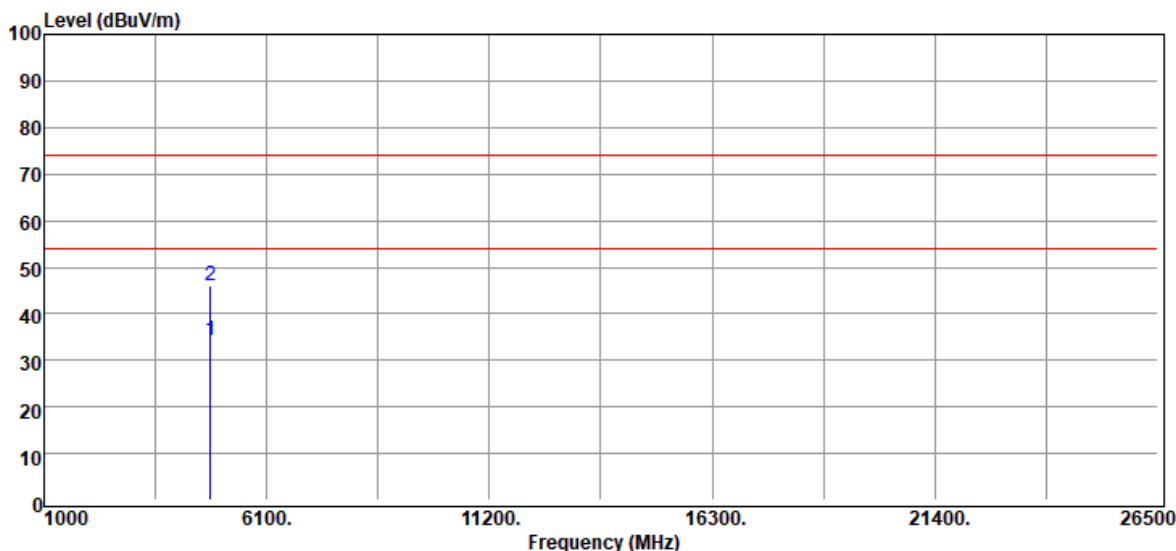
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Report Number :E2/2019/C00057
Operation Mode :BLE 1M
Test Frequency :2402 MHz
Test Mode :TX CH LOW
EUT Pol :H Plan

Test Date :2020-03-31
Temp./Humi. :23.9/57
Antenna Pol. :HORIZONTAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4804.00	Average	20.05	14.07	34.12	54.00	-19.88
4804.00	Peak	31.83	14.07	45.90	74.00	-28.10

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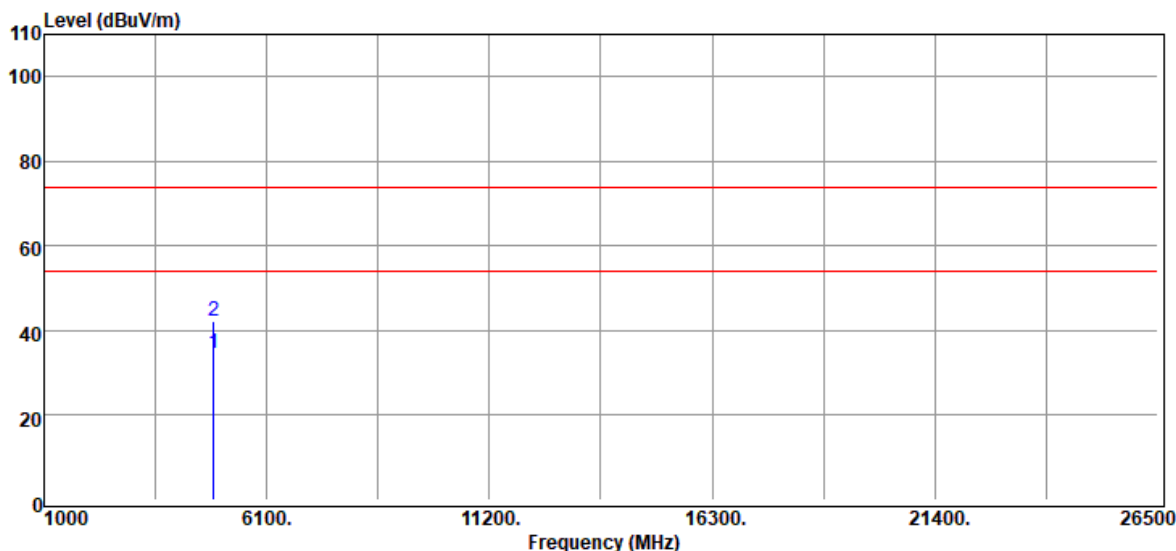
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Report Number :E2/2019/C00057
Operation Mode :BLE 1M
Test Frequency :2442 MHz
Test Mode :TX CH MID
EUT Pol :H Plan

Test Date :2019-12-30
Temp./Humi. :23.6/65
Antenna Pol. :VERTICAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4884.00	Average	20.99	13.75	34.74	54.00	-19.26
4884.00	Peak	28.44	13.75	42.19	74.00	-31.81

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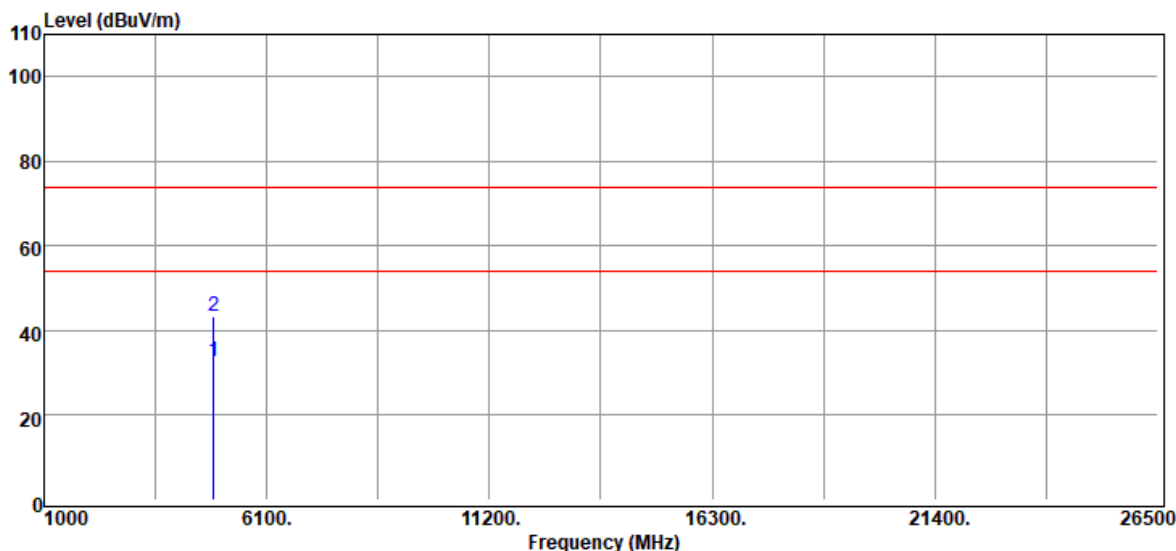
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Report Number :E2/2019/C00057
 Operation Mode :BLE 1M
 Test Frequency :2442 MHz
 Test Mode :TX CH MID
 EUT Pol :H Plan

Test Date :2019-12-30
 Temp./Humi. :23.6/65
 Antenna Pol. :HORIZONTAL
 Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4884.00	Average	18.99	13.75	32.74	54.00	-21.26
4884.00	Peak	29.61	13.75	43.36	74.00	-30.64

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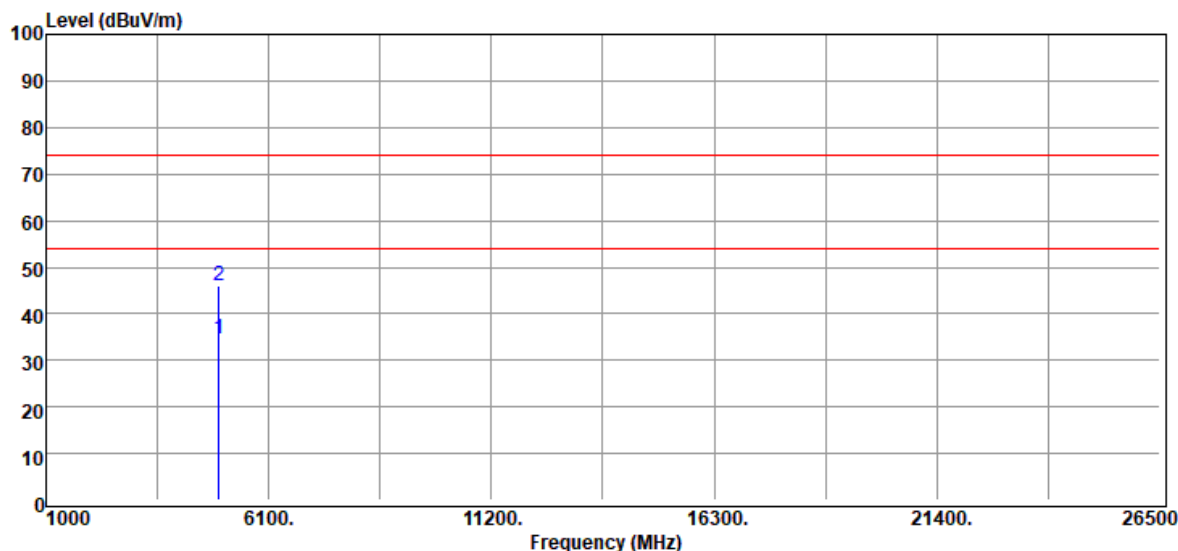
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Report Number :E2/2019/C00057
Operation Mode :BLE 1M
Test Frequency :2480 MHz
Test Mode :TX CH HIGH
EUT Pol :H Plan

Test Date :2020-03-31
Temp./Humi. :23.9/57
Antenna Pol. :VERTICAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4960.00	Average	20.62	14.13	34.75	54.00	-19.25
4960.00	Peak	31.72	14.13	45.85	74.00	-28.15

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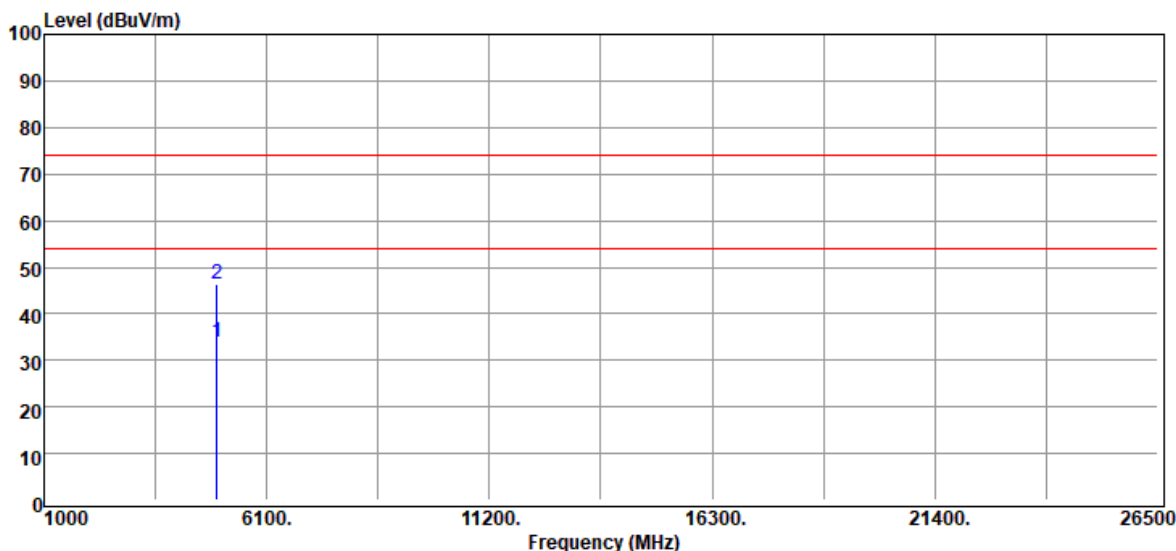
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Report Number :E2/2019/C00057
Operation Mode :BLE 1M
Test Frequency :2480 MHz
Test Mode :TX CH HIGH
EUT Pol :H Plan

Test Date :2020-03-31
Temp./Humi. :23.9/57
Antenna Pol. :HORIZONTAL
Engineer :Ashton



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
4960.00	Average	19.62	14.13	33.75	54.00	-20.25
4960.00	Peak	32.07	14.13	46.20	74.00	-27.80

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7 ANTENNA REQUIREMENT

7.1 Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

7.2 Antenna Connected Construction

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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