


# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## CLASS II PC REPORT

OF

**Applicant:** Acer Incorporated  
8F,88, Sec. 1, Hsin Tai Wu Rd. Hsichih, Taipei Hsien Taiwan

**Product Name:** 7c Modular Platform

**Brand Name:** 

**Model No.:** QSIP7180

**Model Difference:** N/A

**Report Number:** E2/2020/B0010

**FCC ID** HLZQSIP7180Q

**FCC Rule Part:** §15.247, Cat: DSS

**Issue Date:** January 25, 2021

**Date of Test:** November 12, 2020 - January 25, 2021

**Date of EUT Received:** November 12, 2020

**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 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: \_\_\_\_\_

*Jay Lin*  
Jay Lin / Asst. Supervisor



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## Revision History

Report Number	Revision	Description	Issue Date	Remark
E2/2020/B0010	Rev.00	Original.	January 25, 2021	Revised By: Tiffany Kao

**Note:**

## 1、Disclaimer

Antenna information 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:	Notebook Computer
Brand Name:	<i>acer</i>
Model No. of Host:	N20Q4
Model Difference:	N/A
Hardware Version:	N/A
Software Version:	N/A
Model No. of BT/WLAN Module:	QSIP7180
Class II Permissive change:	7c Modular Platform INSTALLED IN Notebook Computer
Power Supply:	7.7Vdc from Rechargeable Li-ion Battery or 5 / 9 / 12 / 15 / 20 Vdc from AC/DC Adapter

Radio Technology:	Bluetooth BR+EDR
Channel number:	79 channels
Modulation type:	GFSK + $\pi/4$ DQPSK + 8DPSK
Rated Power (Peak):	10.62dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	$\leq 0.4s$

### 1.2 Antenna Designation

Antenna Type	Supplier	Mode	Main / Aux	Antenna Part No.	Freq.	Peak Antenna Gain (dBi)
PIFA	WNC	Tablet Mode	Main	N/A	2.4GHz	0.68

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### 1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

KDB 558074 D01 v05r02 DSS Meas. Guidance

ANSI C63.10:2013

### 1.4 Test Facility

SGS Taiwan Ltd. Central RF Lab (TAF code 3702)

No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

FCC Designation number: TW0028

### 1.5 Special Accessories

There is no special accessory used while test was conducted.

### 1.6 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 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

#### 2.3.2 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.

### 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\*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.

#### 2.4.2 For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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**2.5 Configuration of Tested System**  
**Fig. 2-1 Radiated Emission**



**Fig. 2-2 Conducted (Antenna Port)**



**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

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### 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.247(b)(1)	Peak Output Power	Compliant
§15.247(d) §15.209	Radiated Spurious Emission	Compliant

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## 4 DESCRIPTION OF TEST MODES

### 4.1 Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY
1	2402 MHz	21	2422 MHz	41	2442 MHz	71	2462 MHz
2	2403 MHz	22	2423 MHz	42	2443 MHz	72	2463 MHz
3	2404 MHz	23	2424 MHz	43	2444 MHz	73	2464 MHz
4	2405 MHz	24	2425 MHz	44	2445 MHz	74	2465 MHz
5	2406 MHz	25	2426 MHz	45	2446 MHz	75	2466 MHz
6	2407 MHz	26	2427 MHz	46	2447 MHz	76	2467 MHz
7	2408 MHz	27	2428 MHz	47	2448 MHz	77	2468 MHz
8	2409 MHz	28	2429 MHz	48	2449 MHz	78	2469 MHz
9	2410 MHz	29	2430 MHz	49	2450 MHz	79	2470 MHz
10	2411 MHz	30	2431 MHz	50	2451 MHz	70	2471 MHz
11	2412 MHz	31	2432 MHz	51	2452 MHz	71	2472 MHz
12	2413 MHz	32	2433 MHz	52	2453 MHz	72	2473 MHz
13	2414 MHz	33	2434 MHz	53	2454 MHz	73	2474 MHz
14	2415 MHz	34	2435 MHz	54	2455 MHz	74	2475 MHz
15	2416 MHz	35	2436 MHz	55	2456 MHz	75	2476 MHz
16	2417 MHz	36	2437 MHz	56	2457 MHz	76	2477 MHz
17	2418 MHz	37	2438 MHz	57	2458 MHz	77	2478 MHz
18	2419 MHz	38	2439 MHz	58	2459 MHz	78	2479 MHz
19	2420 MHz	39	2440 MHz	59	2460 MHz	79	2480 MHz
20	2421 MHz	40	2441 MHz	60	2461 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	PACKET TYPE
<b>RADIATED EMISSION TEST (ABOVE 1 GHz)</b>				
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK	DH5
<b>Note:</b> The field strength of radiation emission was measured as E1 Plane for channel Low, Mid and High.				

<b>ANTENNA PORT CONDUCTED TEST</b>				
MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	PACKET TYPE
<b>Peak Output Power</b>				
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK, $\pi/4$ -DQPSK, 8-DQPK	DH1/DH3/DH5

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
Peak Output Power	+/- 0.84 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission Measurement Uncertainty	
<b>Polarization: Vertical</b>	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
<b>Polarization: Horizontal</b>	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 PEAK OUTPUT POWER MEASUREMENT

### 6.1 Standard Applicable

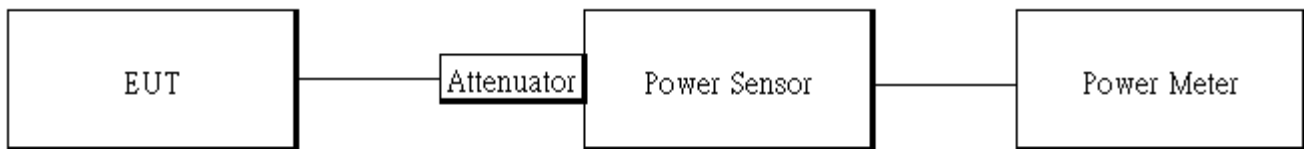
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, The Limit: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: The Limit: 0.125 Watts. The power limit for 1Mbps is 1watt, and 2Mbps, 3Mbps and AFH mode are 0.125 watts.

The e.i.r.p. shall not exceed 4 W.

### 6.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1804002	04/06/2020	04/05/2021
Power Sensor	Anritsu	MA2411B	1726105	04/06/2020	04/05/2021
Power Sensor	Anritsu	MA2411B	1726106	04/06/2020	04/05/2021
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	02/20/2020	02/19/2021
Attenuator	Marvelous	MVE2213-10	RF31	11/19/2020	11/18/2021
DC Block	PASTER-NACK	PE8210	RF81	11/19/2020	11/18/2021

### 6.3 Test Set-up:



### 6.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows ANSI C63.10 Measurement Guidelines.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max Hold, Detector = Peak, RBW >=20dB bandwidth)
4. Record the max. reading.
5. Repeat above procedures until all default test channel is completed.

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## 6.5 Peak & Average Power Measurement Result

1M BR mode (Peak):

CH	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	9.56	9.036	1000
Mid	2441	<b>10.62</b>	11.535	1000
High	2480	10.37	10.889	1000

1M BR mode (Average):

CH	Freq. (MHz)	Max. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	9.44	8.790	1000
Mid	2441	10.58	11.429	1000
High	2480	10.10	10.233	1000

2M EDR mode (Peak):

CH	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	9.73	9.397	125
Mid	2441	<b>10.41</b>	10.990	125
High	2480	9.64	9.204	125

2M EDR mode (Average):

CH	Freq. (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	8.86	7.691	125
Mid	2441	9.97	9.931	125
High	2480	8.75	7.499	125

3M EDR mode (Peak):

CH	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	10.13	10.304	125
Mid	2441	<b>10.58</b>	11.429	125
High	2480	10.04	10.093	125

3M EDR mode (Average):

CH	Freq. (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
Low	2402	8.94	7.834	125
Mid	2441	9.52	8.954	125
High	2480	9.77	9.484	125

*NOTE: cable loss as 0dB that offsets in the spectrum*

*\*Note: Max. Output include tune up tolerance Power measured by using average detector.*

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## 7 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

### 7.1 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 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 (dBV/m)

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## 7.2 Measurement Equipment Used

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	TESEQ	CBL 6112D	35240	09/08/2020	09/07/2021
Horn Antenna	Schwarzbeck	BBHA9170	185	07/30/2020	07/29/2021
Horn Antenna	Schwarzbeck	BBHA9120D	1187	01/11/2021	01/10/2022
Loop Antenna	ETS.LINDGREN	6502	143303	04/28/2020	04/27/2021
EMI Test Receiver	R&S	ESU 40	100363	04/29/2020	04/28/2021
Pre-Amplifier	EMC Instruments	EMC330	980096	11/19/2020	11/18/2021
Pre-Amplifier	EMC Instruments	EMC0011830	980199	11/19/2020	11/18/2021
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2020	10/26/2021
Attenuator	Marvelous	WATT-218FS-10	RF20	11/19/2020	11/18/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/19/2020	11/18/2021
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/19/2020	11/18/2021

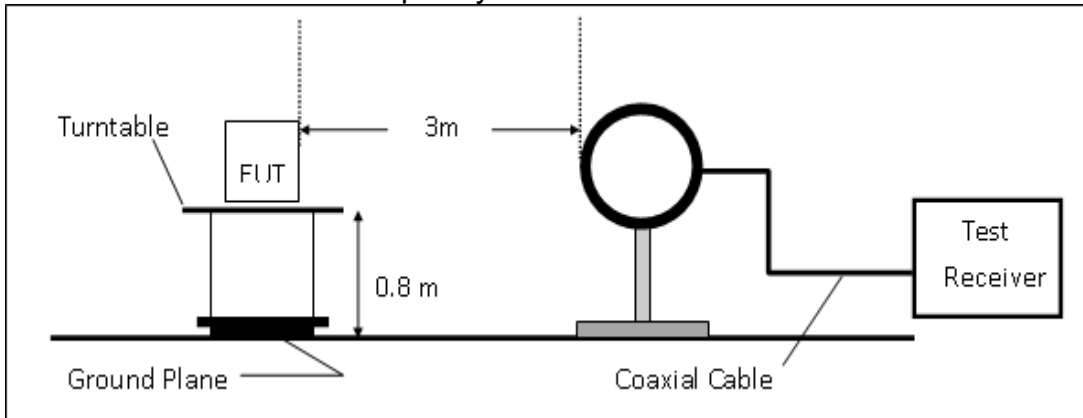
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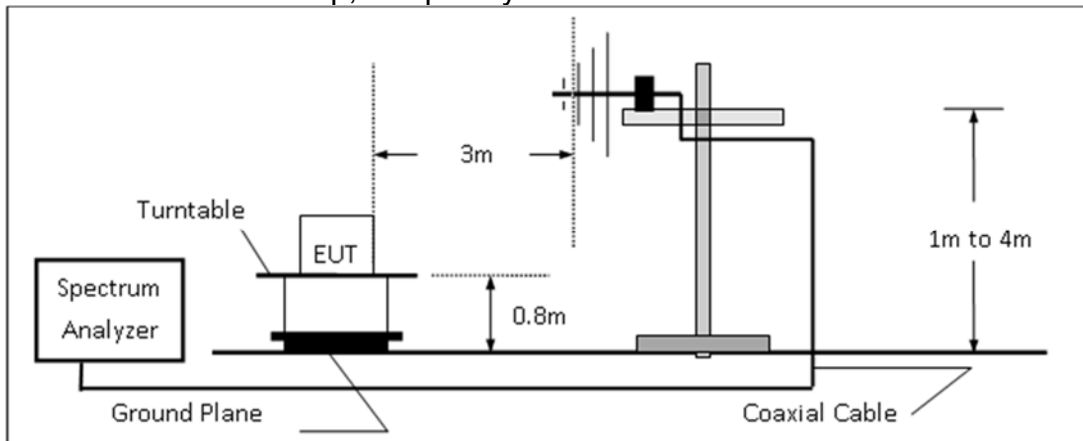
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### 7.3 Test SET-UP

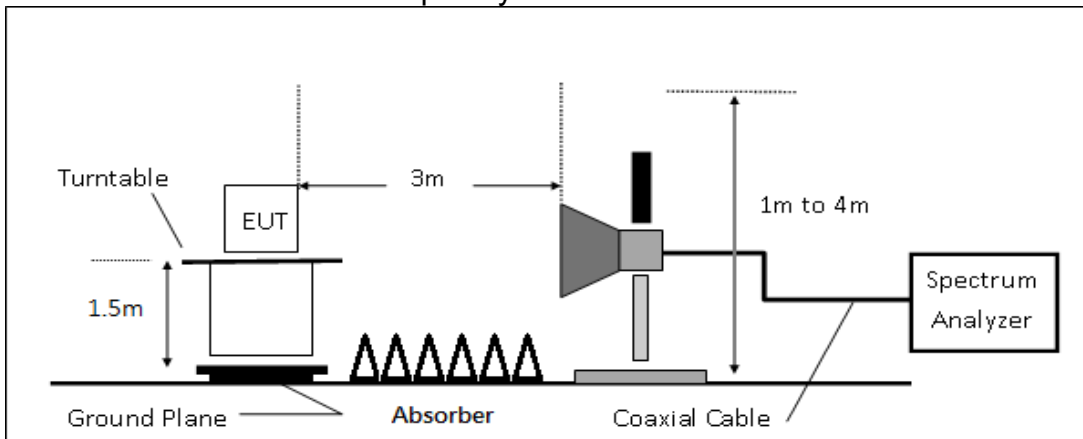
#### (A) Radiated Emission Test Set-UP Frequency Below 30MHz.



#### (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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## 7.4 Measurement Procedure

### 7.4.1 Radiated Emission

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 ≥ 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.

## 7.5 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)

## 7.6 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) & RSS-GEN §6.13.2 was not reported.

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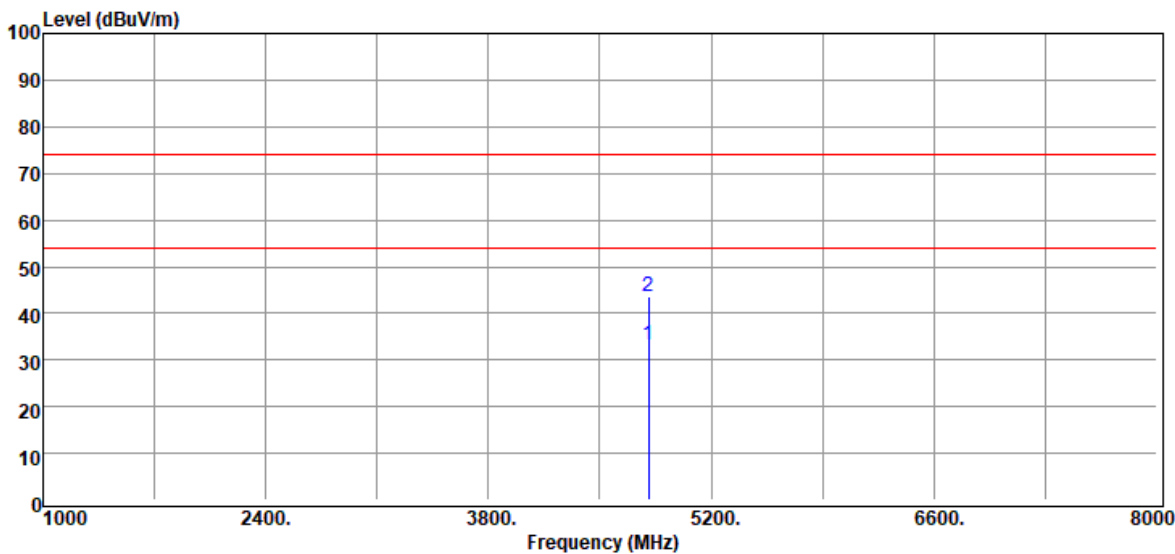
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## 7.7 Measurement Result:

### 7.7.1 Radiated Spurious Emission above 1 GHz:

Report Number	:E2/2020/B0010	Test Site	:966 Chamber C
Operation Mode	:BT BR	Test Date	:2021-01-22
Test Frequency	:2402 MHz	Temp./Humi.	:21.3/61
Test Mode	:TX CH LOW	Antenna Pol.	:VERTICAL
EUT Pol	:E1 Plan	Engineer	:Enzo Chang



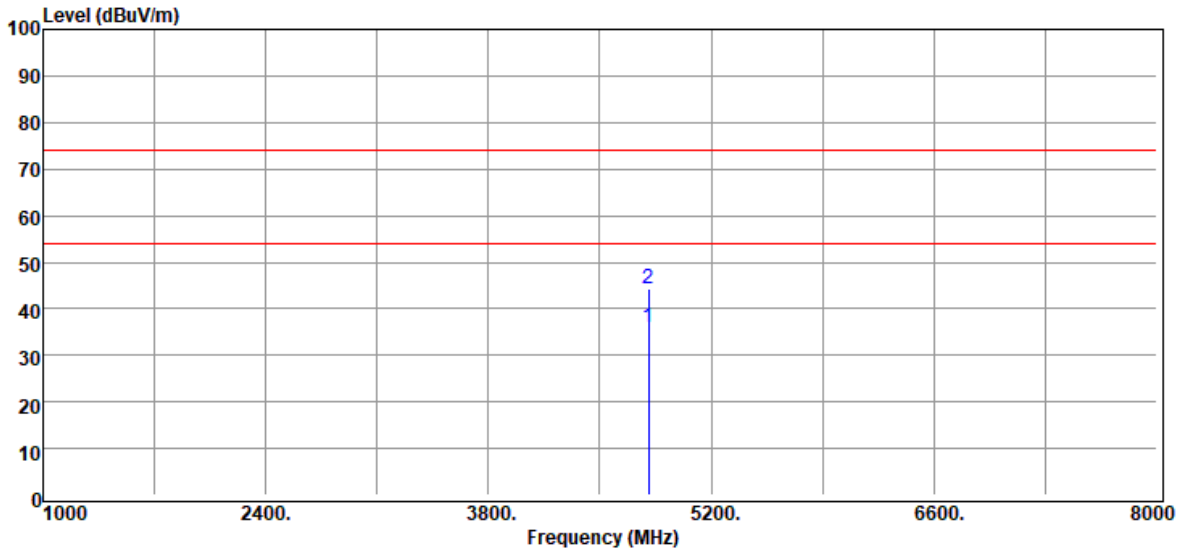
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4804.00	Average	19.02	14.07	33.09	54.00	-20.91
4804.00	Peak	29.66	14.07	43.73	74.00	-30.27

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Report Number	:E2/2020/B0010	Test Site	:966 Chamber C
Operation Mode	:BT BR	Test Date	:2021-01-22
Test Frequency	:2402 MHz	Temp./Humi.	:21.3/61
Test Mode	:TX CH LOW	Antenna Pol.	:HORIZONTAL
EUT Pol	:E1 Plan	Engineer	:Enzo Chang



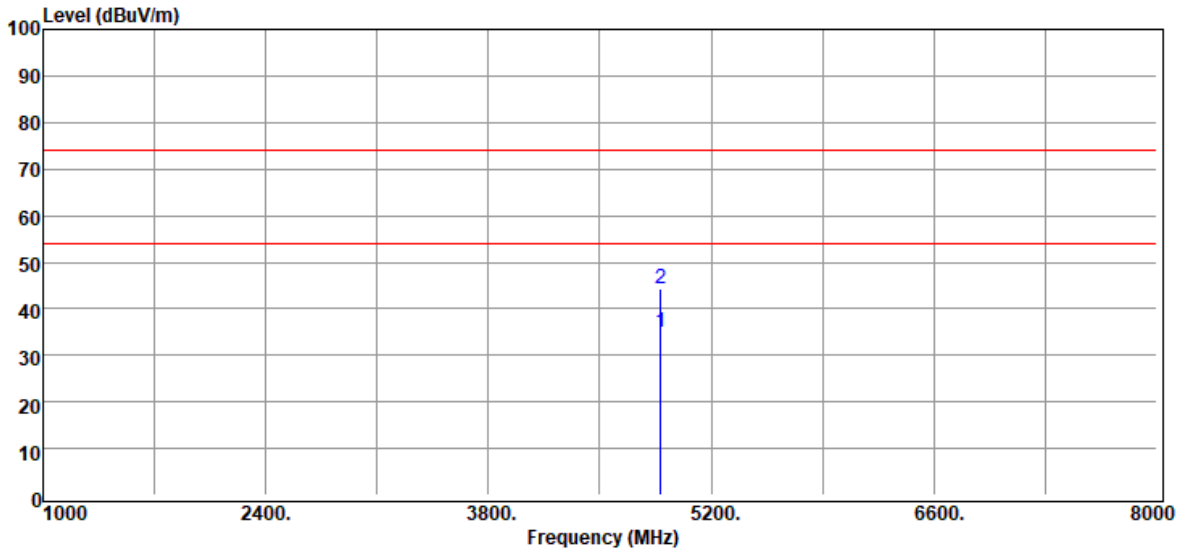
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4804.00	Average	21.77	14.07	35.84	54.00	-18.16
4804.00	Peak	30.18	14.07	44.25	74.00	-29.75

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Report Number	:E2/2020/B0010	Test Site	:966 Chamber C
Operation Mode	:BT BR	Test Date	:2021-01-22
Test Frequency	:2441 MHz	Temp./Humi.	:21.3/61
Test Mode	:TX CH MID	Antenna Pol.	:VERTICAL
EUT Pol	:E1 Plan	Engineer	:Enzo Chang



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
4882.00	Average	20.88	14.21	35.09	54.00	-18.91
4882.00	Peak	30.12	14.21	44.33	74.00	-29.67

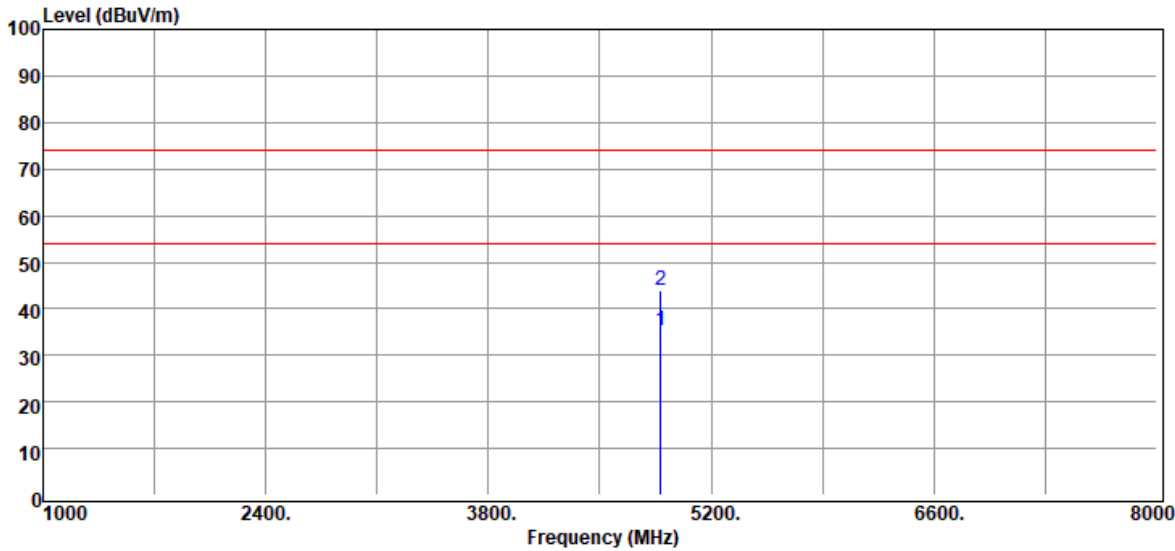
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Report Number :E2/2020/B0010  
 Operation Mode :BT BR  
 Test Frequency :2441 MHz  
 Test Mode :TX CH MID  
 EUT Pol :E1 Plan

Test Site :966 Chamber C  
 Test Date :2021-01-22  
 Temp./Humi. :21.3/61  
 Antenna Pol. :HORIZONTAL  
 Engineer :Enzo Chang



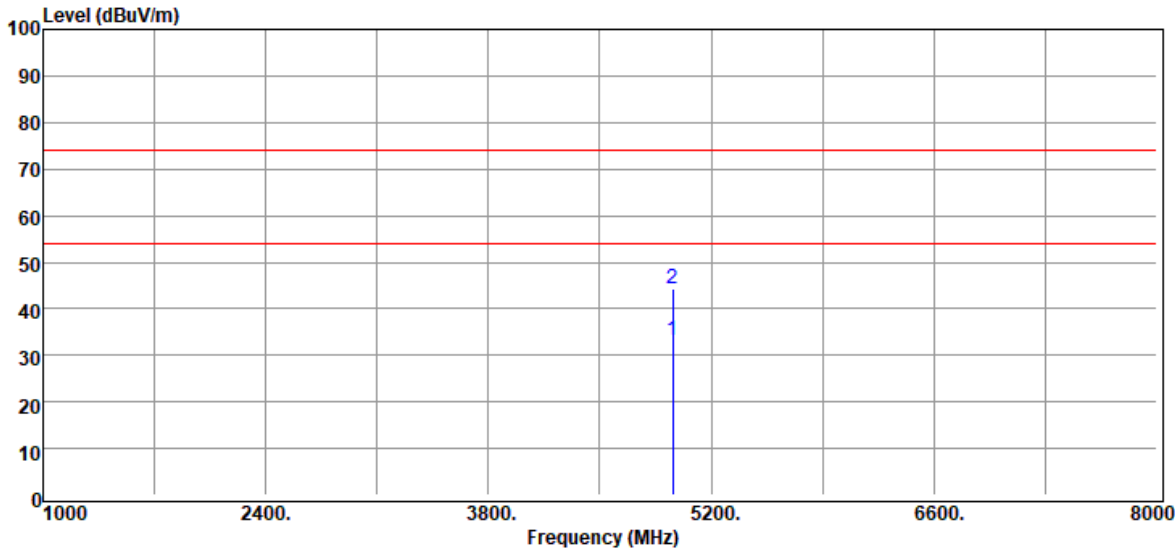
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB
4882.00	Average	21.06	14.21	35.27	54.00	-18.73
4882.00	Peak	29.71	14.21	43.92	74.00	-30.08

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Report Number	:E2/2020/B0010	Test Site	:966 Chamber C
Operation Mode	:BT BR	Test Date	:2021-01-22
Test Frequency	:2480 MHz	Temp./Humi.	:21.3/61
Test Mode	:TX CH HIGH	Antenna Pol.	:VERTICAL
EUT Pol	:E1 Plan	Engineer	:Enzo Chang



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	19.08	14.13	33.21	54.00	-20.79
4960.00	Peak	30.13	14.13	44.26	74.00	-29.74

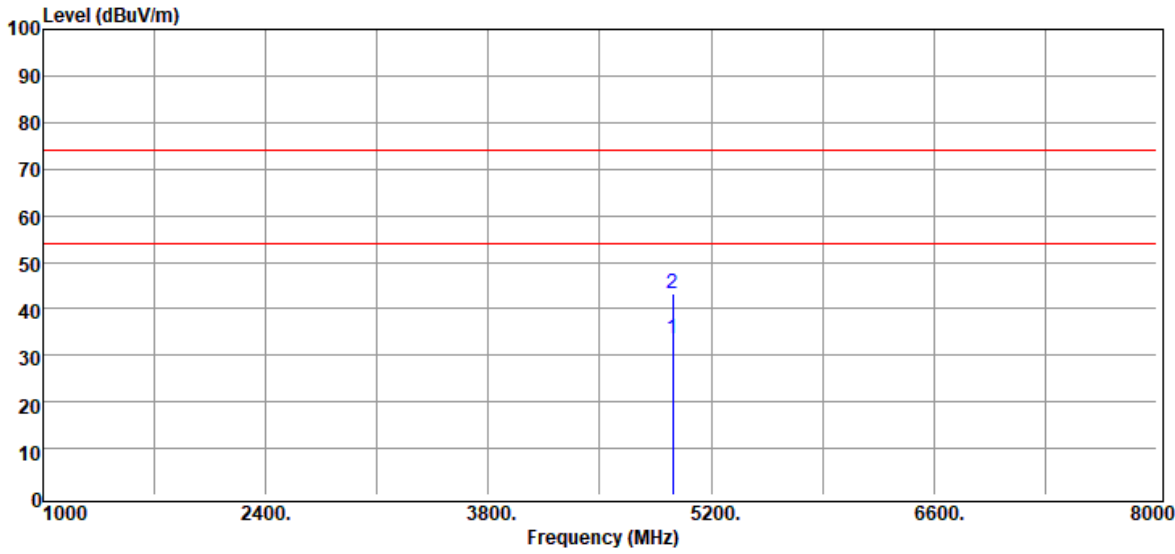
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Report Number :E2/2020/B0010  
 Operation Mode :BT BR  
 Test Frequency :2480 MHz  
 Test Mode :TX CH HIGH  
 EUT Pol :E1 Plan

Test Site :966 Chamber C  
 Test Date :2021-01-22  
 Temp./Humi. :21.3/61  
 Antenna Pol. :HORIZONTAL  
 Engineer :Enzo Chang



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	19.44	14.13	33.57	54.00	-20.43
4960.00	Peak	29.19	14.13	43.32	74.00	-30.68

~ End of Report ~

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