

ELECTROMAGNETIC EMISSIONS COMPLIANCE CLASS II IV PERMISSIVE CHANGE REPORT



Applicant: Acer Incorporated
8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi, New Taipei City
22181, Taiwan (R.O.C)
Product Name: Notebook Computer
Brand Name: acer
FCC Model No.: N20Q10
IC Model No.: R722T
Model Difference: N/A
Report Number: E2/2021/A0059
FCC ID HLZ-QCNFA324
IC: 1754F-QCNFA324
Issue Date: Nov.17,2021
Date of Test: Oct.12,2021~Oct.19,2021
Date of EUT Received: Oct.08,2021

Approved By Arno Hsieh
Arno Hsieh

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, ISSED 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
E2/2021/A0059	Rev.00	Original.	Nov.17,2021	Viola Su	-

Note:

- 1、The remark "" indicates modification of the report upon requests from certification body.
- 2、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 of Host:	Notebook Computer
Brand Name of Host:	<i>acer</i>
Model No. of FCC Host:	N20Q10
Model No. of IC Host:	R722T
Hardware Version:	N/A
Software Version:	4.0.00172.0
Model No. of BT/WLAN Module:	QCNFA324
Scope:	QCNFA324 INSTALLED IN Notebook Computer
Class II & Class IV Permissive change:	The test report covers the radiated emissions requirements of the standards referenced in the report to allow system level approval of the module in this specific host.
EUT Series No.:	N8AZCWW0011362465B7600
Power Supply:	11.55Vdc from Rechargeable Lithium Ion Battery Pack 5 / 9 / 12 / 15 / 20Vdc from AC/DC Adapter

1.2 RF Specification

Radio Technology:	BLE
Frequency Range:	2402 – 2480MHz
Channel number:	40 channels
Modulation type:	GFSK

1.3 Module Report

Test Lab	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory.
Report Number	RF140808E04

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1.4 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Mode	Main/Aux	Freq. (MHz)	Peak Antenna Gain (dBi)
PIFA	Wistron NeWeb Corp.	Pico (ZDGB) C Build	Open Mode	Aux	2402~2480	1.08
			Tablet Mode		2402~2480	-0.66

1.5 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance v05r02

RSS-247 issue 2 Feb. 2017

RSS-Gen Issue 5, Amendment 2, February 2021

ANSI C63.10:2013

1.6 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 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.

1.7 Special Accessories

There are no special accessories used while test was conducted.

1.8 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.

2.4.2 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 2-2 Radiated Setup

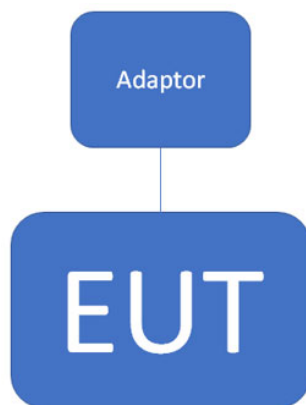


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Version
1.	QRCT	N/A	N/A	N/A	4.0.00161.0
2.	Adapter	Delta	ADP-45HG	N/A	N/A

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3 SUMMARY OF TEST RESULTS

FCC Rules	ISED Rules	Description Of Test	Result
§15.247(d) §15.205 §15.209	RSS-247 §5.5 RSS-Gen §8.9 RSS-Gen §8.10	Radiated & Conducted Band Edge and Spurious Emission	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

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		

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. The field strength of radiation emission was measured as EUT three orthogonal planes, E1 / E2 / H, are positioned to pre-scan the emission generating the highest one. The worst position is tested and recorded.
4. Investigation has been done on all the possible configurations for searching the worst case.

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RADIATED EMISSION TEST (ABOVE 1 GHz)

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
Bluetooth LE	0 to 39	0,20,39	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 channel Low, Mid and High, the worst case NB mode was reported.

5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
Peak Output Power	+/- 1 dB
Temperature	+/- 0.4 °C
Humidity	+/- 3.5 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty		
Polarization: Vertical	+/- 2.64 dB	9kHz~30MHz
	+/- 4.93 dB	30MHz - 1000MHz
	+/- 4.81 dB	1GHz - 18GHz
	+/- 4.52 dB	18GHz - 40GHz
Polarization: Horizontal	+/- 2.64 dB	9kHz~30MHz
	+/- 4.45 dB	30MHz - 1000MHz
	+/- 4.81 dB	1GHz - 18GHz
	+/- 4.52 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 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: The lower limit shall apply at the transition frequencies.

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6.2 Measurement Equipment Used

Radiated Emission Test Site: SAC D					
EQUIPMENT TYPE	MFR/BRAND	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Horn Antenna	Schwarzbeck	BBHA9170	184	12/11/2020	12/10/2021
Horn Antenna	Schwarzbeck	BBHA9120D	1341	06/04/2021	06/03/2022
3m Site NSA	SGS	966 chamber D	N/A	07/12/2021	07/11/2022
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/22/2021	03/21/2022
Pre-Amplifier	EMC Instru- ments	EMC184045B	980135	10/27/2020	10/26/2021
Pre-Amplifier	EMC Instru- ments	EMC9135	980234	11/19/2020	11/18/2021
Pre-Amplifier	EMC Instru- ments	EMC12630SE	980273	11/19/2020	11/18/2021
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	11/19/2020	11/18/2021
Coaxial Cable	Huber Suhner	EMC106-SM-SM- 7200	150703	11/19/2020	11/18/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17413/4	11/19/2020	11/18/2021
High Pass Filter	R&S	F13 HPF 3GHz	RF175	11/19/2020	11/18/2021
Band Rejection Filter	Micro-Tronics	BRM50701-01	RF201	11/19/2020	11/18/2021

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

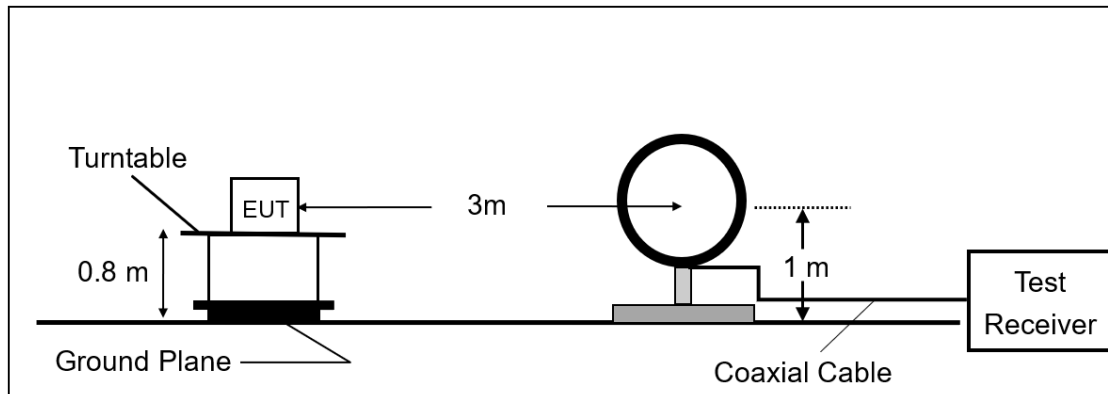
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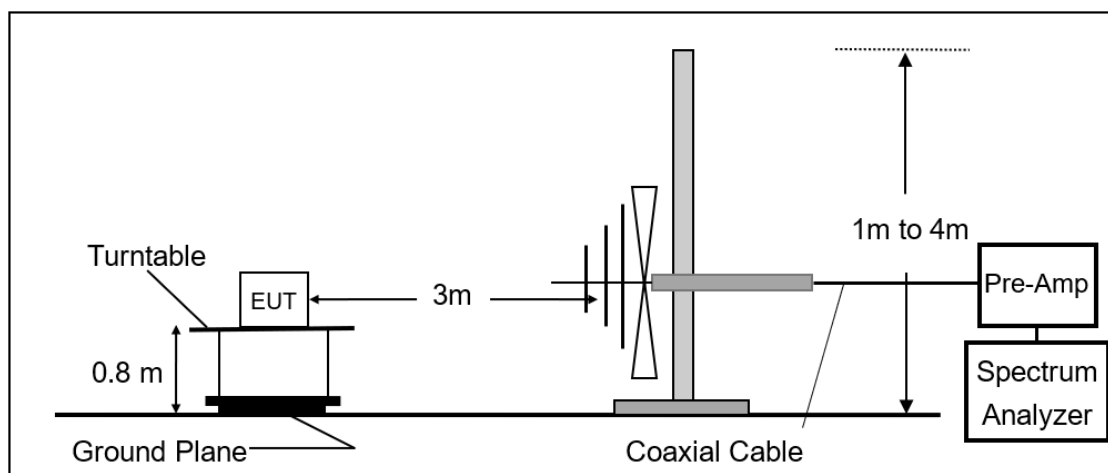
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6.3 Test SET-UP

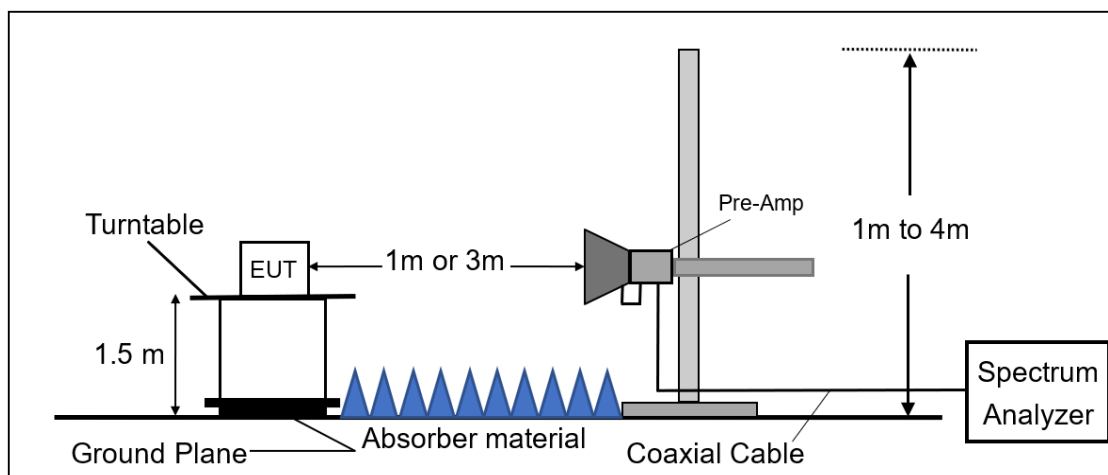
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency 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 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 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 Peak Detector 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 Detector 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. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
12. 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(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – 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.

6.7 Measurement Result:

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

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6.7.1 Radiated Spurious Emission above 1GHz

Report Number :E2-2021-A0059

Test Site :SAC D

Operation Mode :BLE 1M

Test Date :2021-10-19

Test Frequency :2402 MHz

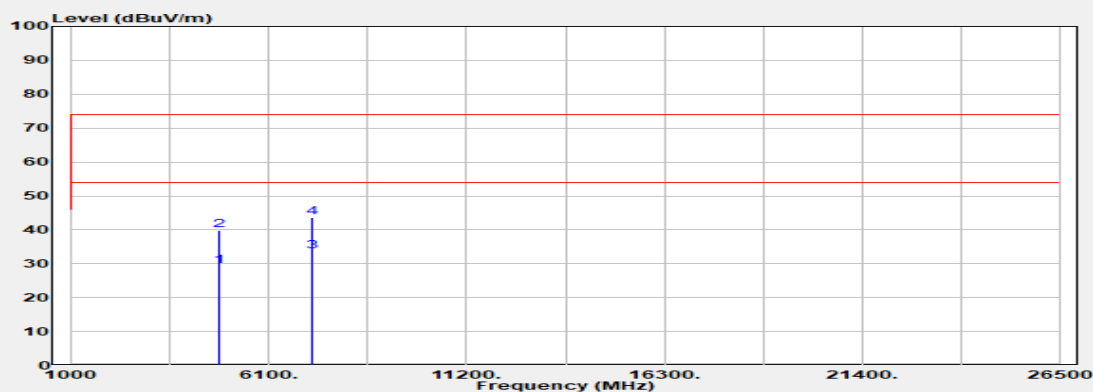
Temp./Humi. :22/70

Test Mode :TX CH LOW

Antenna Pol. :Vertical

EUT Pol :NB Plane

Engineer :Jack tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4804.000	Average	32.36	-3.04	29.32	54.00	-24.68
4804.000	Peak	42.75	-3.04	39.71	74.00	-34.29
7206.000	Average	30.58	2.98	33.56	54.00	-20.44
7206.000	Peak	40.65	2.98	43.63	74.00	-30.37

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Report Number :E2-2021-A0059

Test Site :SAC D

Operation Mode :BLE 1M

Test Date :2021-10-19

Test Frequency :2402 MHz

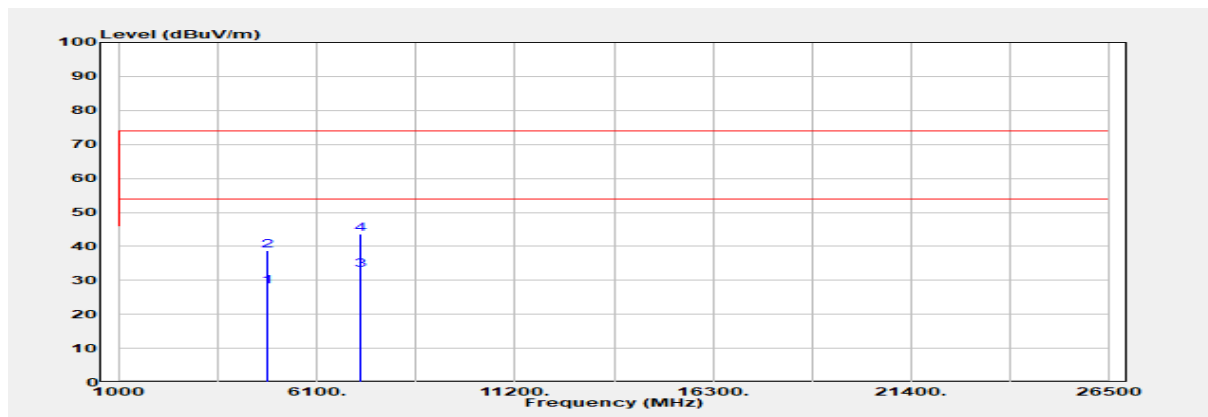
Temp./Humi. :22/70

Test Mode :TX CH LOW

Antenna Pol. :Horizontal

EUT Pol :NB Plane

Engineer :Jack tseng



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
4804.000	Average	31.26	-3.04	28.21	54.00	-25.79
4804.000	Peak	41.67	-3.04	38.63	74.00	-35.37
7206.000	Average	30.16	2.98	33.14	54.00	-20.86
7206.000	Peak	40.68	2.98	43.66	74.00	-30.34

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Report Number :E2-2021-A0059

Test Site :SAC D

Operation Mode :BLE 1M

Test Date :2021-10-19

Test Frequency :2442 MHz

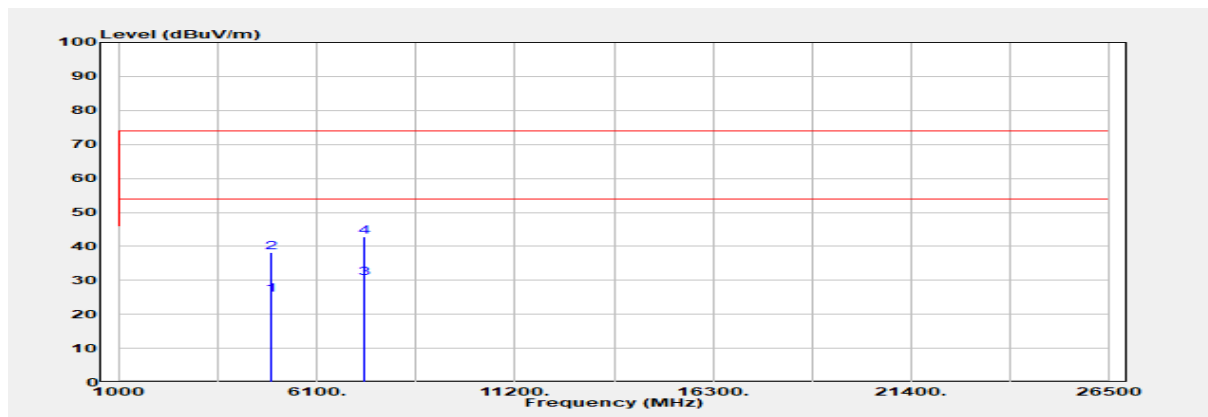
Temp./Humi. :22/70

Test Mode :TX CH MID

Antenna Pol. :Vertical

EUT Pol :NB Plane

Engineer :Jack tseng



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
4884.000	Average	28.83	-3.20	25.63	54.00	-28.37
4884.000	Peak	41.45	-3.20	38.25	74.00	-35.75
7326.000	Average	27.50	3.24	30.74	54.00	-23.26
7326.000	Peak	39.63	3.24	42.87	74.00	-31.13

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Report Number :E2-2021-A0059

Test Site :SAC D

Operation Mode :BLE 1M

Test Date :2021-10-19

Test Frequency :2442 MHz

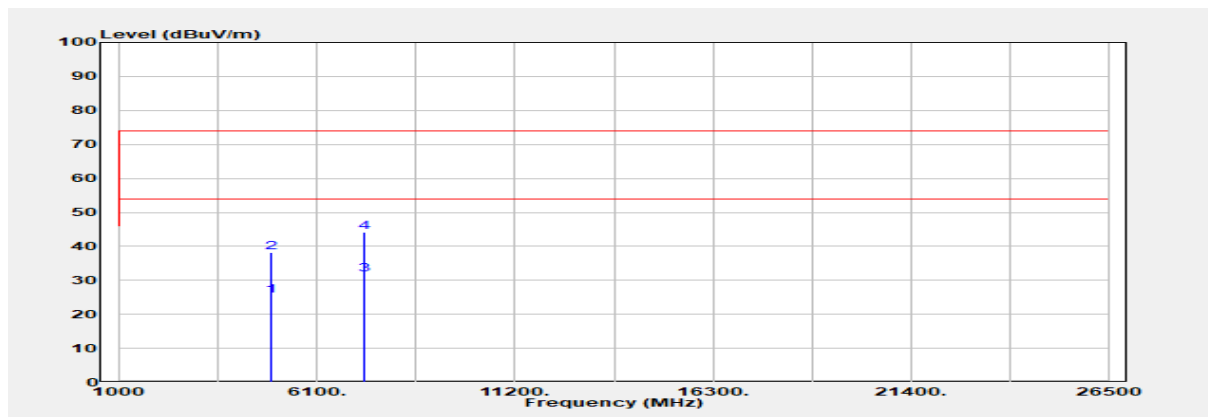
Temp./Humi. :22/70

Test Mode :TX CH MID

Antenna Pol. :Horizontal

EUT Pol :NB Plane

Engineer :Jack tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4884.000	Average	28.63	-3.20	25.42	54.00	-28.58
4884.000	Peak	41.52	-3.20	38.31	74.00	-35.69
7326.000	Average	28.50	3.24	31.74	54.00	-22.26
7326.000	Peak	41.03	3.24	44.27	74.00	-29.73

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Report Number :E2-2021-A0059

Test Site :SAC D

Operation Mode :BLE 1M

Test Date :2021-10-19

Test Frequency :2480 MHz

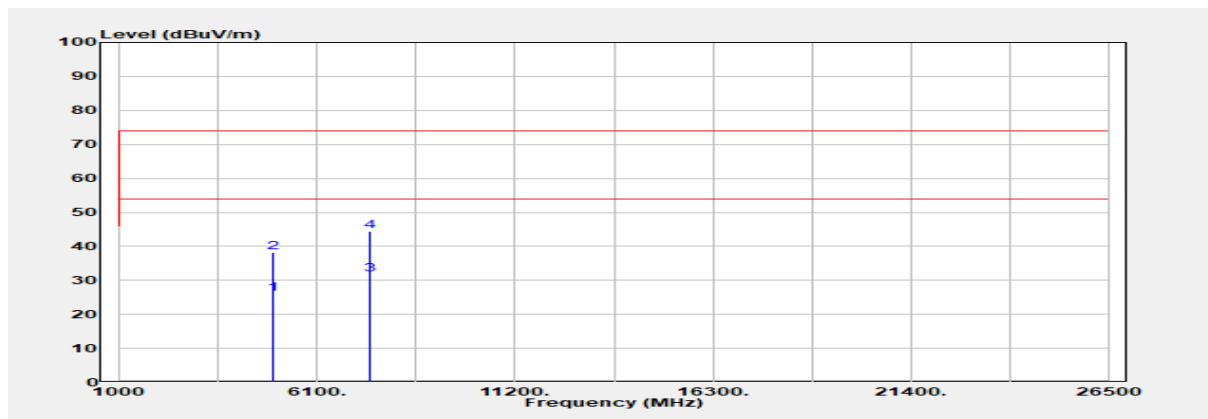
Temp./Humi. :22/70

Test Mode :TX CH HIGH

Antenna Pol. :Vertical

EUT Pol :NB Plane

Engineer :Jack tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4960.000	Average	28.80	-2.87	25.93	54.00	-28.07
4960.000	Peak	41.08	-2.87	38.20	74.00	-35.80
7440.000	Average	27.90	3.85	31.75	54.00	-22.25
7440.000	Peak	40.51	3.85	44.36	74.00	-29.64

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Report Number :E2-2021-A0059

Test Site :SAC D

Operation Mode :BLE 1M

Test Date :2021-10-19

Test Frequency :2480 MHz

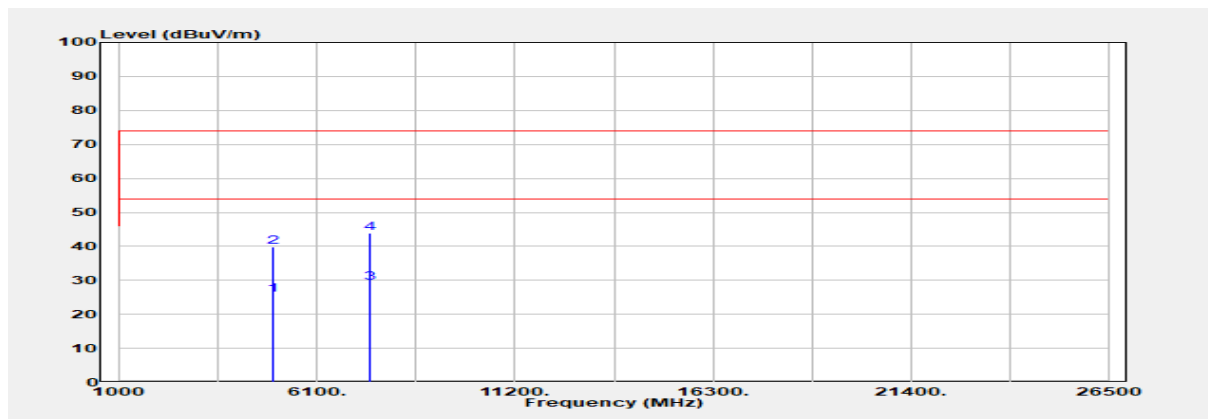
Temp./Humi. :22/70

Test Mode :TX CH HIGH

Antenna Pol. :Horizontal

EUT Pol :NB Plane

Engineer :Jack tseng



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4960.000	Average	28.63	-2.87	25.76	54.00	-28.24
4960.000	Peak	42.74	-2.87	39.87	74.00	-34.13
7440.000	Average	25.31	3.85	29.16	54.00	-24.84
7440.000	Peak	39.97	3.85	43.82	74.00	-30.18

~ End of Report ~

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