

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

CLASS II & IV PC REPORT

OF

Applicant: HP INC.
Product Name: 1501 PAGE MILL ROAD PALO ALTO, CA 94304, USA
Brand Name: 7c Modular Platform
Model No.: HP
Model Difference: QSIP7180P
Report Number: N/A
FCC ID E2/2021/10090
IC: B94-TNH101QSP
FCC Rule Part: 466X-TNH101QSP
IC RSS: §15.247, Cat: DTS
Issue Date: RSS-247 issue 2 Feb 2017
Date of Test: March 31, 2021
Date of EUT Received: February 5, 2021 - March 30, 2021
Date of EUT Received: February 5, 2021

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	Revised By
E2/2021/10090	Rev.00	Original.	March 31, 2021	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 of Host:	Notebook Computer
Brand Name:	HP
Model No. of Host:	TPN-H101
Model Difference:	N/A
Hardware Version:	N/A
Software Version:	N/A
Model No. of BT/WLAN Module:	QSIP7180P
Class II & Class IV Permissive change:	7c Modular Platform INSTALLED IN Notebook Computer
Power Supply:	7.7Vdc from Rechargeable Li-ion Battery or 5 / 9 / 12 / 15 Vdc from AC/DC Adapter

Radio Technology:	Bluetooth LE dual mode
Frequency Range:	2402 – 2480MHz
Channel number:	40 channels
Modulation type:	GFSK
Transmit Power:	4.12dBm (1M) 3.68dBm (2M)

1.2 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	TX1 / TX2	Freq.	Peak Antenna Gain (dBi)
PIFA	Inpaq	WA-P-LB-02-839	TX2	2.4GHz	-0.92

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1.3 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 1, March 2019

ANSI C63.10:2013

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1.4 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		
		Conducted 7		
		Conducted 8		
		Conducted 9		
		Conducted 10		
		No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333		
	SAC C			
	SAC D			
	SAC E			
	Conducted A			
	Conducted B			
	Conducted C			
	Conducted D			
	Conducted E			
	Conducted F			
	Conducted G			
	Conducted H			
	Conducted I			
	Conducted J			
	Conducted TS8997			
Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.				

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1.5 Special Accessories

There are no special accessories 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.

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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*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 Conducted (Antenna Port)

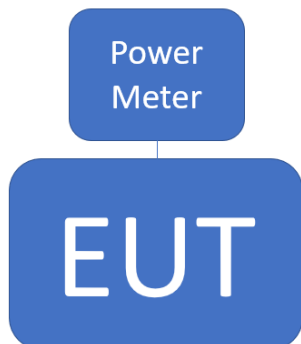


Fig 2-2 Radiated Emission

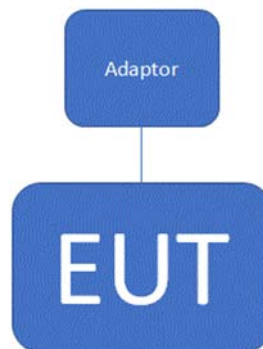


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Ca-ble	Power Cord
1	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A
2	Adapter	Lite-On	TPN-LA19	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULTS

FCC Rules	ISED Rules	Description Of Test	Result
§15.247(b) (3)	RSS-247 §5.4(4)	Peak Output Power	Compliant
§15.247(d) §15.205	RSS-247 §5.5 RSS-Gen §8.10	Radiated Band Edge	Compliant
§15.247(d) §15.209	RSS-247 §5.5 RSS-Gen §8.9	Radiated 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		

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.

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MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)
RADIATED EMISSION TEST (BELOW 1 GHz)				
Bluetooth LE	2402 to 2480	2402, 2440, 2480	GFSK	1
RADIATED EMISSION TEST (ABOVE 1 GHz)				
Bluetooth LE	2402 to 2480	2402, 2440, 2480	GFSK	1
Note: The field strength of radiation emission was measured as NB Plane for channel Low, Mid and High.				

ANTENNA PORT CONDUCTED MEASUREMENT				
MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)
Bluetooth LE	2402 to 2480	2402, 2440, 2480	GFSK	1

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5 MEASUREMENT UNCERTAINTY

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

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/- 2.64 dB	9kHz~30MHz: +/-2.3dB	
	+/- 4.93 dB	30MHz - 1000MHz: +/- 3.37dB	
	+/- 4.81 dB	1GHz - 18GHz: +/- 4.04dB	
	+/- 4.52 dB	18GHz - 40GHz: +/- 4.04dB	
Polarization: Horizontal	+/- 2.64 dB	9kHz~30MHz: +/-2.3dB	
	+/- 4.45 dB	30MHz - 1000MHz: +/- 4.22dB	
	+/- 4.81 dB	1GHz - 18GHz: +/- 4.08dB	
	+/- 4.52 dB	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 systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt and the e.i.r.p. shall not exceed 4 W (ISED only).

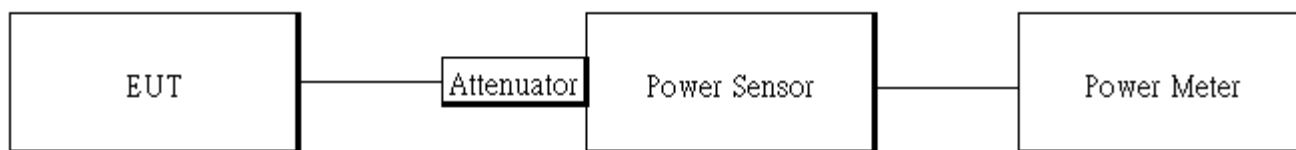
If the transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi. (FCC only)

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi. (FCC only)

6.2 Measurement Equipment Used:

Conducted Emission Test Site: Conducted A					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1512003	07/23/2020	07/22/2021
Power Sensor	Anritsu	MA2411B	1339378	07/23/2020	07/22/2021
Power Sensor	Anritsu	MA2411B	1339379	07/23/2020	07/22/2021
Attenuator	Marvelous	MVE2213-10	RF07	11/19/2020	11/18/2021
DC Block	PASTERNAK	PE8210	RF151	11/19/2020	11/18/2021
I Pex4 Cables	Woken	00100A1H6460 27	RF501	06/01/2020	05/31/2021
I Pex4 Cables	Woken	00100A1H6460 27	RF502	06/01/2020	05/31/2021
AP	ASUS	RT-N66U	N/A	N/A	N/A
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071574	06/24/2020	06/23/2021

6.3 Test Set-up:



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6.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
4. Record the max. Reading as observed from Power Meter.
5. Repeat above procedures until all test default channel measured was complete.

6.5 Output Power:

6.5.1 Peak & Avg

BLE 1M

BLE mode:

CH	Frequency (MHz)	Power set	Peak Power Output (dBm)	Required Limit
Low	2402	default	2.80	1 Watt = 30 dBm
Mid	2442	default	2.89	1 Watt = 30 dBm
High	2480	default	4.12	1 Watt = 30 dBm
CH	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit
Low	2402	default	2.35	1 Watt = 30 dBm
Mid	2442	default	2.48	1 Watt = 30 dBm
High	2480	default	3.27	1 Watt = 30 dBm

*Note: Measured by power meter, cable loss dB + Duty cycle factor has been offsetted to the power meter for Avg. power and cable loss has been offsetted for Peak power measurement.

BLE 2M

BLE mode:

CH	Frequency (MHz)	Power set	Peak Power Output (dBm)	Required Limit
Low	2402	default	1.69	1 Watt = 30 dBm
Mid	2440	default	3.68	1 Watt = 30 dBm
High	2480	default	2.41	1 Watt = 30 dBm
CH	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit
Low	2402	default	1.59	1 Watt = 30 dBm
Mid	2440	default	3.23	1 Watt = 30 dBm
High	2480	default	2.29	1 Watt = 30 dBm

*Note: Measured by power meter, cable loss dB + Duty cycle factor has been offsetted to the power meter for Avg. power and cable loss has been offsetted for Peak power measurement.

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6.5.2 EIRP

BLE 1M

EIRP

CH	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit
Low	2402	default	2.35	-0.92	1.43	4W= 36 dBm
Mid	2442	default	2.48	-0.92	1.56	4W= 36 dBm
High	2480	default	3.27	-0.92	2.35	4W= 36 dBm

* **Note:** EIRP = Average Power + Gain

BLE 2M

EIRP

CH	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit
Low	2402	default	1.59	-0.92	0.67	4W= 36 dBm
Mid	2440	default	3.23	-0.92	2.31	4W= 36 dBm
High	2480	default	2.29	-0.92	1.37	4W= 36 dBm

* **Note:** EIRP = Average Power + Gain

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7 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 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 (dBμV/m)

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7.2 Measurement Equipment Used

Radiated Emission Test Site: SAC D					
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	BBHA9120D	1341	06/22/2020	06/21/2021
Horn Antenna	Schwarzbeck	BBHA9170	185	07/30/2020	07/29/2021
Loop Antenna	ETS.LINDGREN	6502	143303	04/28/2020	04/27/2021
3m Site NSA	SGS	966 chamber D	N/A	07/12/2020	07/11/2021
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	07/08/2020	07/07/2021
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2020	10/26/2021
Pre-Amplifier	EMC Instruments	EMC9135	980234	11/19/2020	11/18/2021
Pre-Amplifier	EMC Instruments	EMC12630SE	980271	11/19/2020	11/18/2021
Attenuator	Marvelous	WATT-218FS-10	RF25	11/19/2020	11/18/2021
High Pass Filter	R&S	F13 HPF 3GHz	RF175	11/19/2020	11/18/2021
Lowpass Filter	Woken	EWT-56-0019	RF173	11/19/2020	11/18/2021
Notch Filter	Woken	EWT-54-0038	RF178	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	RG 214/U	W21.01	11/19/2020	11/18/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17413/4	11/19/2020	11/18/2021

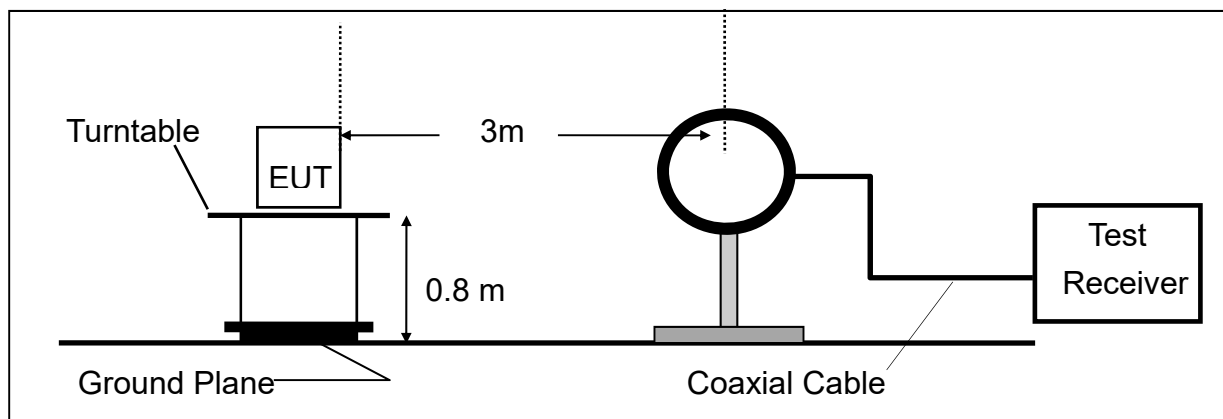
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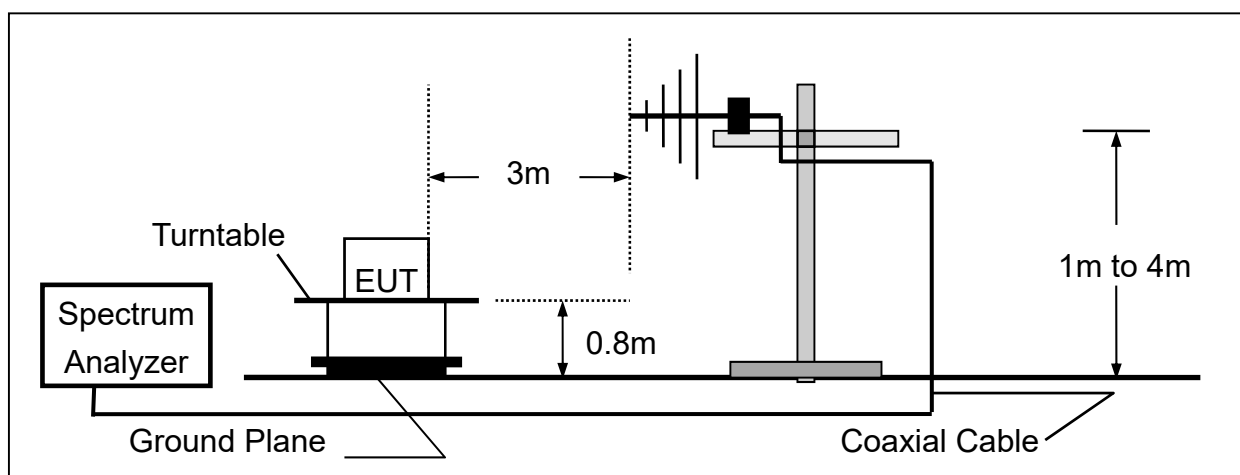
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7.3 Test SET-UP

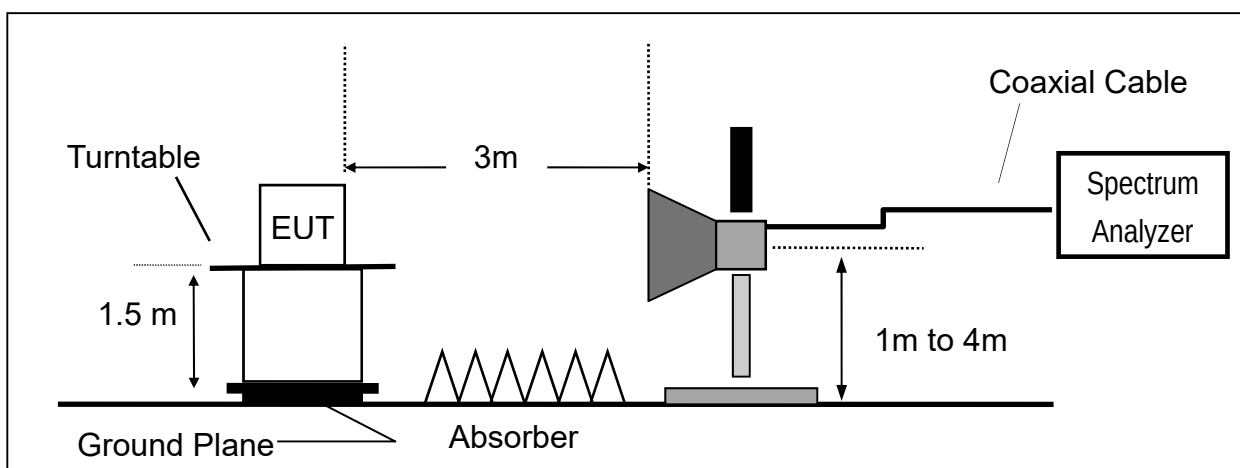
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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

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

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

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

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) was not reported.

7.7 Measurement Result:

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

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7.7.1 Radiated Band Edge Measurement Result

BLE 1M

Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 1M

Test Date :2021-03-05

Test Frequency :2402 MHz

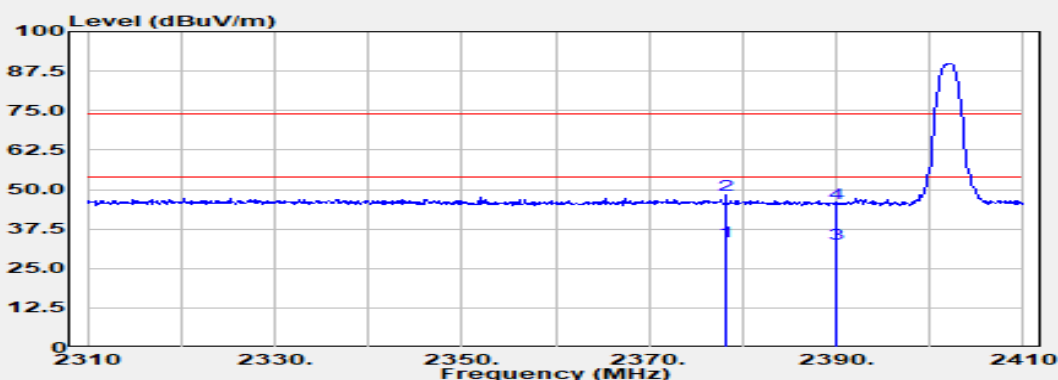
Temp./Humi. :20.5/69

Test Mode :BE CH LOW

Antenna Pol. :Vertical

EUT Pol :NB Plan

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
2378.200	Average	41.11	-7.69	33.41	54.00	-20.59
2378.200	Peak	56.03	-7.69	48.34	74.00	-25.66
2390.000	Average	40.88	-7.99	32.89	54.00	-21.11
2390.000	Peak	53.75	-7.99	45.76	74.00	-28.24

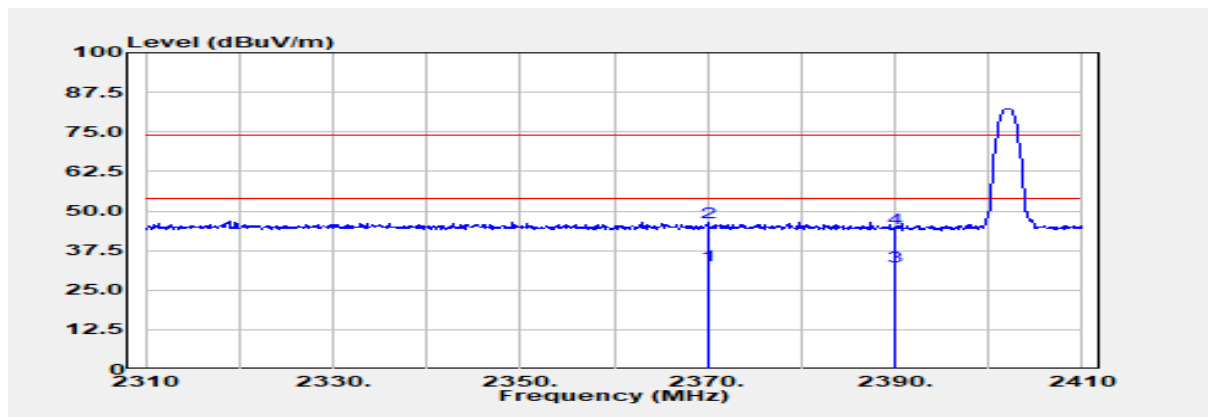
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Report Number :E2/2021/10090
 Operation Mode :BLE 1M
 Test Frequency :2402 MHz
 Test Mode :BE CH LOW
 EUT Pol :NB Plan

Test Site :966 Chamber D
 Test Date :2021-03-05
 Temp./Humi. :20.5/69
 Antenna Pol. :Horizontal
 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
2370.100	Average	40.59	-7.71	32.88	54.00	-21.12
2370.100	Peak	54.07	-7.71	46.36	74.00	-27.64
2390.000	Average	40.56	-7.99	32.57	54.00	-21.43
2390.000	Peak	52.34	-7.99	44.35	74.00	-29.65

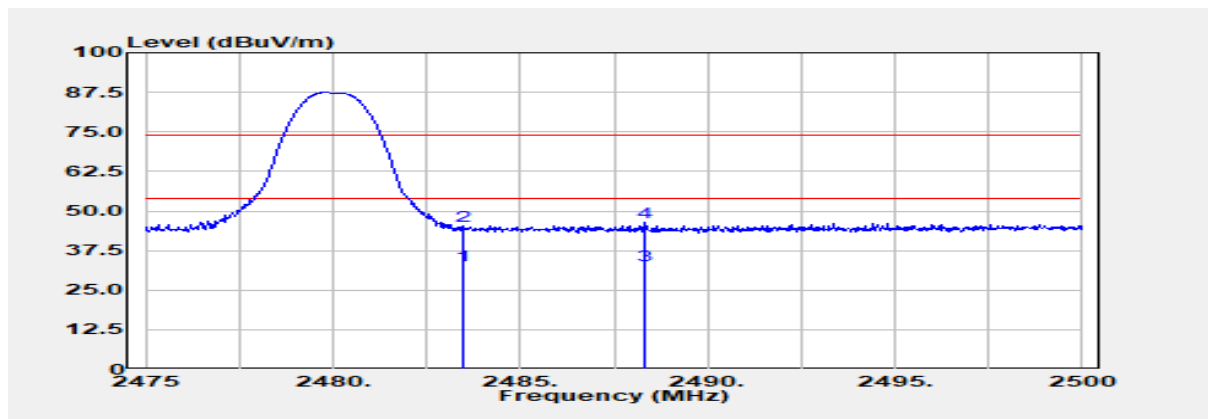
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Report Number :E2/2021/10090
 Operation Mode :BLE 1M
 Test Frequency :2480 MHz
 Test Mode :BE CH HIGH
 EUT Pol :NB Plan

Test Site :966 Chamber D
 Test Date :2021-03-05
 Temp./Humi. :20.5/69
 Antenna Pol. :Vertical
 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
2483.500	Average	41.11	-8.12	32.99	54.00	-21.01
2483.500	Peak	53.28	-8.12	45.17	74.00	-28.83
2488.350	Average	41.00	-8.14	32.86	54.00	-21.14
2488.350	Peak	54.58	-8.14	46.43	74.00	-27.57

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Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 1M

Test Date :2021-03-05

Test Frequency :2480 MHz

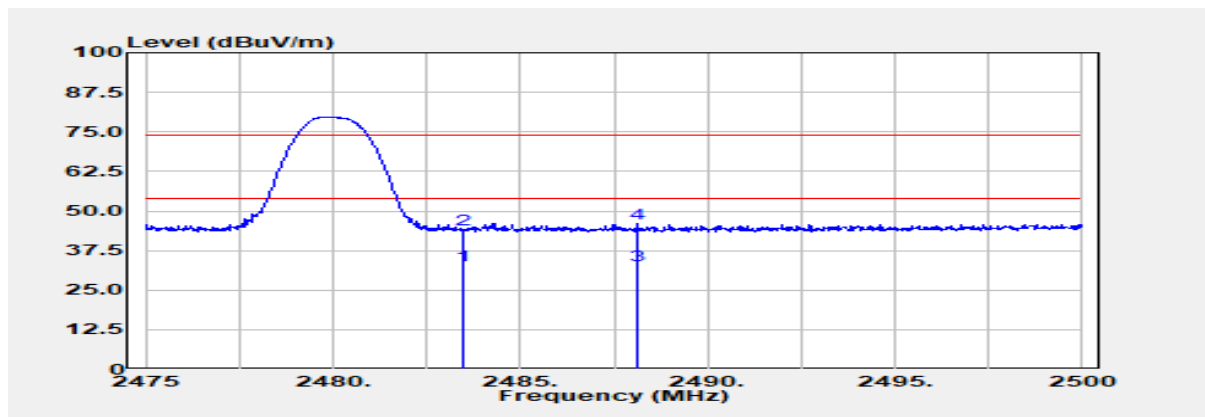
Temp./Humi. :20.5/69

Test Mode :BE CH HIGH

Antenna Pol. :Horizontal

EUT Pol :NB Plan

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
2483.500	Average	41.01	-8.12	32.89	54.00	-21.11
2483.500	Peak	52.20	-8.12	44.08	74.00	-29.92
2488.125	Average	40.90	-8.14	32.76	54.00	-21.24
2488.125	Peak	54.12	-8.14	45.98	74.00	-28.02

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BLE 2M

Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 2M

Test Date :2021-03-29

Test Frequency :2402 MHz

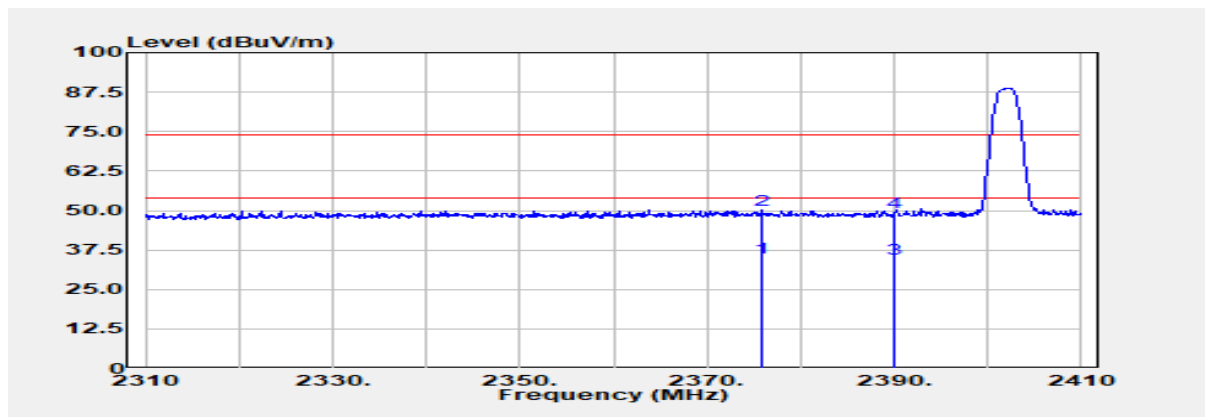
Temp./Humi. :22.8/60

Test Mode :BE CH LOW

Antenna Pol. :Vertical

EUT Pol :H Plan

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
2375.800	Average	42.68	-7.70	34.98	54.00	-19.02
2375.800	Peak	58.02	-7.70	50.33	74.00	-23.67
2390.000	Average	42.63	-7.99	34.64	54.00	-19.36
2390.000	Peak	57.26	-7.99	49.27	74.00	-24.73

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Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 2M

Test Date :2021-03-29

Test Frequency :2402 MHz

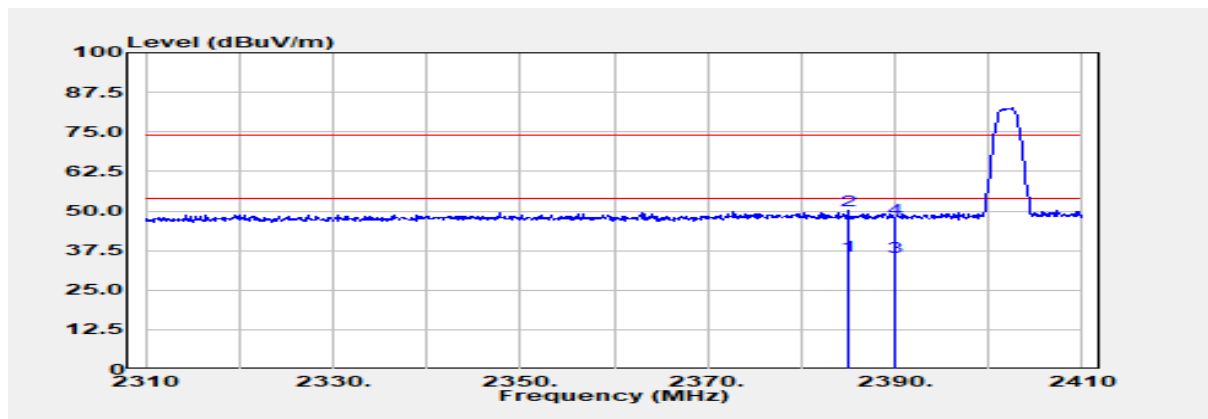
Temp./Humi. :22.8/60

Test Mode :BE CH LOW

Antenna Pol. :Horizontal

EUT Pol :H Plan

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
2384.900	Average	43.52	-7.83	35.69	54.00	-18.31
2384.900	Peak	57.98	-7.83	50.15	74.00	-23.85
2390.000	Average	43.53	-7.99	35.54	54.00	-18.46
2390.000	Peak	55.59	-7.99	47.60	74.00	-26.40

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Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 2M

Test Date :2021-03-29

Test Frequency :2480 MHz

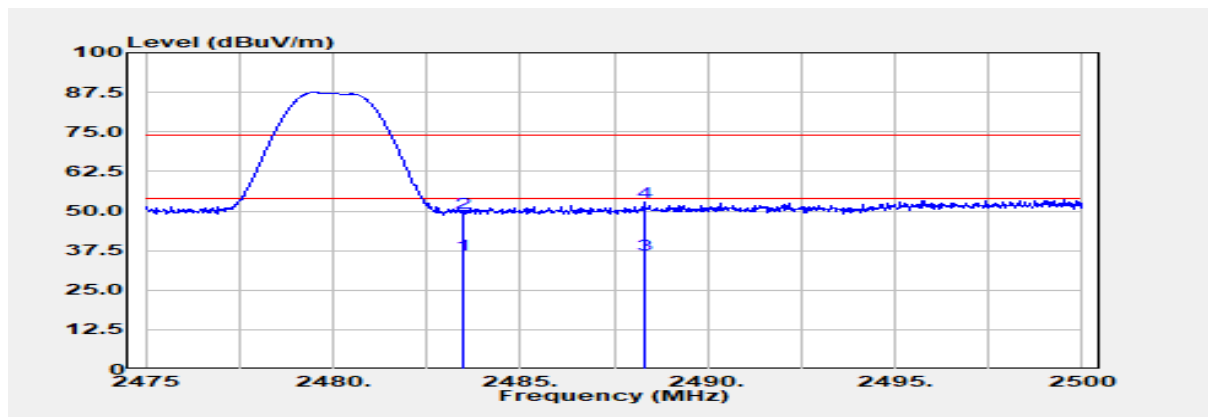
Temp./Humi. :22.8/60

Test Mode :BE CH HIGH

Antenna Pol. :Vertical

EUT Pol :H Plan

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
2483.500	Average	44.48	-8.12	36.36	54.00	-17.64
2483.500	Peak	57.64	-8.12	49.52	74.00	-24.48
2488.300	Average	44.32	-8.14	36.18	54.00	-17.82
2488.300	Peak	61.08	-8.14	52.94	74.00	-21.06

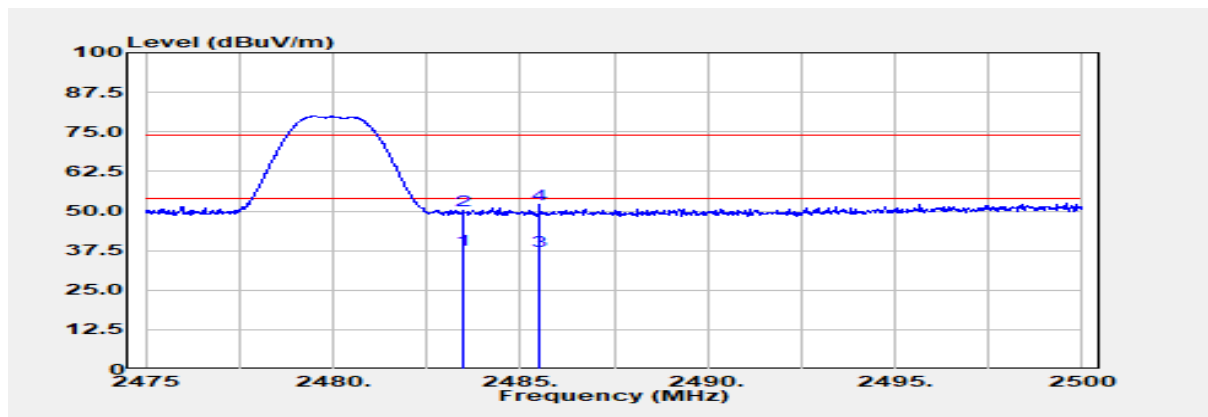
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Report Number :E2/2021/10090
 Operation Mode :BLE 2M
 Test Frequency :2480 MHz
 Test Mode :BE CH HIGH
 EUT Pol :H Plan

Test Site :966 Chamber D
 Test Date :2021-03-29
 Temp./Humi. :22.8/60
 Antenna Pol. :Horizontal
 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
2483.500	Average	45.74	-8.12	37.62	54.00	-16.38
2483.500	Peak	58.36	-8.12	50.24	74.00	-23.76
2485.500	Average	45.61	-8.13	37.48	54.00	-16.52
2485.500	Peak	60.02	-8.13	51.90	74.00	-22.10

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7.7.2 Radiated Spurious Emission from 30MHz to 1000MHz

BLE 1M

Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 1M

Test Date :2021-03-05

Test Frequency :2440 MHz

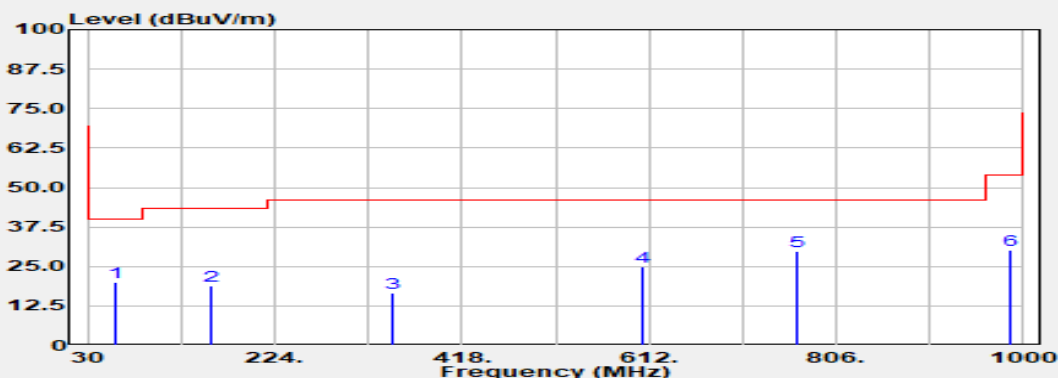
Temp./Humi. :20.5/69

Test Mode :TX CH MID

Antenna Pol. :Vertical

EUT Pol :NB Plan

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
60.070	Peak	37.90	-17.92	19.98	40.00	-20.02
158.040	Peak	35.71	-17.03	18.68	43.50	-24.82
347.190	Peak	31.90	-15.44	16.45	46.00	-29.55
606.180	Peak	33.85	-8.86	24.99	46.00	-21.01
765.260	Peak	36.51	-6.63	29.87	46.00	-16.13
985.450	Peak	34.88	-4.56	30.33	54.00	-23.67

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Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 1M

Test Date :2021-03-05

Test Frequency :2440 MHz

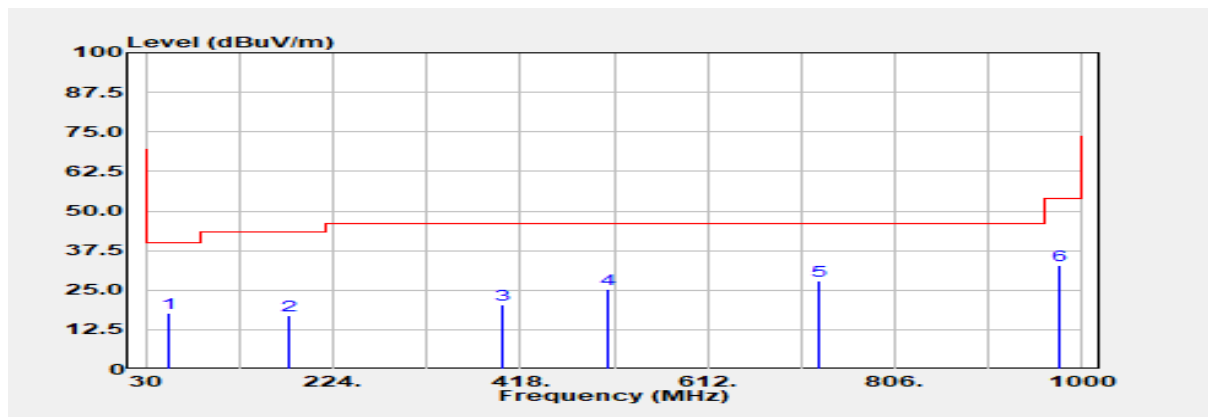
Temp./Humi. :20.5/69

Test Mode :TX CH MID

Antenna Pol. :Horizontal

EUT Pol :NB Plan

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
54.250	Peak	35.47	-17.80	17.67	40.00	-22.33
177.440	Peak	34.81	-17.71	17.10	43.50	-26.40
398.600	Peak	34.07	-13.77	20.30	46.00	-25.70
509.180	Peak	36.46	-11.09	25.37	46.00	-20.63
726.460	Peak	35.01	-7.27	27.74	46.00	-18.26
975.750	Peak	37.41	-4.44	32.96	54.00	-21.04

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BLE 2M

Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 2M

Test Date :2021-03-29

Test Frequency :2441 MHz

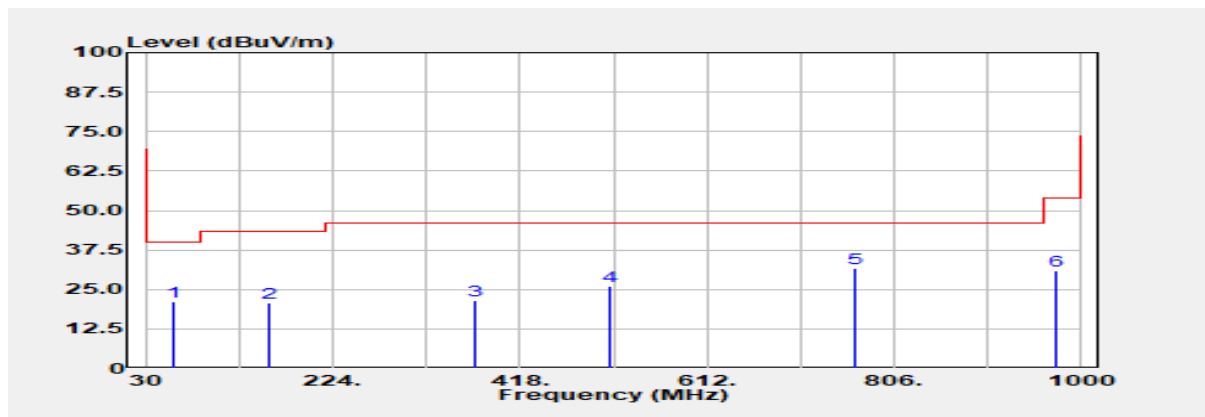
Temp./Humi. :22.8/60

Test Mode :TX CH MID

Antenna Pol. :Vertical

EUT Pol :NB Plan

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
60.070	Peak	38.90	-17.92	20.98	40.00	-19.02
158.040	Peak	37.71	-17.03	20.68	43.50	-22.82
371.440	Peak	36.30	-14.63	21.67	46.00	-24.33
511.120	Peak	36.89	-10.93	25.95	46.00	-20.05
765.260	Peak	38.51	-6.63	31.87	46.00	-14.13
972.840	Peak	35.05	-4.16	30.89	54.00	-23.11

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Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 2M

Test Date :2021-03-29

Test Frequency :2441 MHz

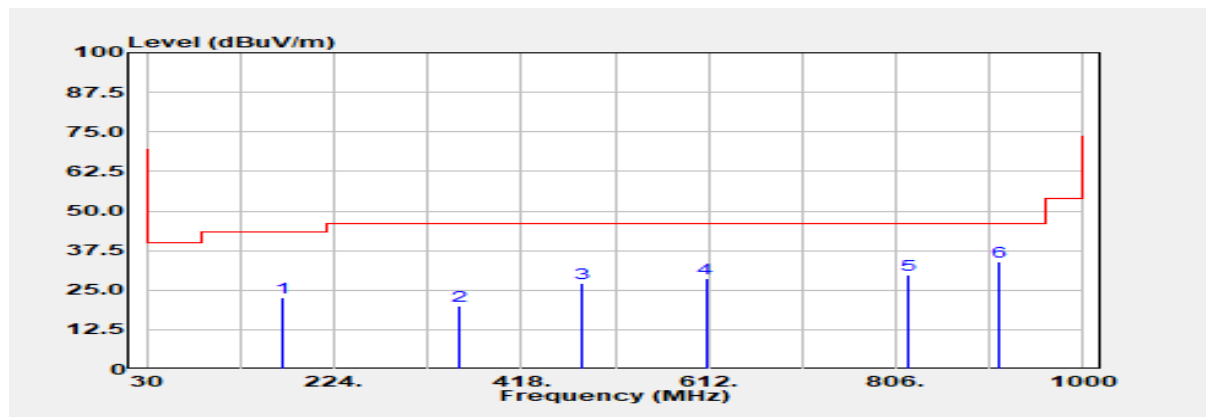
Temp./Humi. :22.8/60

Test Mode :TX CH MID

Antenna Pol. :Horizontal

EUT Pol :NB Plan

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
171.620	Peak	39.73	-17.06	22.67	43.50	-20.83
353.010	Peak	34.77	-14.91	19.85	46.00	-26.15
480.080	Peak	38.79	-11.60	27.19	46.00	-18.81
609.090	Peak	38.02	-9.31	28.70	46.00	-17.30
818.610	Peak	36.46	-6.74	29.72	46.00	-16.28
913.670	Peak	39.59	-5.53	34.07	46.00	-11.93

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7.7.3 Radiated Spurious Emission above 1GHz

BLE 1M

Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 1M

Test Date :2021-03-05

Test Frequency :2402 MHz

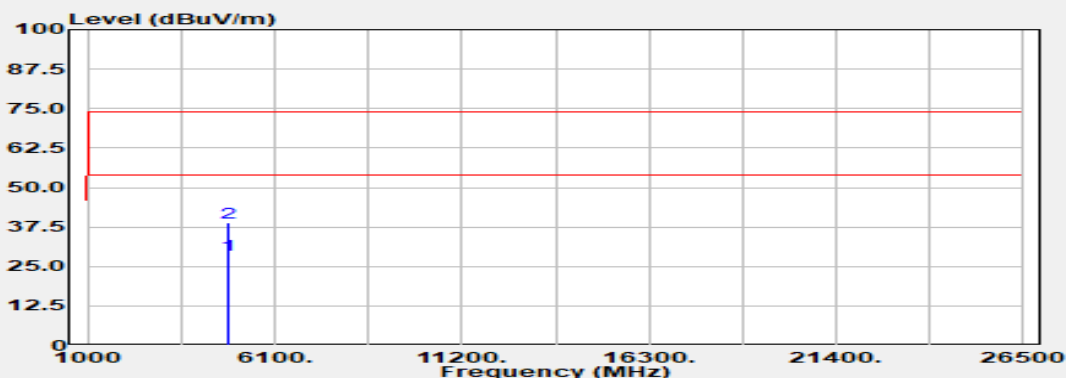
Temp./Humi. :20.5/69

Test Mode :TX CH LOW

Antenna Pol. :Vertical

EUT Pol :NB Plan

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	31.53	-3.03	28.50	54.00	-25.50
4804.000	Peak	42.01	-3.03	38.98	74.00	-35.02

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Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 1M

Test Date :2021-03-05

Test Frequency :2402 MHz

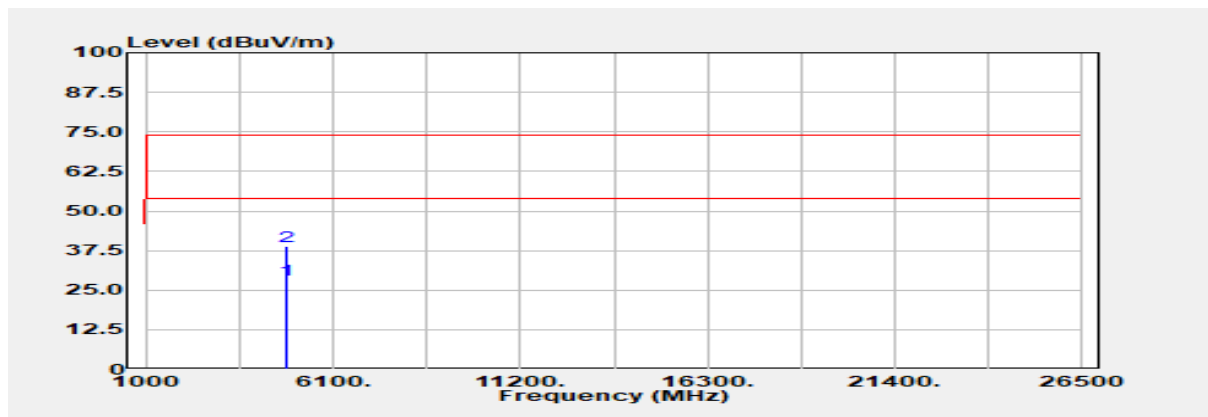
Temp./Humi. :20.5/69

Test Mode :TX CH LOW

Antenna Pol. :Horizontal

EUT Pol :NB Plan

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
4804.000	Average	31.33	-3.03	28.30	54.00	-25.70
4804.000	Peak	41.73	-3.03	38.69	74.00	-35.31

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Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 1M

Test Date :2021-03-05

Test Frequency :2440 MHz

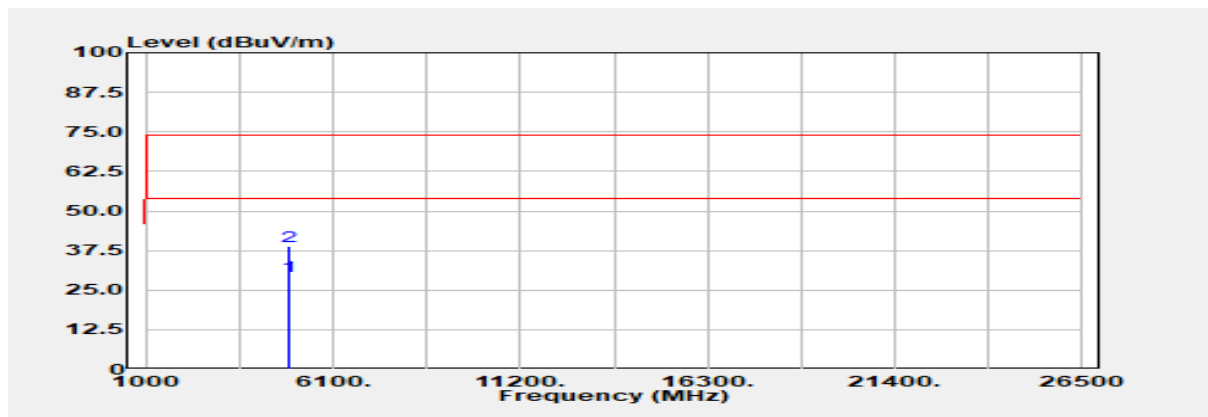
Temp./Humi. :20.5/69

Test Mode :TX CH MID

Antenna Pol. :Vertical

EUT Pol :NB Plan

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
4880.000	Average	32.22	-2.87	29.35	54.00	-24.65
4880.000	Peak	41.67	-2.87	38.80	74.00	-35.20

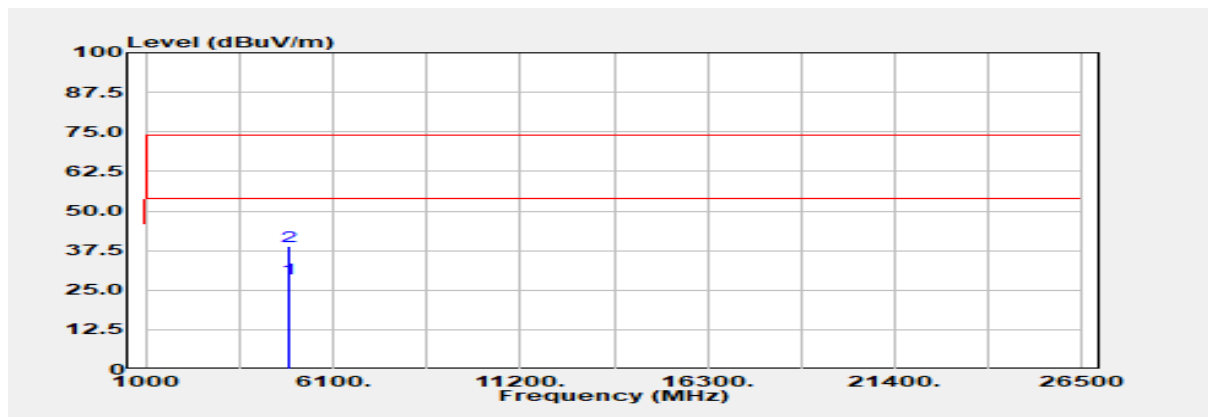
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Report Number :E2/2021/10090
 Operation Mode :BLE 1M
 Test Frequency :2440 MHz
 Test Mode :TX CH MID
 EUT Pol :NB Plan

Test Site :966 Chamber D
 Test Date :2021-03-05
 Temp./Humi. :20.5/69
 Antenna Pol. :Horizontal
 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
4880.000	Average	31.57	-2.87	28.71	54.00	-25.29
4880.000	Peak	41.90	-2.87	39.04	74.00	-34.96

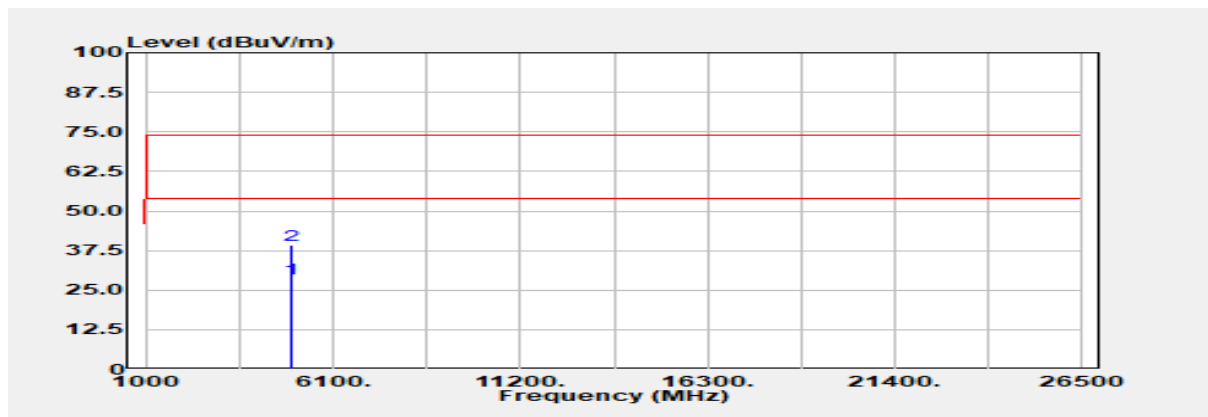
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Report Number :E2/2021/10090
 Operation Mode :BLE 1M
 Test Frequency :2480 MHz
 Test Mode :TX CH HIGH
 EUT Pol :NB Plan

Test Site :966 Chamber D
 Test Date :2021-03-05
 Temp./Humi. :20.5/69
 Antenna Pol. :Vertical
 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
4960.000	Average	31.44	-2.89	28.55	54.00	-25.45
4960.000	Peak	42.19	-2.89	39.30	74.00	-34.70

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Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 1M

Test Date :2021-03-05

Test Frequency :2480 MHz

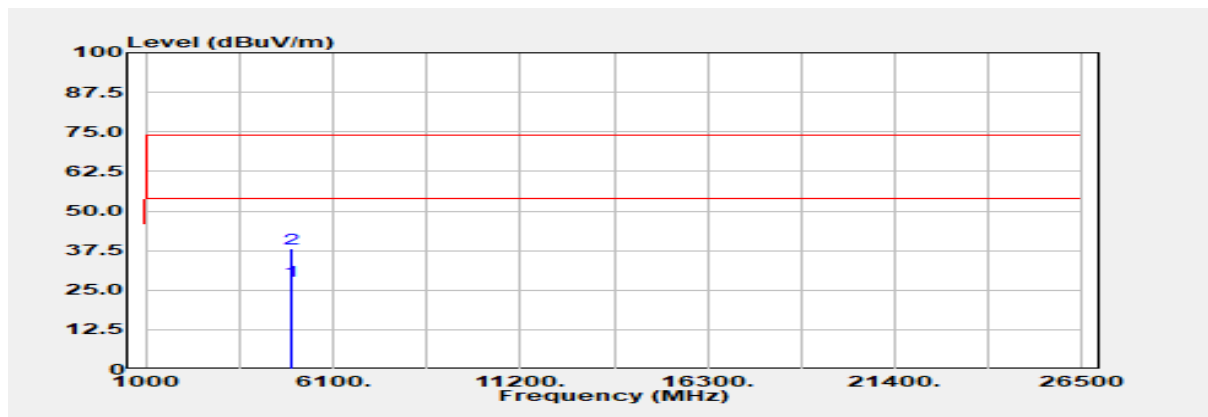
Temp./Humi. :20.5/69

Test Mode :TX CH HIGH

Antenna Pol. :Horizontal

EUT Pol :NB Plan

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
4960.000	Average	30.64	-2.89	27.75	54.00	-26.25
4960.000	Peak	40.99	-2.89	38.09	74.00	-35.91

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BLE 2M

Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 2M

Test Date :2021-03-29

Test Frequency :2402 MHz

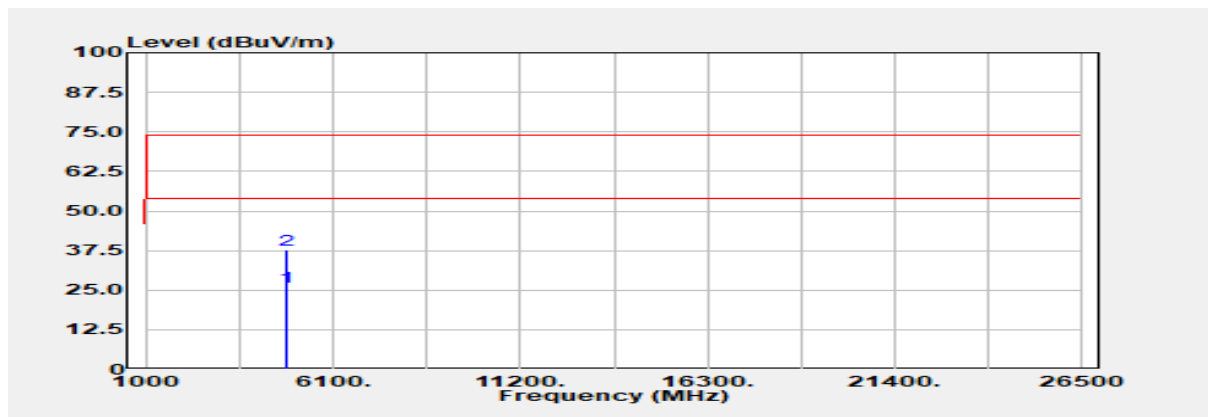
Temp./Humi. :22.8/60

Test Mode :TX CH LOW

Antenna Pol. :Vertical

EUT Pol :NB Plan

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	28.96	-3.03	25.92	54.00	-28.08
4804.000	Peak	40.92	-3.03	37.89	74.00	-36.11

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Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 2M

Test Date :2021-03-29

Test Frequency :2402 MHz

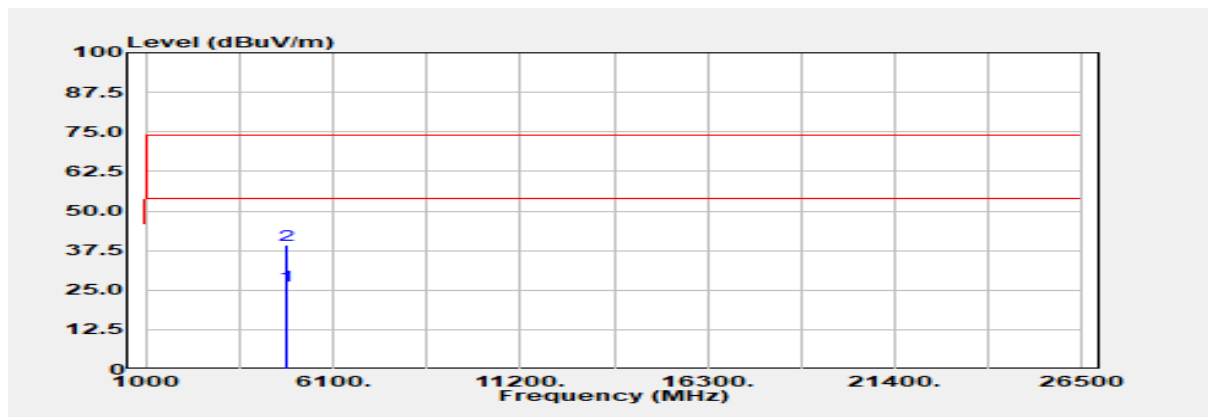
Temp./Humi. :22.8/60

Test Mode :TX CH LOW

Antenna Pol. :Horizontal

EUT Pol :NB Plan

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	29.58	-3.03	26.55	54.00	-27.45
4804.000	Peak	42.31	-3.03	39.27	74.00	-34.73

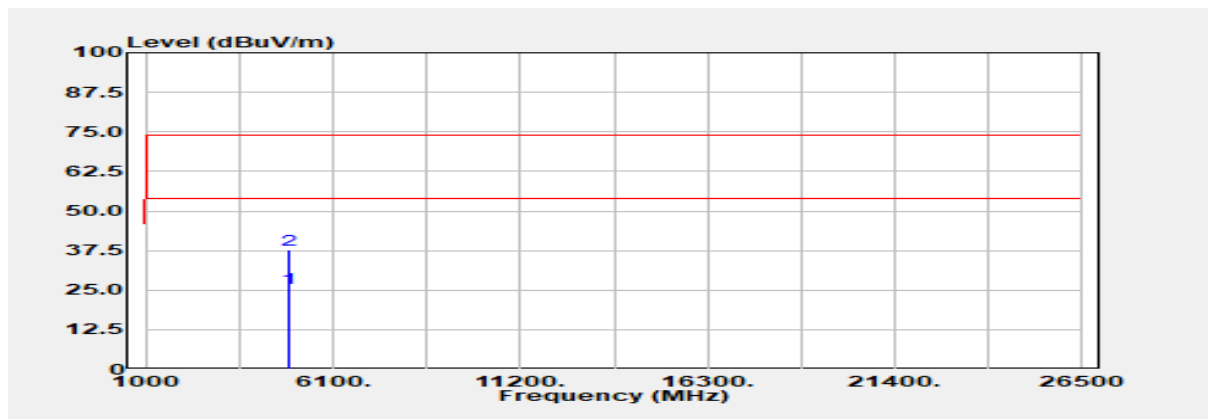
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Report Number :E2/2021/10090
 Operation Mode :BLE 2M
 Test Frequency :2441 MHz
 Test Mode :TX CH MID
 EUT Pol :NB Plan

Test Site :966 Chamber D
 Test Date :2021-03-29
 Temp./Humi. :22.8/60
 Antenna Pol. :Vertical
 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
4882.000	Average	28.58	-3.02	25.56	54.00	-28.44
4882.000	Peak	40.84	-3.02	37.82	74.00	-36.18

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Report Number :E2/2021/10090

Test Site :966 Chamber D

Operation Mode :BLE 2M

Test Date :2021-03-29

Test Frequency :2441 MHz

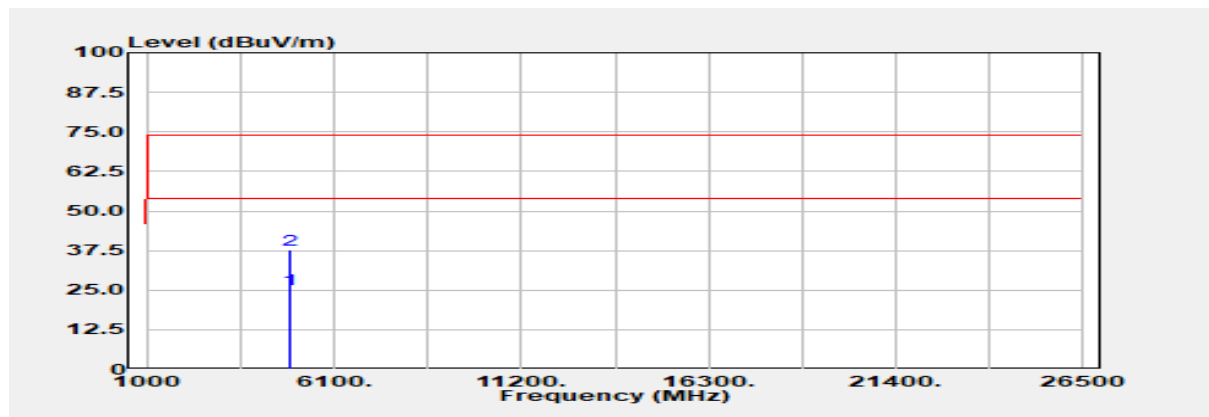
Temp./Humi. :22.8/60

Test Mode :TX CH MID

Antenna Pol. :Horizontal

EUT Pol :NB Plan

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
4882.000	Average	28.49	-3.02	25.47	54.00	-28.53
4882.000	Peak	40.72	-3.02	37.70	74.00	-36.30

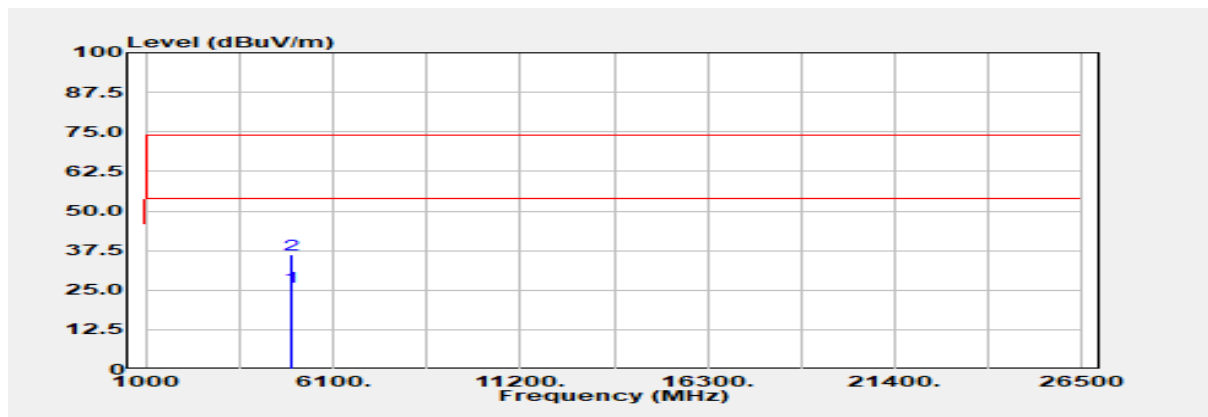
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Report Number :E2/2021/10090
 Operation Mode :BLE 2M
 Test Frequency :2480 MHz
 Test Mode :TX CH HIGH
 EUT Pol :NB Plan

Test Site :966 Chamber D
 Test Date :2021-03-29
 Temp./Humi. :22.8/60
 Antenna Pol. :Vertical
 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	28.98	-2.89	26.09	54.00	-27.91
4960.000	Peak	39.20	-2.89	36.31	74.00	-37.69

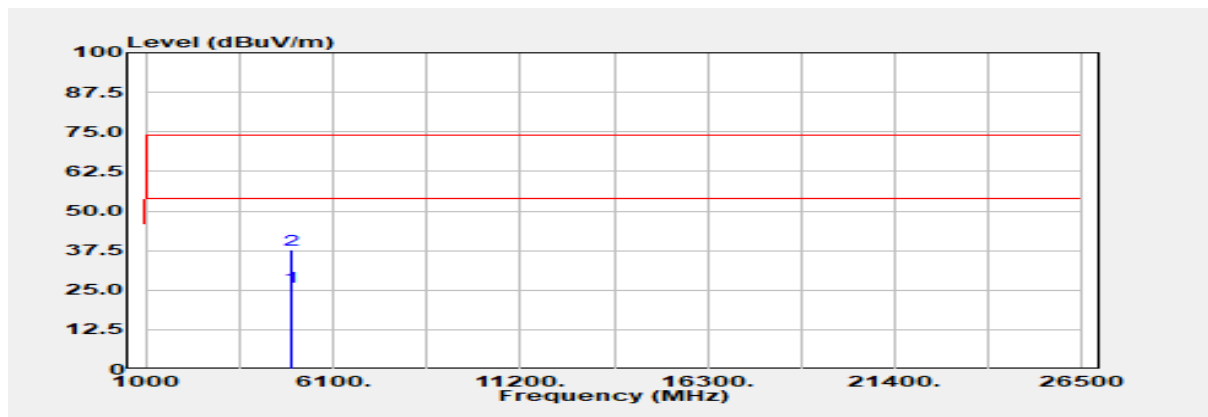
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Report Number :E2/2021/10090
Operation Mode :BLE 2M
Test Frequency :2480 MHz
Test Mode :TX CH HIGH
EUT Pol :NB Plan

Test Site :966 Chamber D
Test Date :2021-03-29
Temp./Humi. :22.8/60
Antenna Pol. :Horizontal
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
4960.000	Average	29.05	-2.89	26.16	54.00	-27.84
4960.000	Peak	40.75	-2.89	37.86	74.00	-36.14

~ End of Report ~

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