

ELECTROMAGNETIC EMISSIONS
COMPLIANCE REPORT

Applicant: HP Inc.
1501 Page Mill Road Palo Alto, California 94304, U.S.
Manufacturer: HP Inc.
1501 Page Mill Road Palo Alto, California 94304, U.S.
Product Name: Embedded HyperX Wireless Module
Brand Name: HP
Model No.: TPN-M101D
Report Number: TERF2310002475ER
FCC ID B94TNM101D
Date of EUT Received: Sep. 22, 2023
Date of Test: Oct. 03, 2023~Oct. 04, 2023
Issue Date: Nov. 07, 2023

Approved By

Jim Chang

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.

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
TERF2310002475ER	00	Original.	Nov. 07, 2023	Yami Kuo	

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Embedded HyperX Wireless Module
Brand Name:	HP
Model No.:	TPN-M101D
Product Name of Host:	Notebook PC
Brand Name of Host:	HP
Model No. of Host:	TPN-Q297
Hardware Version:	N/A
Firmware Version:	V4103
EUT Series No.:	A5CD333LGTJ
Power Supply:	5 / 9 / 12 / 15 / 20 / 28 Vdc from AC/DC Adapter or 11.58Vdc from Rechargeable Li-Polymer Battery
Test Software (Name/Version)	Airoha Tool Kit/3.5.4

1.2 RF Specification

Radio Technology:	BLE
Frequency Range:	2402 – 2480MHz
Channel number:	40 channels
Modulation type:	GFSK
Transmit Power:	BLE 1M: 6.06 dBm BLE 2M: 6.06 dBm

1.3 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
PIFA	Vendor 1	DQ6915G0900 (81ELA915.G09)	2402 – 2480	-0.80

Note:

1. Antenna information is provided by the applicant.

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1.4 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

ANSI C63.10:2013

1.5 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designa- tion 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 2		
		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.

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1.6 Special Accessories

There are no special accessories used while test was conducted.

1.7 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 Emissions

The EUT is placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50 μ H/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 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.

2.3.3 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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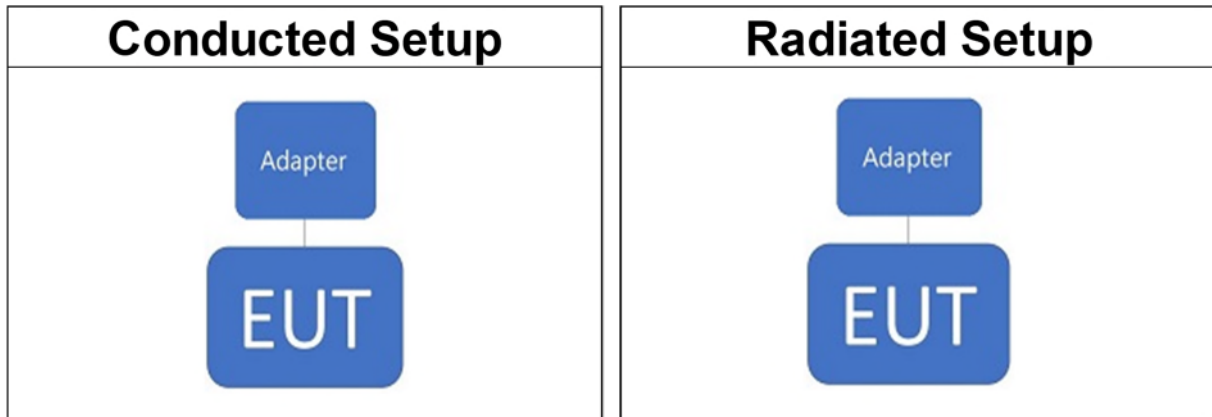
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2.5 Test Configuration



2.6 Control Unit(s)

Conducted Emission Test Site: Conducted 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Adapter	Lite On	TPN-LA29	N/A	N/A	N/A

Radiated Emission Test Site: SAC 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Adapter	Lite On	TPN-LA29	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(d) §15.205 §15.209	Radiated Band Edge and Spurious Emission	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY
0	2402 MHz	14	2430 MHz	28	2458 MHz
1	2404 MHz	15	2432 MHz	29	2460 MHz
2	2406 MHz	16	2434 MHz	30	2462 MHz
3	2408 MHz	17	2436 MHz	31	2464 MHz
4	2410 MHz	18	2438 MHz	32	2466 MHz
5	2412 MHz	19	2440 MHz	33	2468 MHz
6	2414 MHz	20	2442 MHz	34	2470 MHz
7	2416MHz	21	2444 MHz	35	2472 MHz
8	2418 MHz	22	2446 MHz	36	2474 MHz
9	2420 MHz	23	2448 MHz	37	2476 MHz
10	2422 MHz	24	2450 MHz	38	2478 MHz
11	2424 MHz	25	2452 MHz	39	2480 MHz
12	2426 MHz	26	2454 MHz		
13	2428 MHz	27	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 the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.
4. Investigation has been done on all the possible configurations for searching the worst case.

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CONDUCTED TEST				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
Bluetooth LE	0 to 39	0,20,39	GFSK	1
Bluetooth LE	0 to 39	0,20,39	GFSK	2

TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
Bluetooth LE	0 to 39	20	GFSK	1
TRANSMIT 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
Bluetooth LE	0 to 39	0,20,39	GFSK	2

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.32 dB
Output Power measurement	+/- 1 dB
Emission Bandwidth	+/- 1.53 Hz
Undesignable radiated emission measurement	+/- 1.68 dB
Peak Power Density	+/- 2.16 dB
Temperature	+/- 0.7 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/- 2.8 dB	9kHz~30MHz	
	+/- 4.82 dB	30MHz - 1000MHz	
	+/- 4.37 dB	1GHz - 18GHz	
	+/- 4.21 dB	18GHz - 40GHz	
Polarization: Horizontal	+/- 2.8 dB	9kHz~30MHz	
	+/- 4.54 dB	30MHz - 1000MHz	
	+/- 4.37 dB	1GHz - 18GHz	
	+/- 4.21 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 MEASUREMENT EQUIPMENT USED

6.1 Conducted Measurement

Conducted Emission Test Site: Conducted 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY59071571	06/07/2023	06/06/2024
Test Software	SGS	Radio Test Software	Ver. 21	N.C.R	N.C.R
Power Meter	Anritsu	ML2496A	1242004	10/26/2022	10/25/2023
Power Sensor	Anritsu	MA2411B	1207365	10/26/2022	10/25/2023
Power Sensor	Anritsu	MA2411B	1207368	10/26/2022	10/25/2023
DC Block	Mini-Circuits	BLK-18-S+	1	12/13/2022	12/12/2023

6.2 Radiated Measurement

Radiated Emission Test Site: SAC 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Loop Antenna	ETS.LINDGREN	6502	0014303	05/23/2023	05/22/2024
Horn Antenna	RF SPIN	DRH0844	LE2D05A0844	07/03/2023	07/02/2024
Horn Antenna	SCHWARZBECK	BBHA9120D	D803	12/30/2022	12/29/2023
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	12/27/2022	12/26/2023
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY60242081	10/06/2022	10/05/2023
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R
EMI Test Receiver	R&S	ESR 7	102525	02/18/2023	02/17/2024
Site Cal	SGS	SAC 1	N/A	08/31/2023	08/30/2024
Pre-Amplifier	EMCI	EMC184045B	980135	08/31/2023	08/30/2024
Pre-Amplifier	HP	8447D	2944A09469	08/31/2023	08/30/2024
Pre-Amplifier	EMCI	EMC118A45SEE	980933	07/31/2023	07/30/2024
Bandreject Filter 2400-2483.5	EWT	EWT-14-0166	M1	12/13/2022	12/12/2023
4GHz High Pass Filter	WI	WHKX4.0/18G-10SS	22	12/13/2022	12/12/2023
Coaxial Cables	Huber Suhner	SUCOFLEX 102	RX Cable 18G-40G MY2630/2+805062/2	08/31/2023	08/30/2024
Coaxial Cable	EMCI	EMC104-SM-SM-8000+EMC106-SM-SM-7600	RX Cable 9K-18G(160125+150817)	09/12/2023	09/11/2024

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

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7 PEAK OUTPUT POWER MEASUREMENT

7.1 Standard Applicable:

7.1.1 Duty Cycle

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

7.1.2 FCC

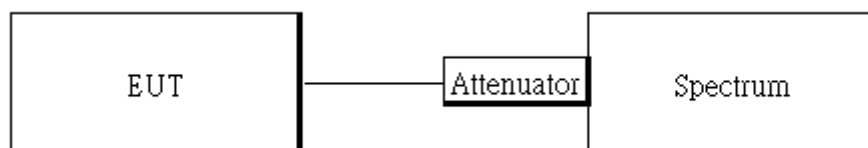
For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

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.

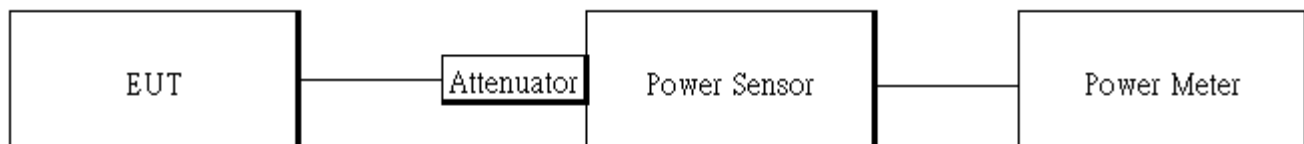
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

7.2 Test Setup

7.2.1 Duty Cycle



7.2.2 Output Power



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7.3 Measurement Procedure:

7.3.1 Duty Cycle

1. Place the EUT on the table and set it in transmitting mode.
2. Set span = Zero
3. RBW = 8MHz, VBW = 8MHz,
4. Detector = Peak

7.3.2 Output Power

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.

7.4 Duty Factor:

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
BLE 1M	60.80	2.16	2.63	3.00
BLE 2M	31.20	5.06	5.13	6.00

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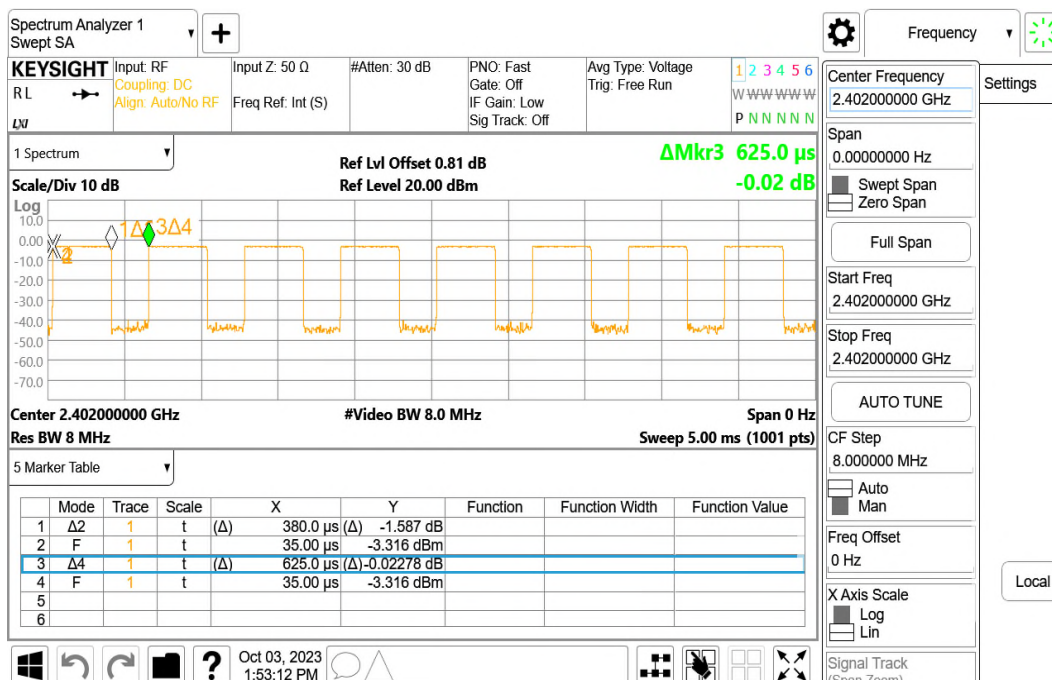
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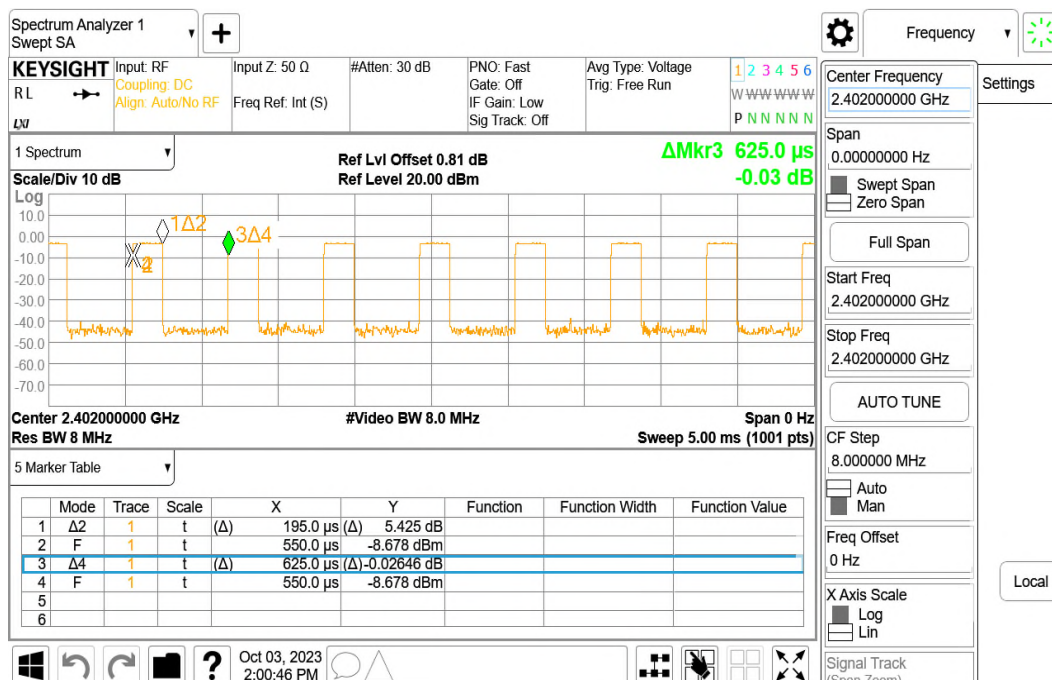
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BLE_1M_LowCH00-2402



BLE_2M_LowCH00-2402



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7.5 Output Power:

7.5.1 Peak & Avg

BLE 1M mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	2402	49	6.06	30
Mid	2442	49	5.99	30
High	2480	49	5.91	30
CH	Frequency (MHz)	Power set	Avg. Output Power (dBm)	Required Limit (dBm)
Low	2402	49	5.93	30
Mid	2442	49	5.86	30
High	2480	49	5.78	30

***Note:**

1.Measured by power meter, cable loss 0.81 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

BLE 2M mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	2402	49	6.06	30
Mid	2442	49	6.01	30
High	2480	49	5.92	30
CH	Frequency (MHz)	Power set	Avg. Output Power (dBm)	Required Limit (dBm)
Low	2402	49	5.93	30
Mid	2442	49	5.85	30
High	2480	49	5.78	30

***Note:**

1.Measured by power meter, cable loss dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

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8 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

8.1 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.

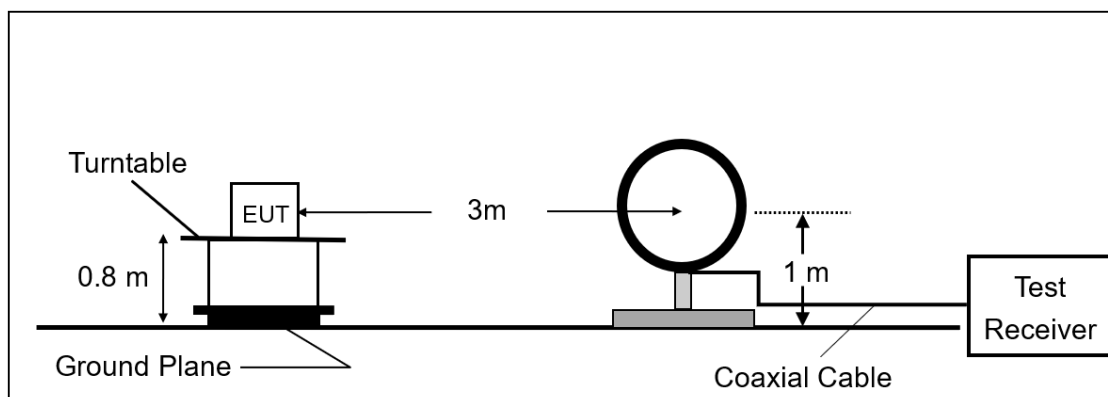
And according to §15.33(a) (1) for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

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: The lower limit shall apply at the transition frequencies.

8.2 Test Setup

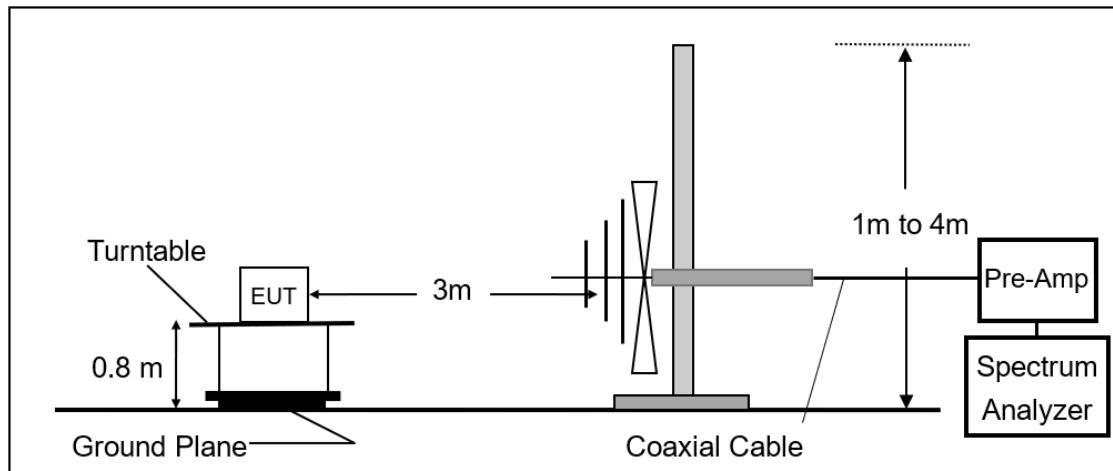
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



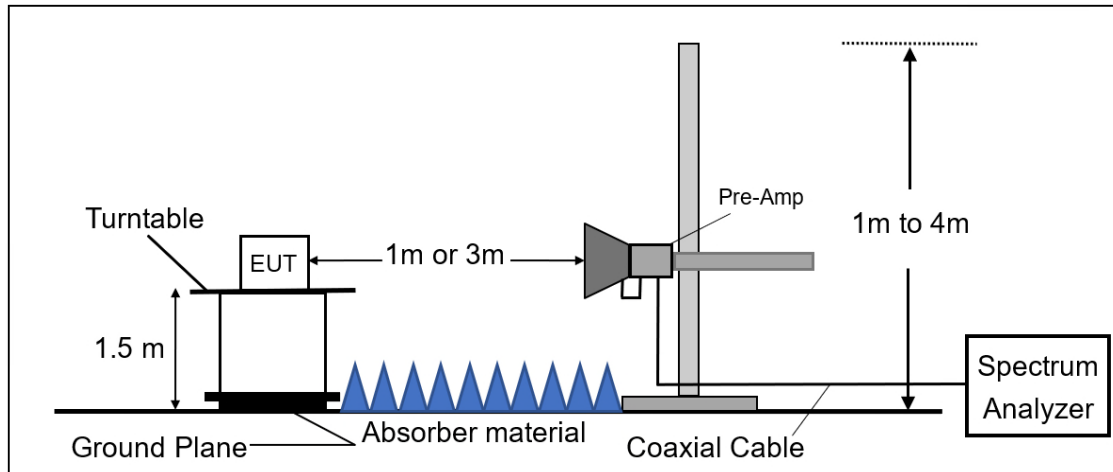
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(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



(C) Radiated Emission Test Set-Up, Frequency Above 1GHz.



8.3 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.

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7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Maximum Emission Measurements 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 Emission Measurements 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.
12. Repeat above procedures until all default test channel measured were complete.

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

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

8.5 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) was not reported.

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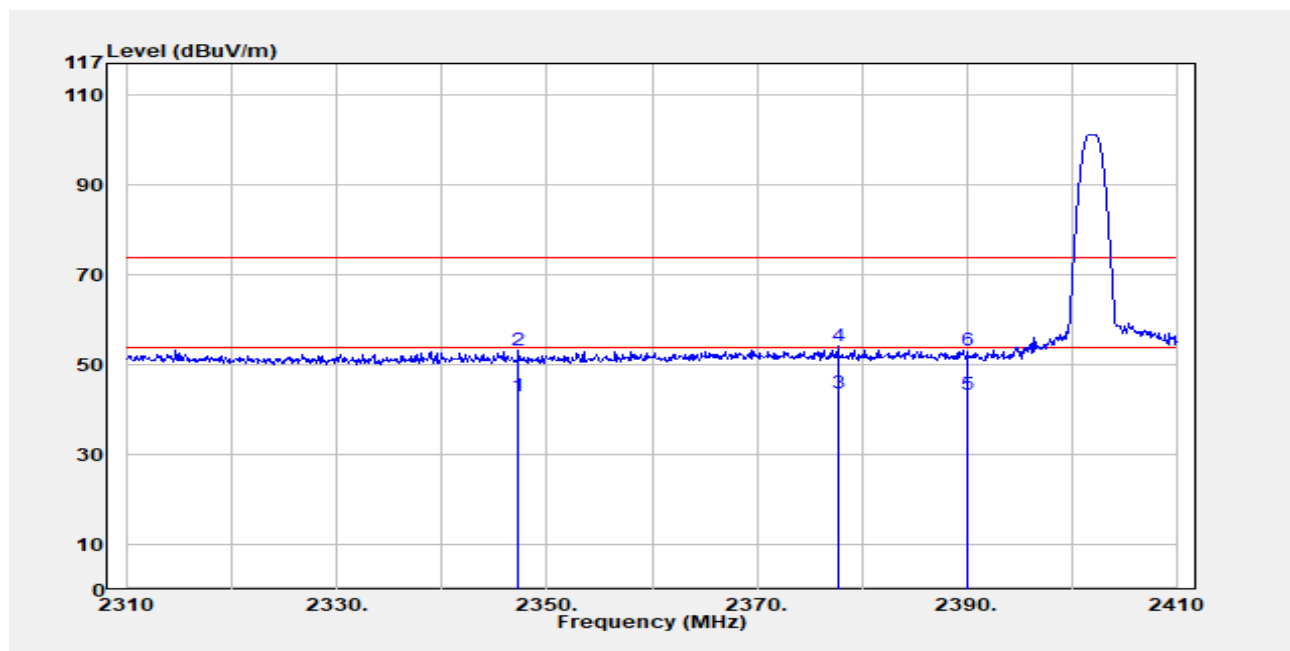
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8.6 Measurement Result:

8.6.1 Radiated Band Edge Measurement Result

Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2402 MHz
 Test Mode :Bandedge
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Vertical
 Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2347.30	Average	45.57	-2.43	43.14	54.00	-10.86
2347.30	Peak	55.73	-2.43	53.31	74.00	-20.69
2377.70	Average	46.32	-2.55	43.77	54.00	-10.23
2377.70	Peak	56.70	-2.55	54.15	74.00	-19.85
2390.00	Average	46.16	-2.60	43.56	54.00	-10.44
2390.00	Peak	55.96	-2.60	53.36	74.00	-20.64

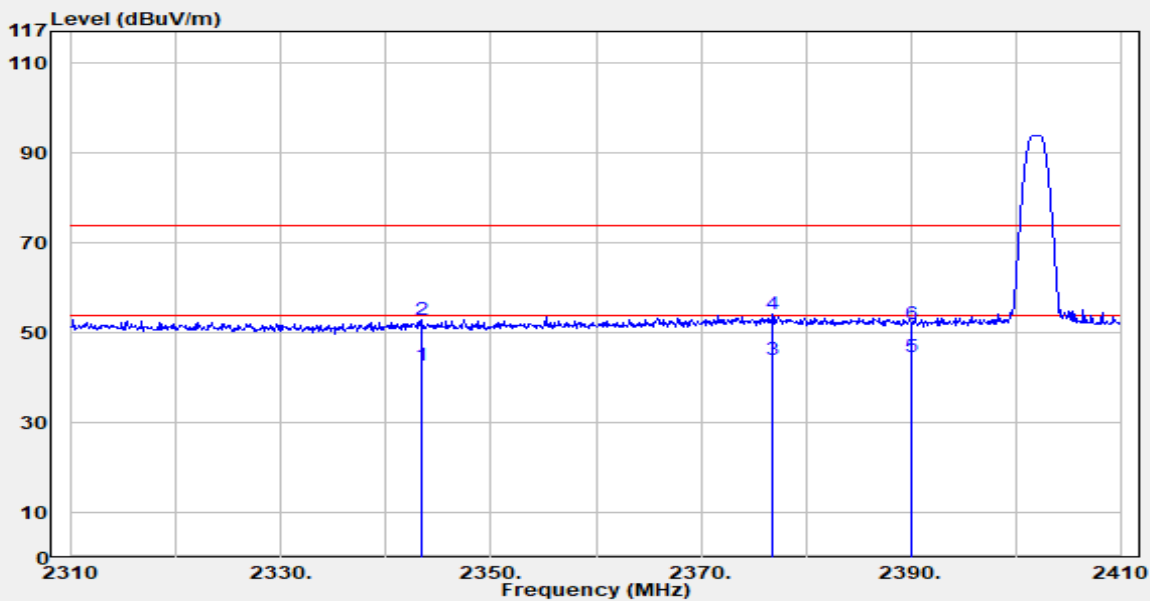
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Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2402 MHz
 Test Mode :Bandedge
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



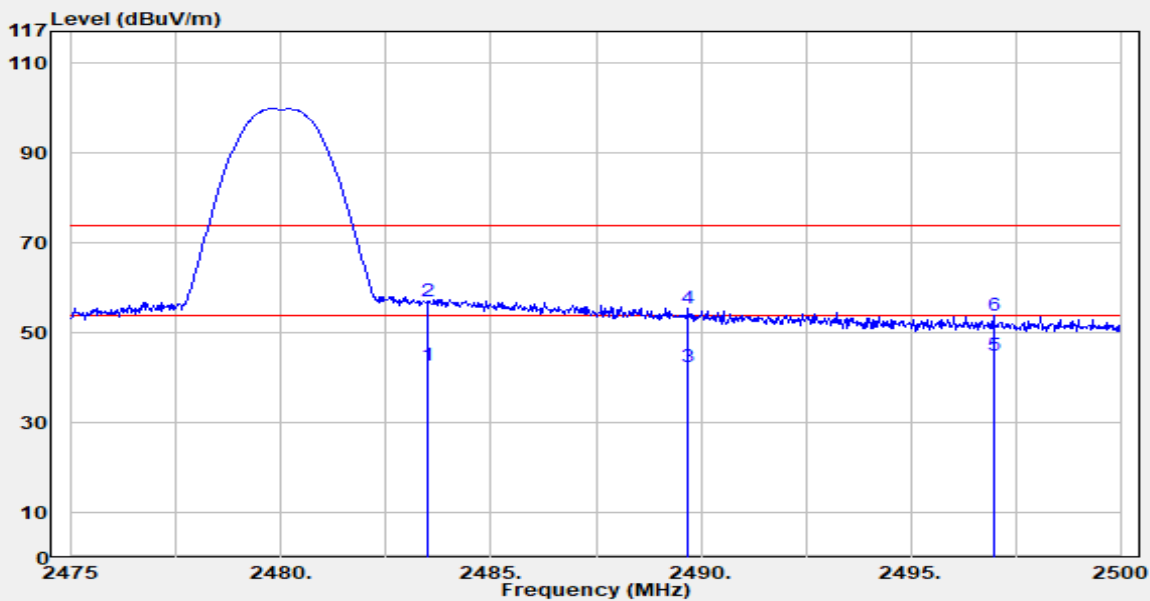
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2343.30	Average	45.33	-2.42	42.91	54.00	-11.09
2343.30	Peak	55.28	-2.42	52.86	74.00	-21.14
2376.90	Average	46.59	-2.54	44.05	54.00	-9.95
2376.90	Peak	56.73	-2.54	54.19	74.00	-19.81
2390.00	Average	47.39	-2.60	44.79	54.00	-9.21
2390.00	Peak	54.73	-2.60	52.13	74.00	-21.87

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Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2480 MHz
 Test Mode :Bandedge
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Vertical
 Engineer :WJ Lin



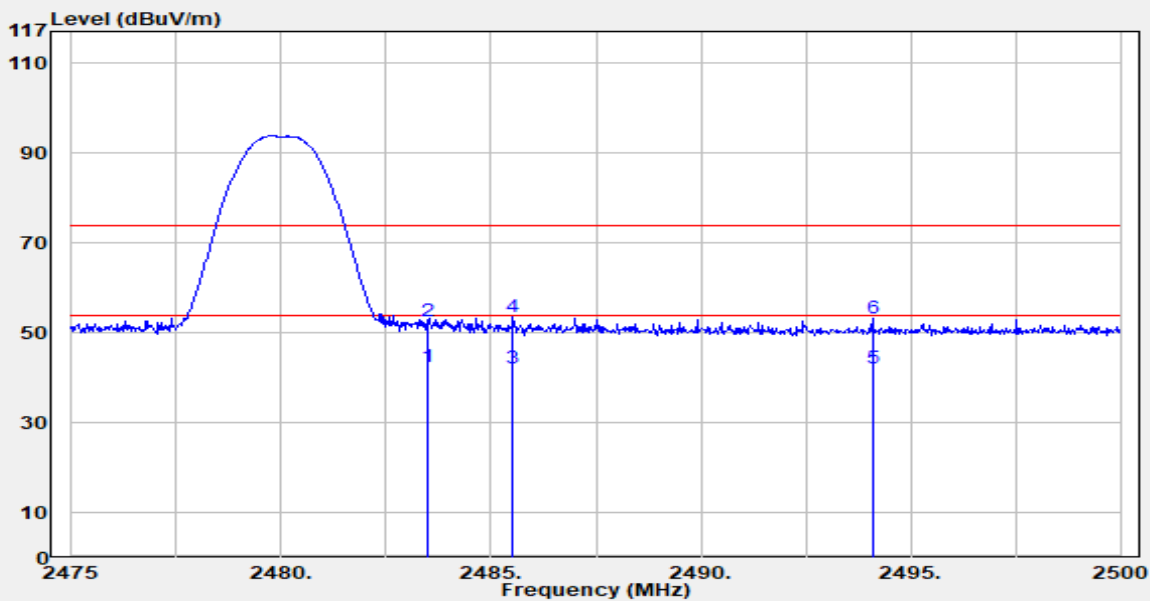
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	45.32	-2.58	42.74	54.00	-11.26
2483.50	Peak	59.55	-2.58	56.97	74.00	-17.03
2489.70	Average	45.05	-2.55	42.50	54.00	-11.50
2489.70	Peak	58.10	-2.55	55.55	74.00	-18.45
2496.98	Average	47.52	-2.51	45.01	54.00	-8.99
2496.98	Peak	56.55	-2.51	54.04	74.00	-19.96

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Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2480 MHz
 Test Mode :Bandedge
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



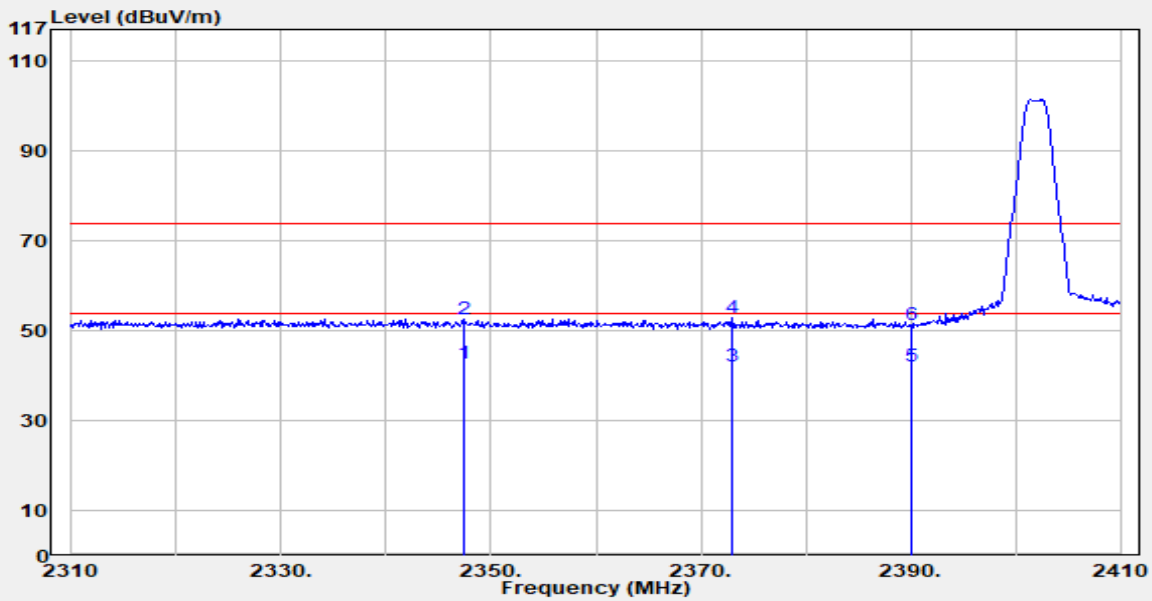
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	44.99	-2.58	42.41	54.00	-11.59
2483.50	Peak	55.08	-2.58	52.50	74.00	-21.50
2485.53	Average	44.70	-2.57	42.13	54.00	-11.87
2485.53	Peak	56.21	-2.57	53.64	74.00	-20.36
2494.10	Average	44.57	-2.52	42.05	54.00	-11.95
2494.10	Peak	55.78	-2.52	53.26	74.00	-20.74

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Report Number :TERF2310002475ER
 Operation Mode :BLE 2M
 Test Frequency :2402 MHz
 Test Mode :Bandedge
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Vertical
 Engineer :WJ Lin



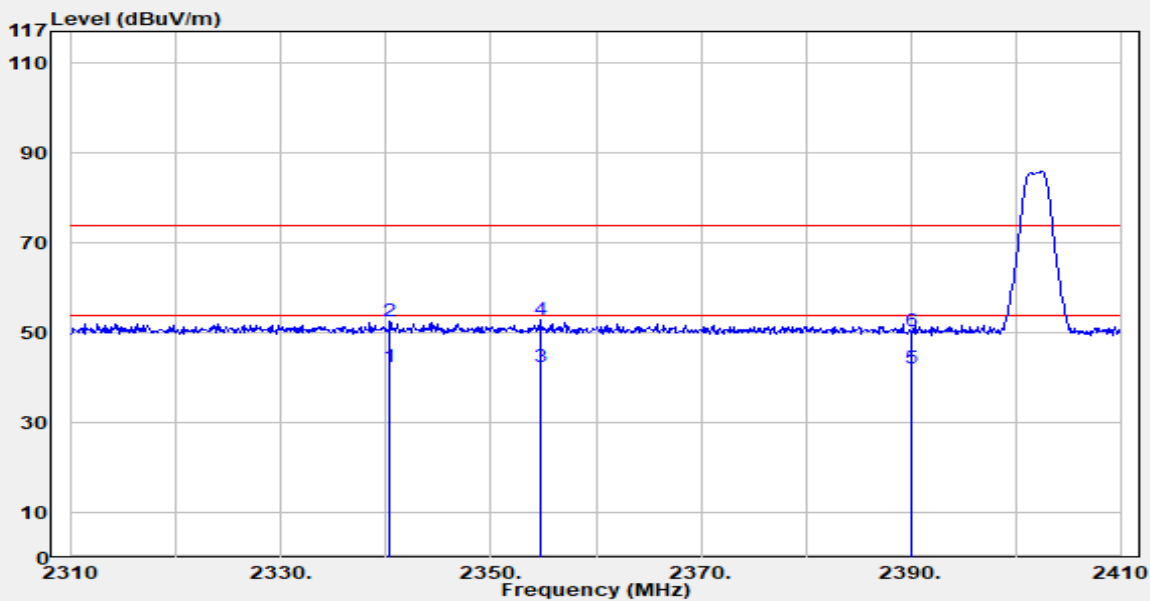
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2347.40	Average	45.09	-2.43	42.66	54.00	-11.34
2347.40	Peak	55.19	-2.43	52.76	74.00	-21.24
2372.90	Average	44.85	-2.53	42.32	54.00	-11.68
2372.90	Peak	55.35	-2.53	52.82	74.00	-21.18
2390.00	Average	44.76	-2.60	42.16	54.00	-11.84
2390.00	Peak	53.81	-2.60	51.21	74.00	-22.79

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Report Number :TERF2310002475ER
 Operation Mode :BLE 2M
 Test Frequency :2402 MHz
 Test Mode :Bandedge
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



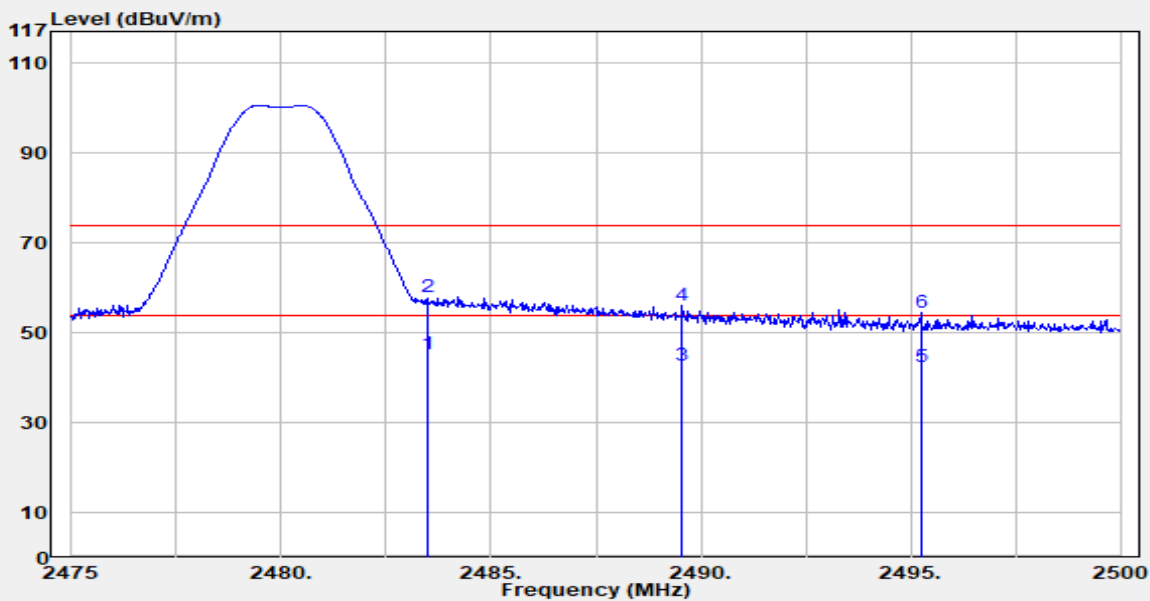
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2340.30	Average	44.89	-2.41	42.48	54.00	-11.52
2340.30	Peak	54.98	-2.41	52.57	74.00	-21.43
2354.70	Average	44.98	-2.45	42.53	54.00	-11.47
2354.70	Peak	55.38	-2.45	52.93	74.00	-21.07
2390.00	Average	44.82	-2.60	42.22	54.00	-11.78
2390.00	Peak	53.03	-2.60	50.43	74.00	-23.57

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Report Number :TERF2310002475ER
 Operation Mode :BLE 2M
 Test Frequency :2480 MHz
 Test Mode :Bandedge
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Vertical
 Engineer :WJ Lin



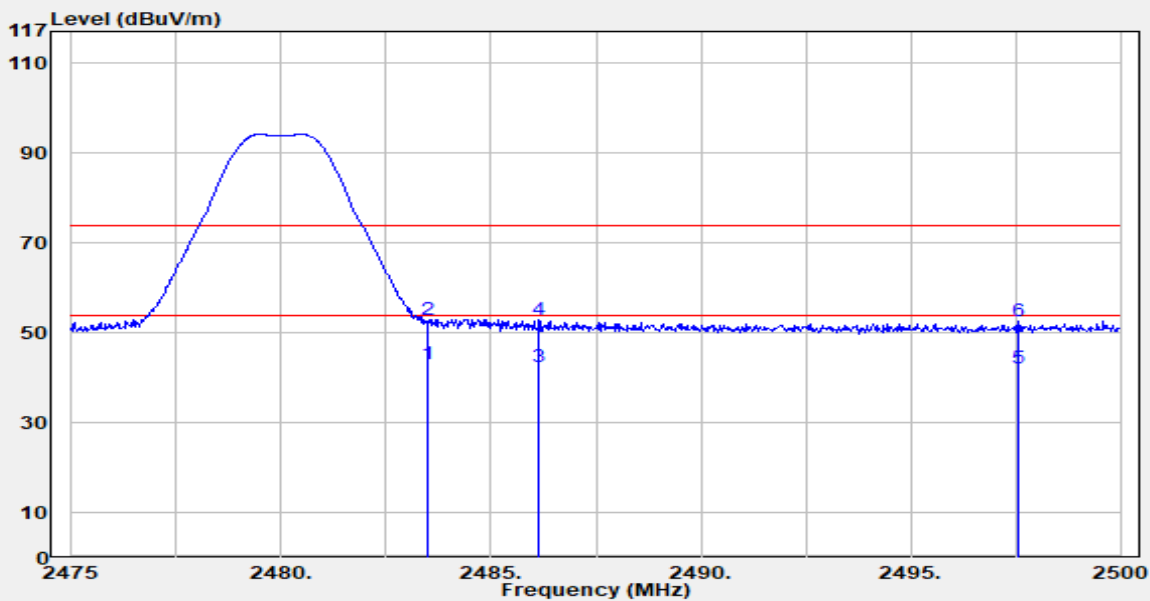
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	47.96	-2.58	45.38	54.00	-8.62
2483.50	Peak	60.48	-2.58	57.89	74.00	-16.11
2489.55	Average	45.36	-2.55	42.81	54.00	-11.19
2489.55	Peak	58.61	-2.55	56.06	74.00	-17.94
2495.25	Average	44.92	-2.52	42.40	54.00	-11.60
2495.25	Peak	56.90	-2.52	54.38	74.00	-19.62

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Report Number :TERF2310002475ER
 Operation Mode :BLE 2M
 Test Frequency :2480 MHz
 Test Mode :Bandedge
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C /62%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	45.60	-2.58	43.02	54.00	-10.98
2483.50	Peak	55.65	-2.58	53.07	74.00	-20.93
2486.15	Average	45.20	-2.57	42.63	54.00	-11.37
2486.15	Peak	55.57	-2.57	53.00	74.00	-21.00
2497.58	Average	44.76	-2.50	42.26	54.00	-11.74
2497.58	Peak	55.18	-2.50	52.68	74.00	-21.32

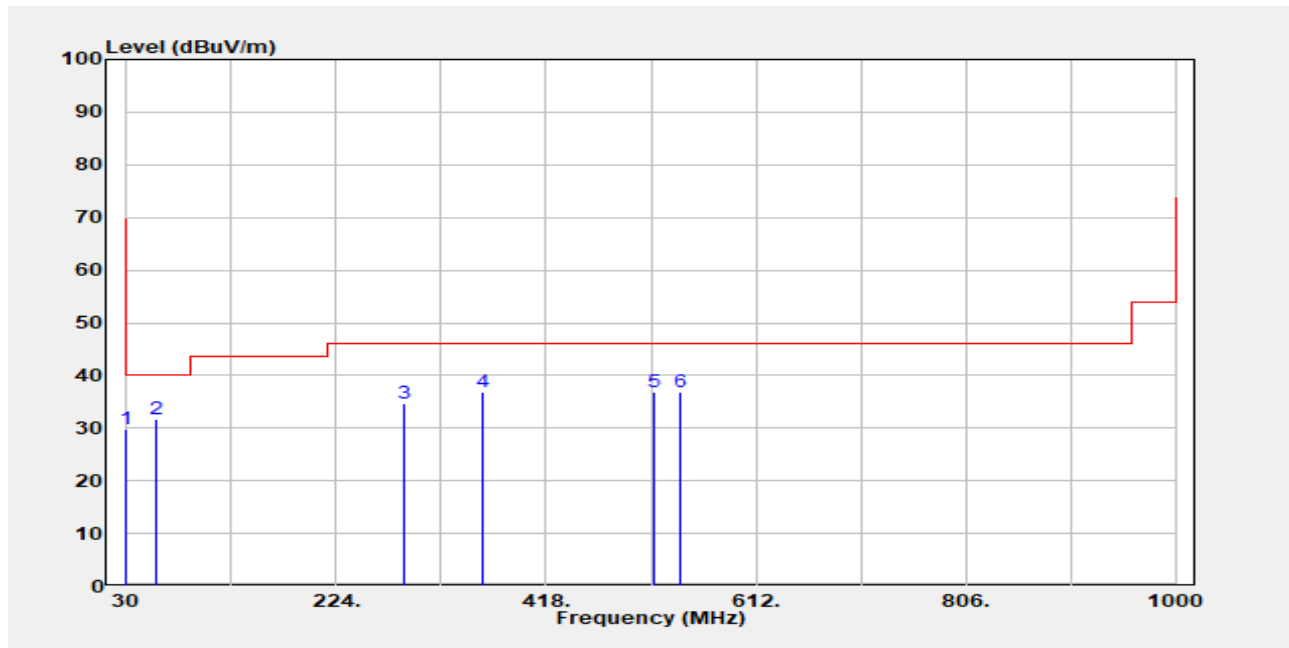
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8.6.2 Radiated Spurious Emission

Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2442 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :VERTICAL
 Engineer :WJ Lin



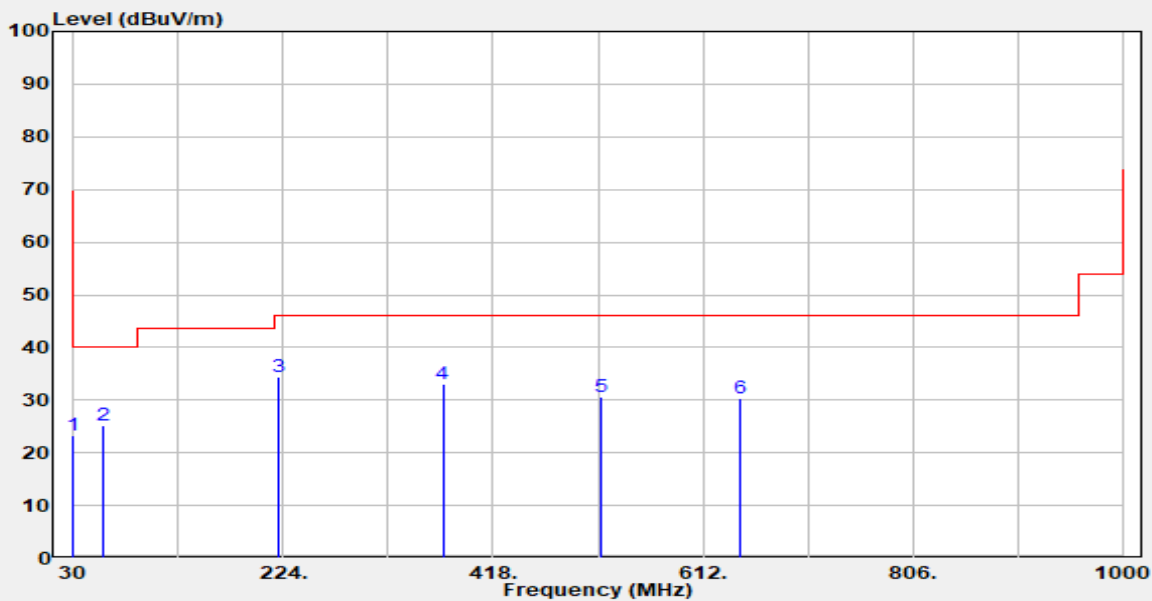
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
30.00	QP	34.99	-5.16	29.83	40.00	-10.17
57.16	Peak	49.78	-18.19	31.59	40.00	-8.41
286.08	Peak	44.15	-9.58	34.57	46.00	-11.43
359.80	Peak	44.51	-7.71	36.80	46.00	-9.20
517.91	Peak	42.46	-5.56	36.90	46.00	-9.10
542.16	Peak	41.44	-4.68	36.75	46.00	-9.25

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Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2442 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :HORIZONTAL
 Engineer :WJ Lin



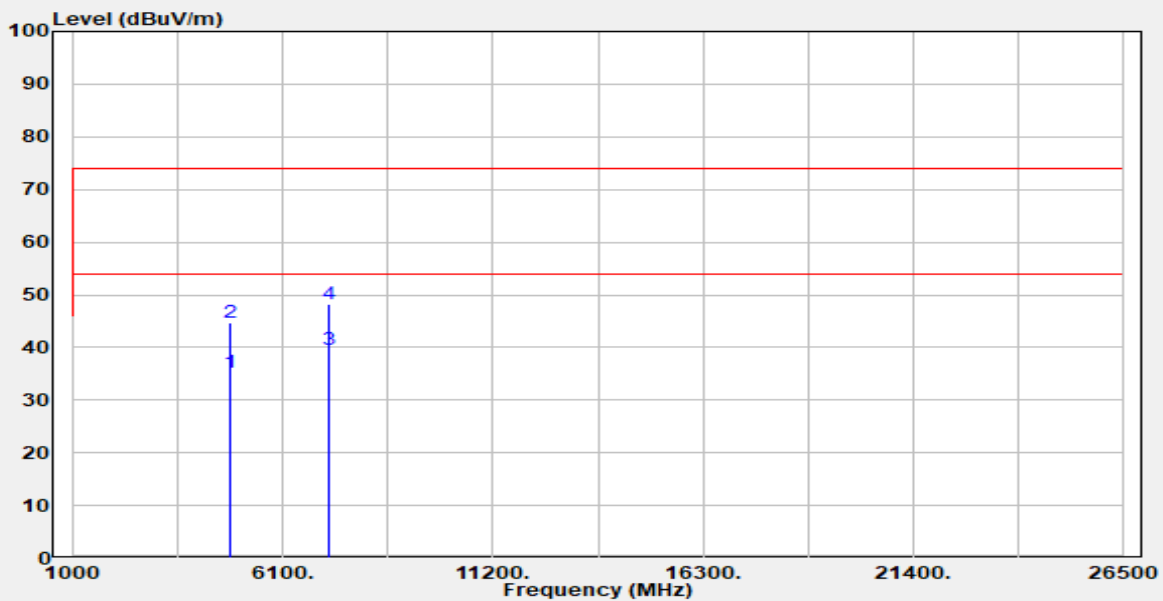
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
30.00	Peak	28.55	-5.16	23.39	40.00	-16.61
58.13	Peak	43.57	-18.50	25.07	40.00	-14.93
219.15	Peak	48.03	-13.65	34.37	46.00	-11.63
371.44	Peak	41.14	-7.95	33.20	46.00	-12.80
517.91	Peak	36.27	-5.56	30.71	46.00	-15.29
645.95	Peak	33.81	-3.55	30.26	46.00	-15.74

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Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2402 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Vertical
 Engineer :WJ Lin



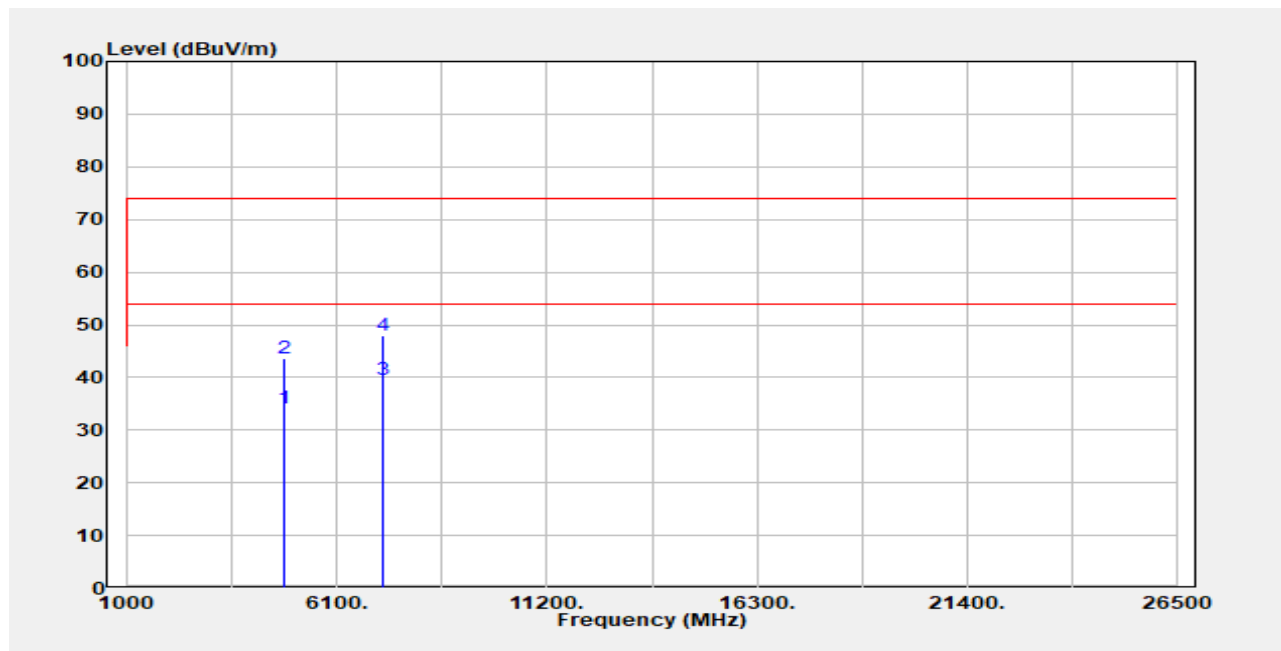
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4804.00	Average	33.57	1.58	35.15	54.00	-18.85
4804.00	Peak	43.15	1.58	44.73	74.00	-29.27
7206.00	Average	32.68	6.97	39.65	54.00	-14.35
7206.00	Peak	41.14	6.97	48.11	74.00	-25.89

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Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2402 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



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	32.46	1.58	34.04	54.00	-19.96
4804.00	Peak	42.12	1.58	43.70	74.00	-30.30
7206.00	Average	32.55	6.97	39.52	54.00	-14.48
7206.00	Peak	40.98	6.97	47.95	74.00	-26.05

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台灣檢驗科技股份有限公司

t (886-2) 2299-3279

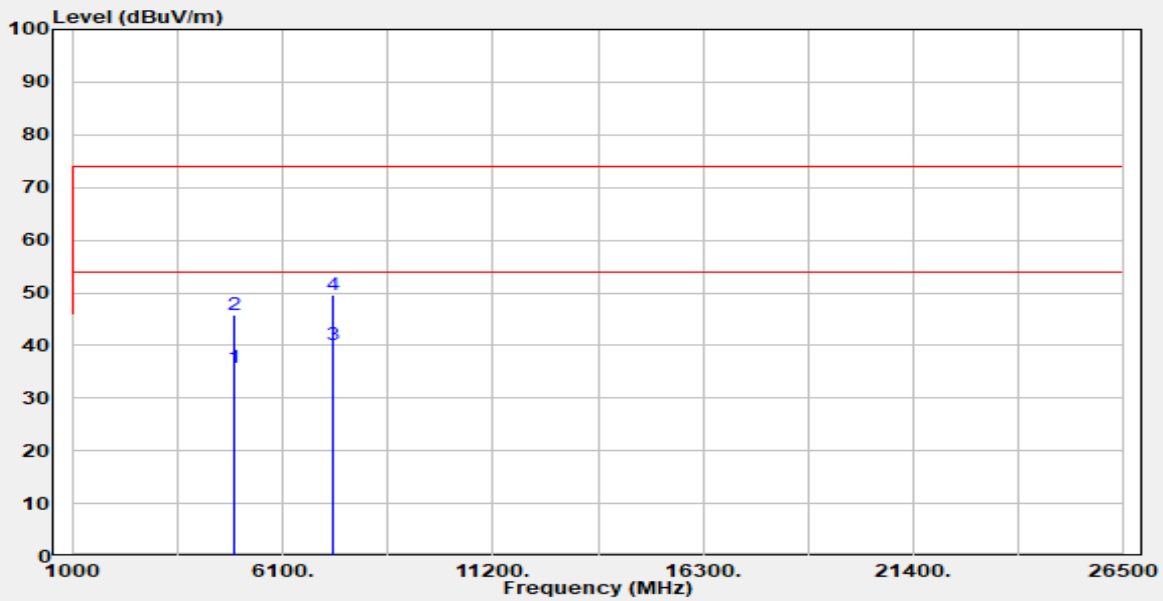
f (886-2) 2298-0488

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Member of SGS Group

Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2442 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Vertical
 Engineer :WJ Lin



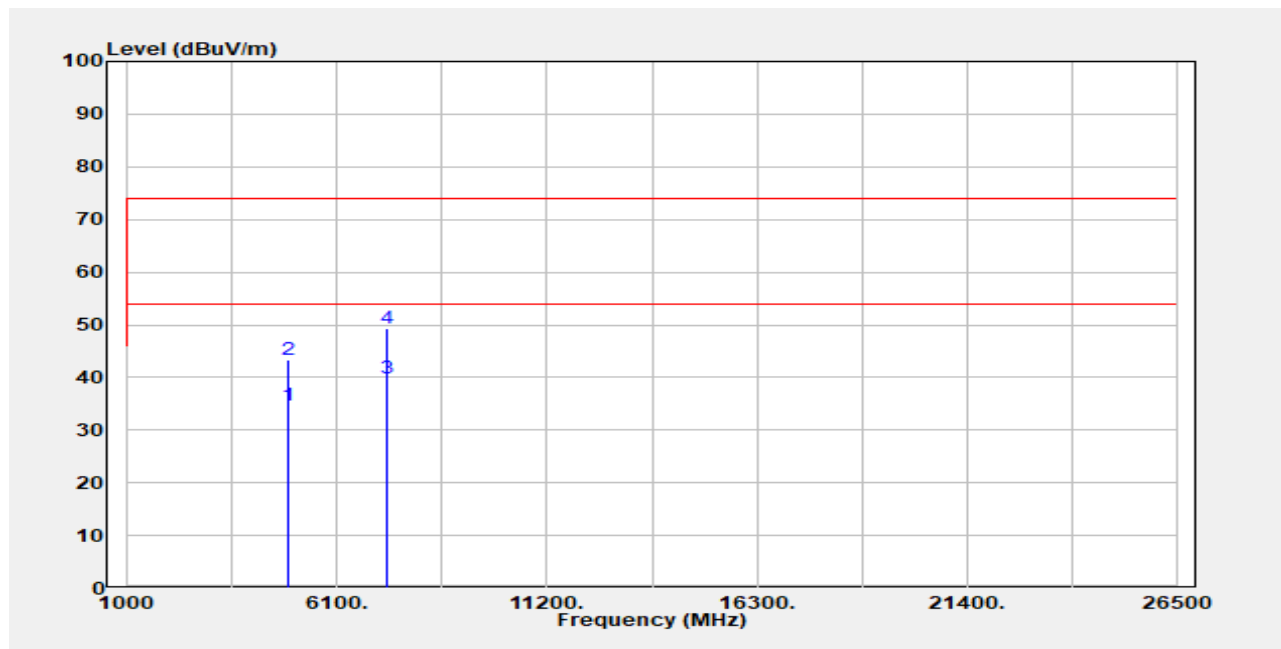
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4884.00	Average	34.01	1.69	35.70	54.00	-18.30
4884.00	Peak	44.03	1.69	45.72	74.00	-28.28
7326.00	Average	32.91	7.07	39.98	54.00	-14.02
7326.00	Peak	42.57	7.07	49.63	74.00	-24.37

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Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2442 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4884.00	Average	32.95	1.69	34.64	54.00	-19.36
4884.00	Peak	41.70	1.69	43.39	74.00	-30.61
7326.00	Average	32.82	7.07	39.89	54.00	-14.11
7326.00	Peak	42.18	7.07	49.25	74.00	-24.75

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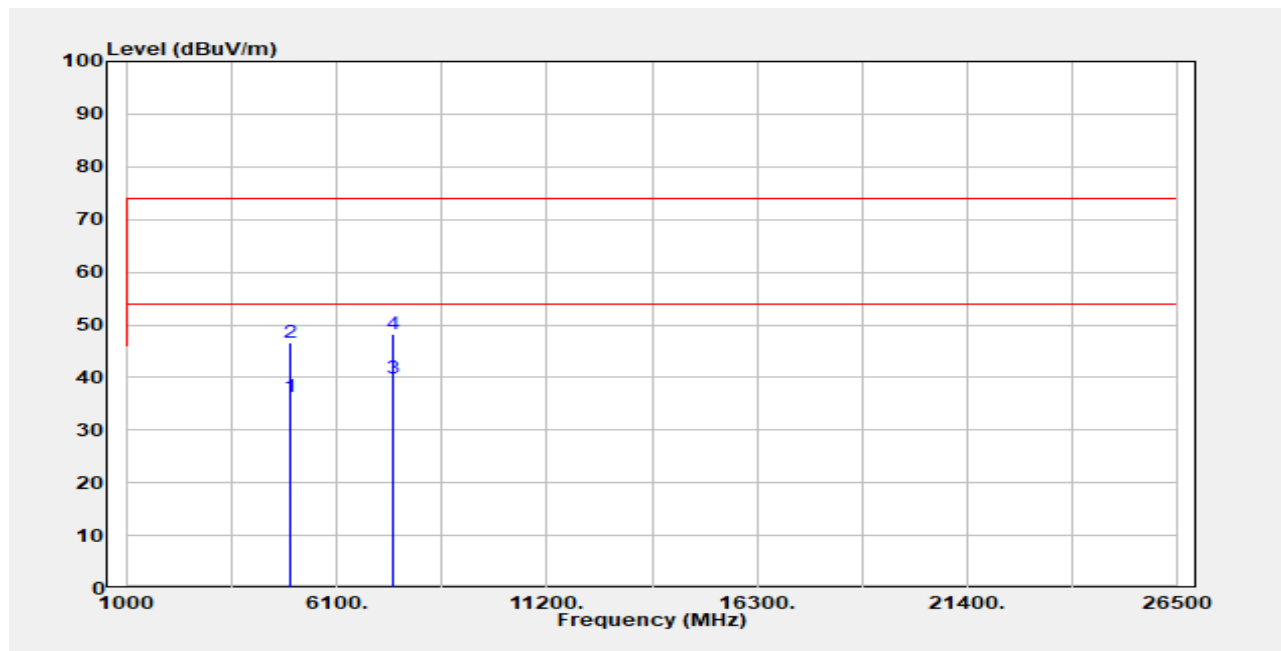
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Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2480 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Vertical
 Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4960.00	Average	34.55	1.81	36.36	54.00	-17.64
4960.00	Peak	44.89	1.81	46.70	74.00	-27.30
7440.00	Average	32.76	7.15	39.91	54.00	-14.09
7440.00	Peak	41.10	7.15	48.25	74.00	-25.75

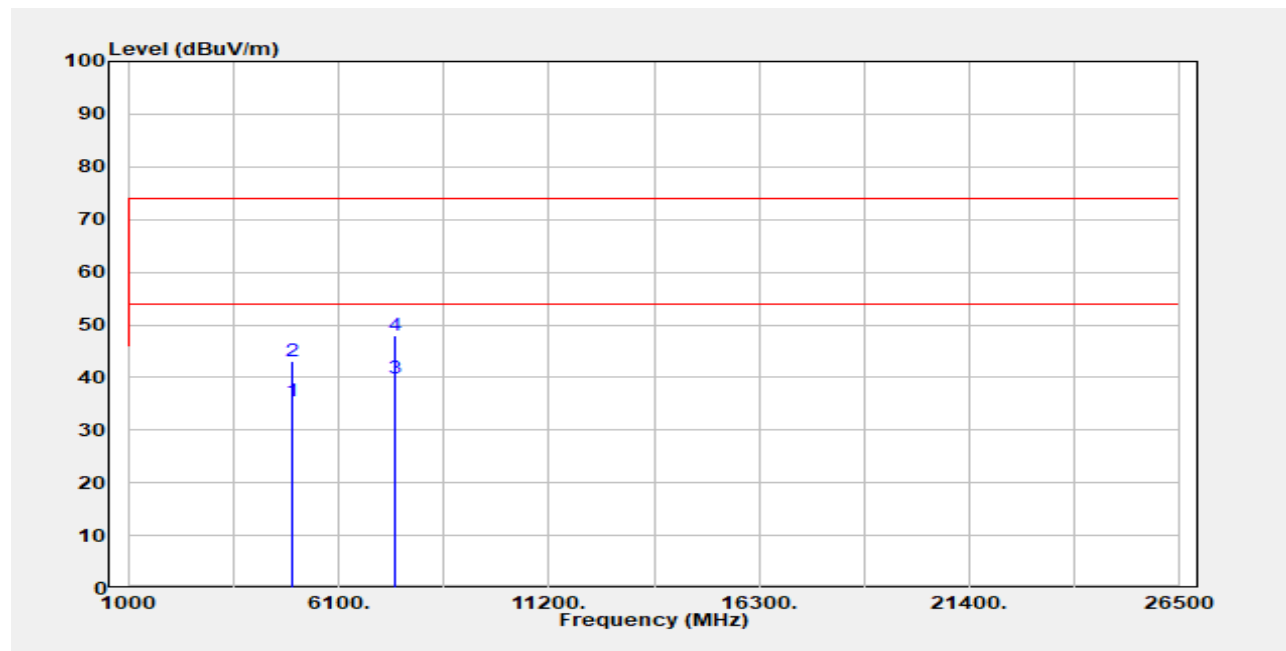
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Report Number :TERF2310002475ER
 Operation Mode :BLE 1M
 Test Frequency :2480 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	33.63	1.81	35.44	54.00	-18.56
4960.00	Peak	41.41	1.81	43.22	74.00	-30.78
7440.00	Average	32.79	7.15	39.94	54.00	-14.06
7440.00	Peak	40.70	7.15	47.85	74.00	-26.15

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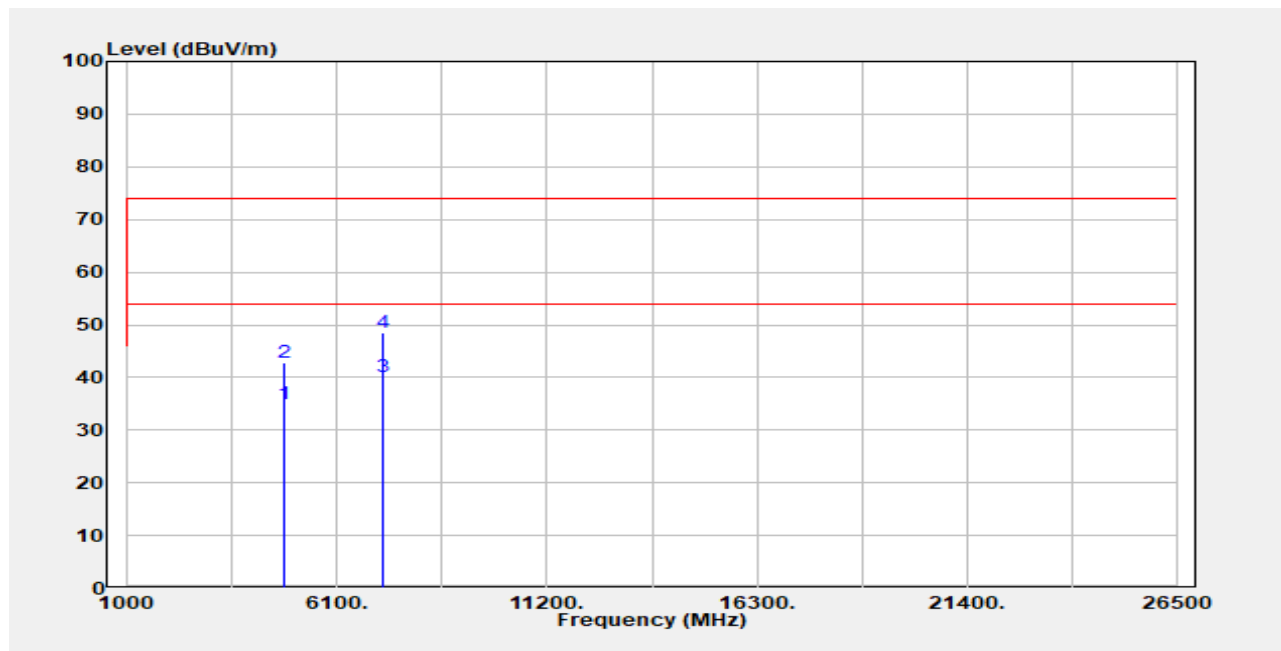
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Report Number :TERF2310002475ER
 Operation Mode :BLE 2M
 Test Frequency :2402 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Vertical
 Engineer :WJ Lin



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	33.50	1.58	35.08	54.00	-18.92
4804.00	Peak	41.30	1.58	42.88	74.00	-31.12
7206.00	Average	33.22	6.97	40.19	54.00	-13.81
7206.00	Peak	41.43	6.97	48.40	74.00	-25.60

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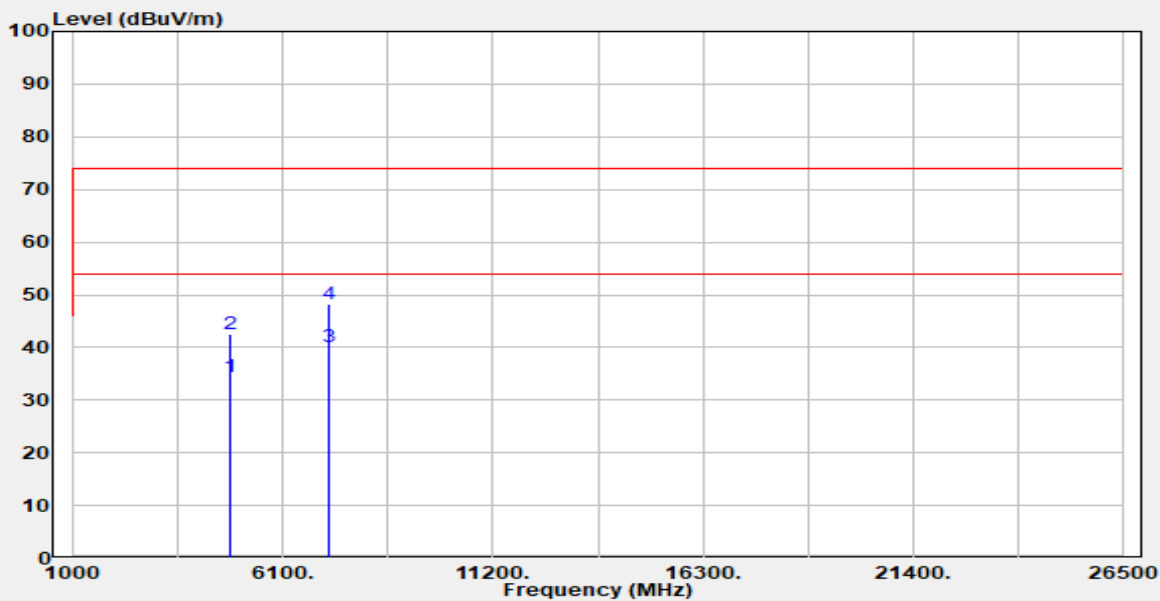
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Report Number :TERF2310002475ER
 Operation Mode :BLE 2M
 Test Frequency :2402 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



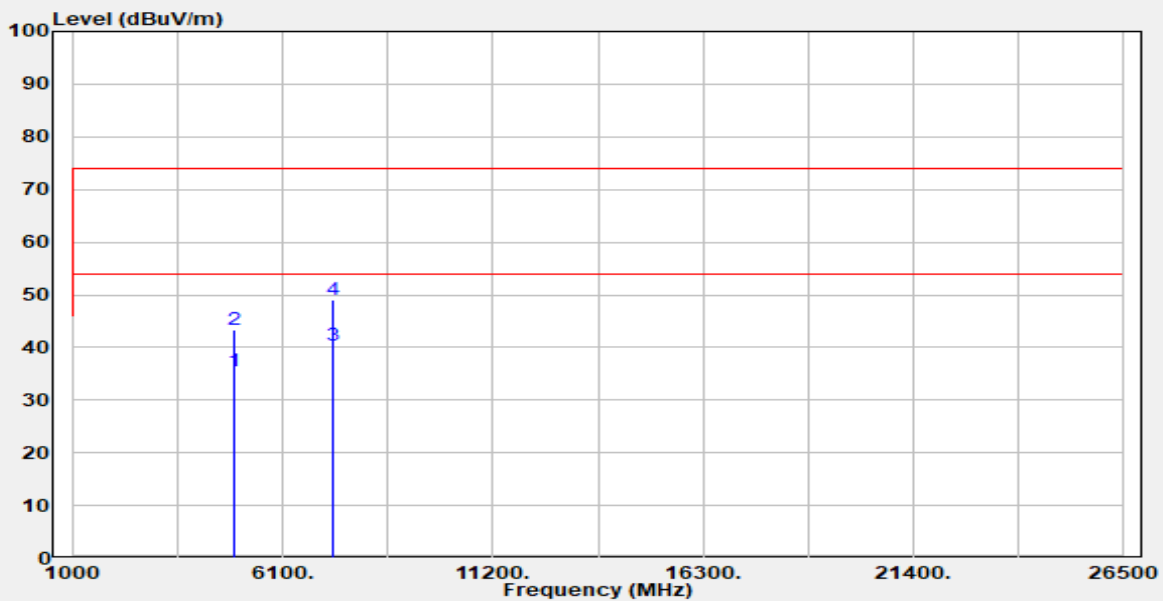
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4804.00	Average	32.86	1.58	34.44	54.00	-19.56
4804.00	Peak	41.04	1.58	42.62	74.00	-31.38
7206.00	Average	33.05	6.97	40.02	54.00	-13.98
7206.00	Peak	41.30	6.97	48.27	74.00	-25.73

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Report Number :TERF2310002475ER
 Operation Mode :BLE 2M
 Test Frequency :2442 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Vertical
 Engineer :WJ Lin



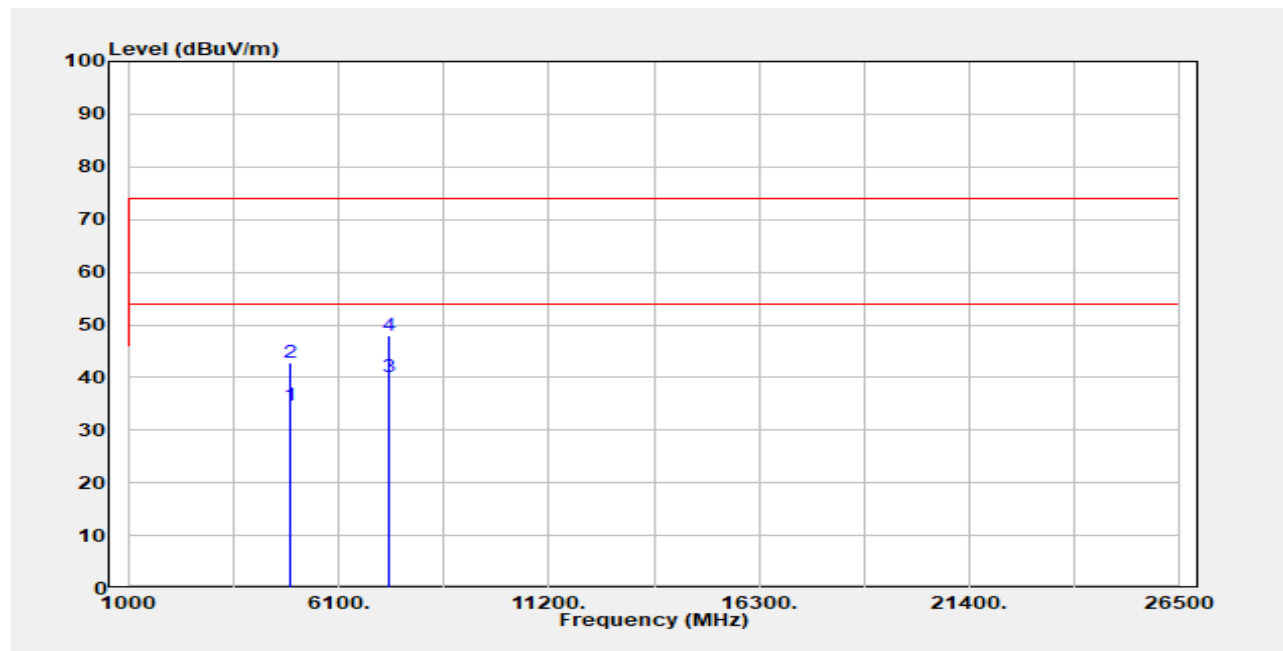
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4884.00	Average	33.70	1.69	35.39	54.00	-18.61
4884.00	Peak	41.77	1.69	43.46	74.00	-30.54
7326.00	Average	33.21	7.07	40.28	54.00	-13.72
7326.00	Peak	42.03	7.07	49.10	74.00	-24.90

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Report Number :TERF2310002475ER
 Operation Mode :BLE 2M
 Test Frequency :2442 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4884.00	Average	33.12	1.69	34.81	54.00	-19.19
4884.00	Peak	41.06	1.69	42.75	74.00	-31.25
7326.00	Average	33.13	7.07	40.20	54.00	-13.80
7326.00	Peak	41.03	7.07	48.10	74.00	-25.90

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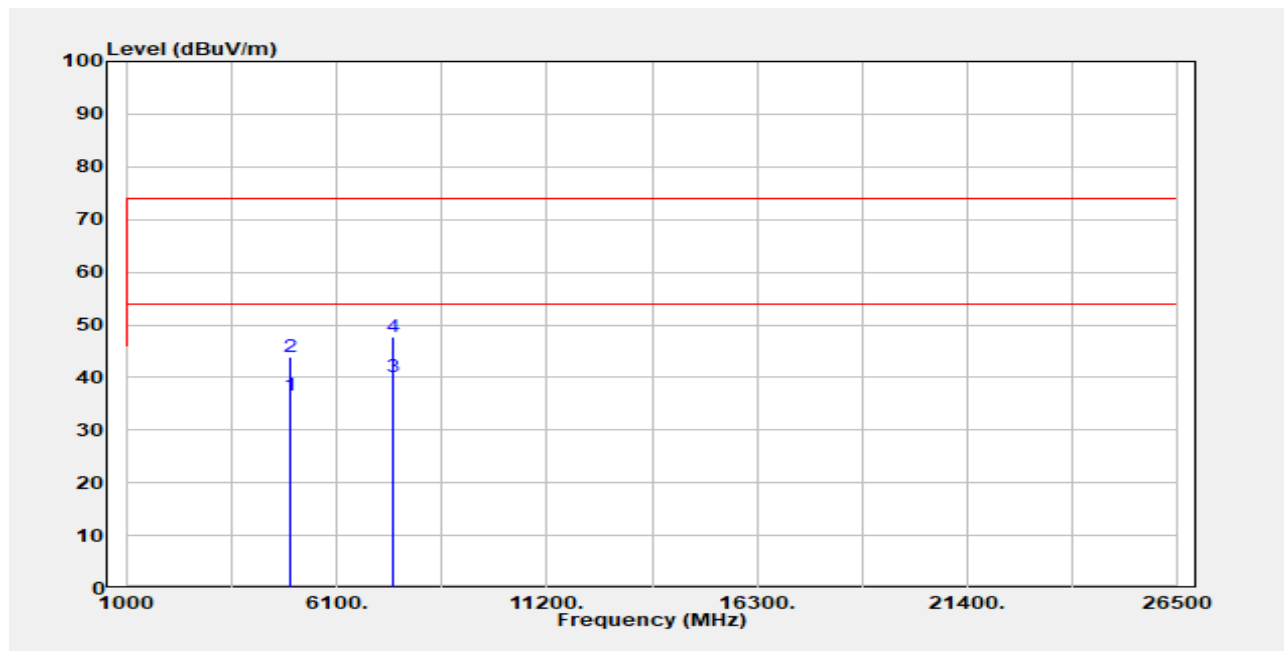
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Report Number :TERF2310002475ER
 Operation Mode :BLE 2M
 Test Frequency :2480 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Vertical
 Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	34.89	1.81	36.70	54.00	-17.30
4960.00	Peak	42.22	1.81	44.04	74.00	-29.96
7440.00	Average	33.03	7.15	40.18	54.00	-13.82
7440.00	Peak	40.56	7.15	47.71	74.00	-26.29

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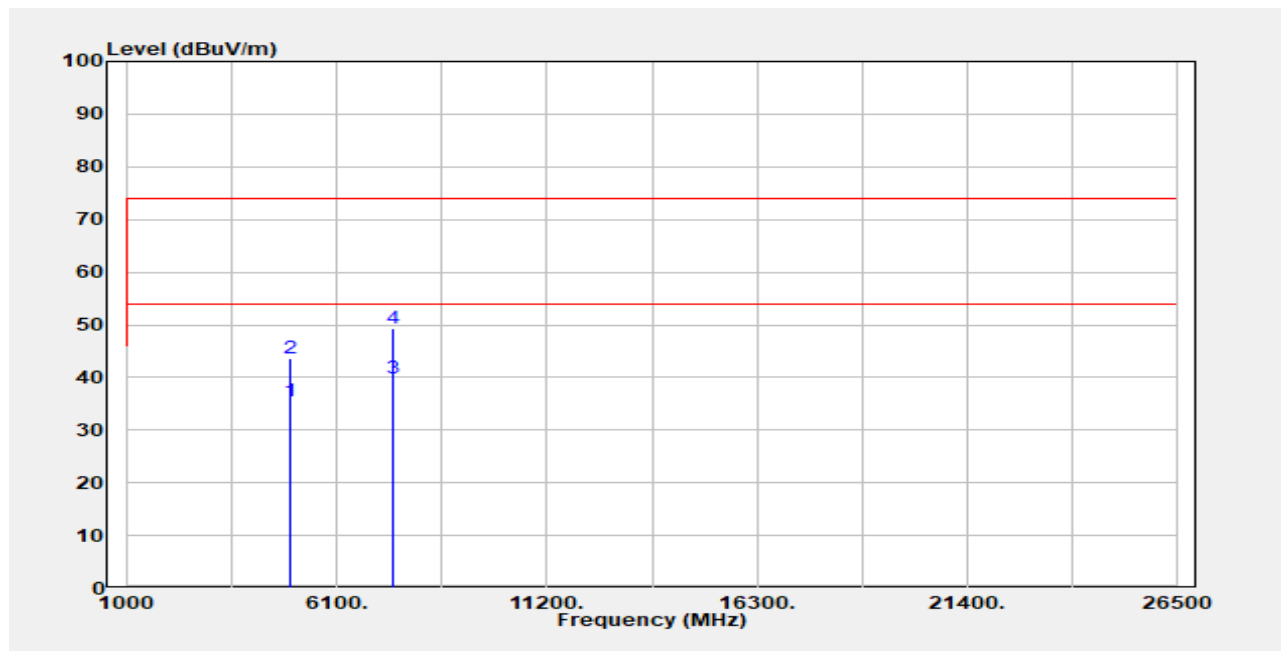
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Report Number :TERF2310002475ER
 Operation Mode :BLE 2M
 Test Frequency :2480 MHz
 Test Mode :Tx
 EUT Pol :NB Plane

Test Site :SAC 1
 Test Date :2023-10-04
 Temp./Humi. :24.8°C/62%
 Antenna Pol. :Horizontal
 Engineer :WJ Lin



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	33.69	1.81	35.50	54.00	-18.50
4960.00	Peak	41.94	1.81	43.75	74.00	-30.25
7440.00	Average	32.78	7.15	39.93	54.00	-14.07
7440.00	Peak	42.21	7.15	49.36	74.00	-24.64

~ End of Report ~

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