ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Testing Laboratory 3702

Applicant:	Murata Manufacturing Co., Ltd. 10-1, Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan
Manufacturer:	Murata Manufacturing Co., Ltd. 10-1, Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan
Product Name:	Communication Module
Brand Name:	muRata
Model No.:	For FCC： LBES5PL2EL, LBEE5PL2DL For ISED： LBES5PL2EL-SANT, LBES5PL2EL-DANT, LBEE5PL2DL-SANT, LBEE5PL2DL-DANT
Model Difference:	Refer to section 1.8
Report Number:	TERF2211002516E2
FCC ID	VPYLBES5PL2EL
IC:	772C-LBES5PL2EL
Date of EUT Received:	Nov. 25, 2022
Date of Test:	Feb. 04, 2023～Feb. 18, 2023
Issue Date:	Mar. 22, 2023

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, ISED RSS-247.

The results of this report relate only to the sample identified in this report.

Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2211002516E2	00	Original	Mar. 02, 2023	Yami Kuo	
TERF2211002516E2	01	Revise applicant's address and model difference	Mar. 22, 2023	Yami Kuo	*

Note:

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

2、 Variant information of model numbers is provided by the applicant, test results of this report are applicable to the sample EUT(s) received.

Contents

1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Communication Module	
Brand Name:	muRata	
Model No.:	For FCC	LBES5PL2EL, LBEE5PL2DL
	For ISED	LBES5PL2EL-SANT, LBES5PL2EL-DANT, LBEE5PL2DL-SANT, LBEE5PL2DL-DANT
Model Difference:	Refer to section 1.8	
Hardware Version:	1	
Firmware Version:	N/A	
EUT Series No.:	ANT0: L#1 ANT1: R#1	
Power Supply:	3.3Vdc, 1.8Vdc	
Test Software (Name/Version)	Tera Term V4.106	

1.2 RF Specification

Radio Technology:	IEEE 802.15.4
Frequency Range:	2405 – 2480MHz
Channel number:	16 channels
Modulation type:	O-QPSK
Transmit Power:	ANT0: 23.38 dBm ANT1: 23.79 dBm

1.3 Antenna Designation

ANT0

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
Dipole	Molex	146153	2400~2500	**3.2**
	Molex	219611	2400~2500	2.67
	Unictron	WT32D1-KX	2400~2500	3
	Inventek	W24P-U	2400~2500	3.2
Monopole	Murata	Type2EL_Antenna	2400~2500	**3.6**

ANT1

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
Dipole	Molex	146153	2400~2500	**3.2**
	Molex	219611	2400~2500	2.67
	Unictron	WT32D1-KX	2400~2500	3
	Inventek	W24P-U	2400~2500	3.2

Note:

1. Pre-scanned was done on the above antennas, measurements were demonstrated by using the antenna with the highest gain as the worst case scenarios.
2. Antenna information is provided by the applicant.

1.4 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247
FCC KDB 558074 D01 15.247 Meas Guidance v05r02
RSS-247 issue 2 Feb. 2017
RSS-Gen, Issue 5 April 2018
ANSI C63.10:2013
Note: All test items have been performed and record as per the above standards.

1.5 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 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.

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.

1.8 Model Difference

1. There are 4 HVINs with 2 PMNs as below

   a. The LBES5PL2EL-SANT and LBES5PL2EL-DANT are electrically identical.

HVIN	PMN	Chip on C101	RF functionss
LBES5PL2EL-SANT	LBES5PL2EL	IW612	WLAN 2.4GHz,5GHz, BT,BLE, IEEE802.15.4
LBES5PL2EL-DANT			

   b. The LBEE5PL2DL-SANT and LBEE5PL2DL-DANT are electrically identical.

HVIN	PMN	Chip on C101	RF functions
LBEE5PL2DL-SANT	LBEE5PL2DL	IW611	WLAN 2.4GHz,5GHz, BT,BLE
LBEE5PL2DL-DANT			

2. In addition, there are 2 HMNs, the differences between the HMN(s) are

HMN	HVIN	Antenna connector(s)	WLAN	BT	BLE	IEEE802.15.4
P2ML10229-D	LBES5PL2EL-DANT	2 (ANT0, ANT1)	ANT0	ANT1	ANT1	ANT1
	LBEE5PL2DL-DANT					NA
P2ML10229-S	LBES5PL2EL-SANT	1 (ANT0)	ANT0	ANT0	ANT0	ANT0
	LBEE5PL2DL-SANT					NA

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 a 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 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/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 a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

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

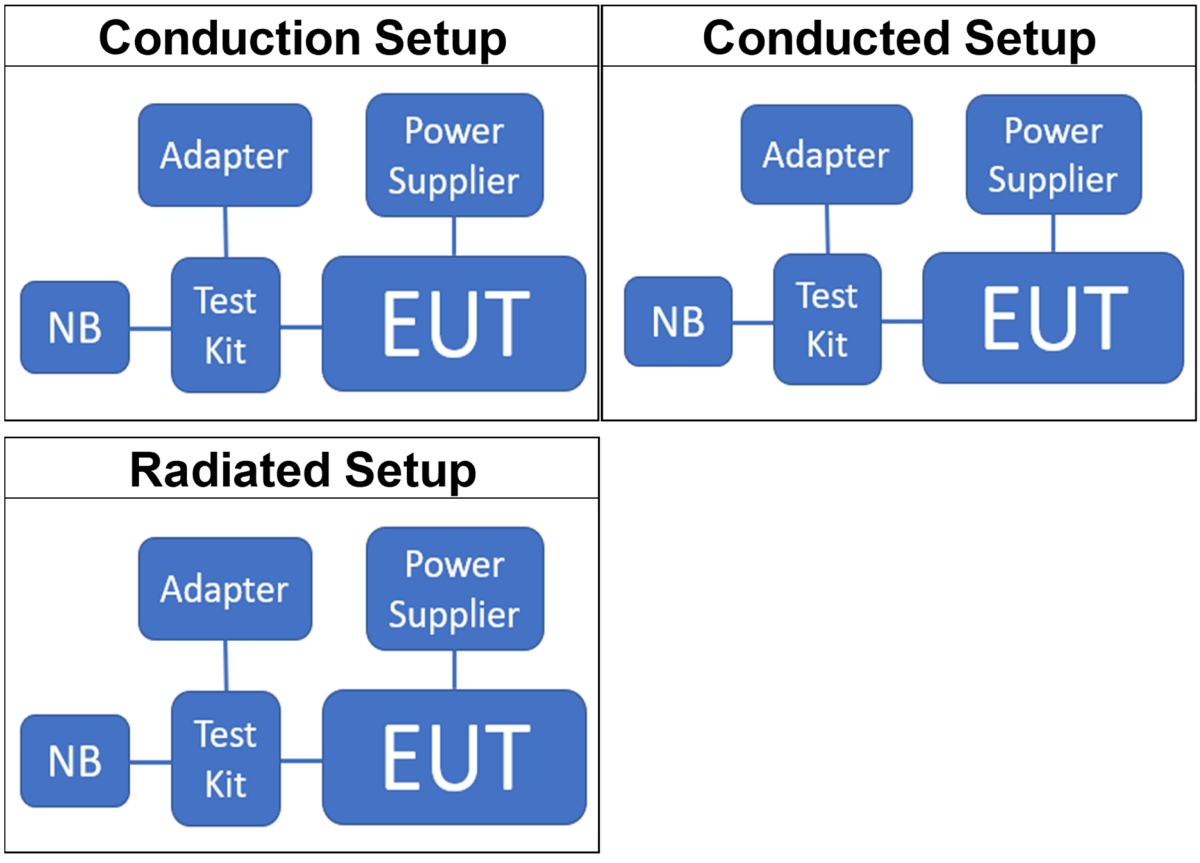
Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

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.

2.5 Test Configuration



2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	T440p	P0000665	N/A	N/A
USB Cable	ZHUANG SHAN CHUAN	E333601	N/A	N/A	N/A
Adapter	EDACPOWER	EA1045CR	N/A	N/A	N/A

Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
USB Cable	ZHUANG SHAN	E333601	N/A	N/A	N/A
Adapter	EDACPOWER	EA1045CR	N/A	N/A	N/A
Notebook	Lenovo	T420	S0012599	N/A	N/A

Radiated Emission Test Site: SAC C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	T440p	P0000665	N/A	N/A
USB Cable	ZHUANG SHAN CHUAN	E333601	N/A	N/A	N/A
Adapter	EDACPOWER	EA1045CR	N/A	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	ISED Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	RSS-247 §5.4 d	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.2 a RSS-Gen §6.7	Emission Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §5.5	Conducted Band Edge and Spurious Emission	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	RSS-247 §5.2 b	Peak Power Density	Compliant
§15.203	N/A	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY
1	2405 MHz	5	2425 MHz	9	2445 MHz	13	2465 MHz
2	2410 MHz	6	2430 MHz	10	2450 MHz	14	2470 MHz
3	2415 MHz	7	2435 MHz	11	2455 MHz	15	2475 MHz
4	2420 MHz	8	2440 MHz	12	2460 MHz	16	2480 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.

MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION
RADIATED EMISSION TEST (BELOW 1 GHz)			
IEEE 802.15.4	2405 to 2480	2440	O-QPSK
RADIATED EMISSION TEST (ABOVE 1 GHz)			
IEEE 802.15.4	2405 to 2480	2405,2440,2475,2480	O-QPSK
Note: The field strength of radiated 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.			

ANTENNA PORT CONDUCTED MEASUREMENT			
MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION
IEEE 802.15.4	2405 to 2480	2405,2440,2475,2480	O-QPSK

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.

6 MEASUREMENT EQUIPMENT USED

6.1 Emission from AC power line

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	973	04/13/2022	04/12/2023
EMI Test Receiver	R&S	ESCI	101342	04/25/2022	04/24/2023
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2022	03/26/2023
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2022	03/26/2023
DC Power Supply	Agilent	E3640A	MY53170008	09/12/2022	09/11/2023
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

6.2 Conducted Measurement

Conducted Emission Test Site: Conducted D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071573	05/16/2022	05/15/2023
Power Meter	Anritsu	ML2496A	1512003	07/26/2022	07/25/2023
Power Sensor	Anritsu	MA2411B	1339378	07/26/2022	07/25/2023
Power Sensor	Anritsu	MA2411B	1339379	07/26/2022	07/25/2023
DC Power Supply	Agilent	E3640A	MY53170008	09/12/2022	09/11/2023
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N.C.R
Attenuator	Woken	WATT-218FS-10	RF17	11/16/2022	11/15/2023
Attenuator	Woken	WATT-218FS-10	RF18	11/16/2022	11/15/2023
Switch E-Channel	E-Channel	ETF-1801 RF Switch	EC2100175	11/16/2022	11/15/2023
DC Block	PASTERNACK	PE8210	RF158	11/16/2022	11/15/2023

6.3 Radiated Measurement

Radiated Emission Test Site: SAC C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-300	11/11/2022	11/10/2023
Horn Antenna	Schwarzbeck	BBHA9170	185	08/22/2022	08/21/2023
Horn Antenna	Schwarzbeck	BBHA9120D	1187	01/12/2023	01/11/2024
Loop Antenna	ETS.LINDGREN	6502	143303	05/14/2022	05/13/2023
3m Site NSA	SGS	966 chamber C	N/A	03/02/2022	03/01/2023
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	04/01/2022	03/31/2023
DC Power Supply	Agilent	E3640A	MY53170008	09/12/2022	09/11/2023
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R
Pre-Amplifier	EMC Instruments	EMC330	980096	11/16/2022	11/15/2023
Pre-Amplifier	EMC Instruments	EMC0011830	980199	11/16/2022	11/15/2023
Pre-Amplifier	EMC Instruments	EMC18405SEE	980881	10/25/2022	10/24/2023
Attenuator	Woken	WATT-218FS-10	RF16	11/16/2022	11/15/2023
Coaxial Cable	Huber Suhner	EMC106-SM-SM-9100	150704	11/16/2022	11/15/2023
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/16/2022	11/15/2023
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/16/2022	11/15/2023

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

7 CONDUCTED EMISSION TEST

7.1 Standard Applicable:

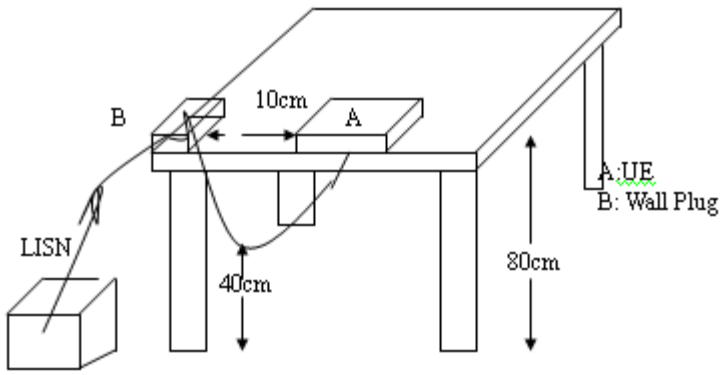
Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

7.2 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

7.3 Test Setup



7.4 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

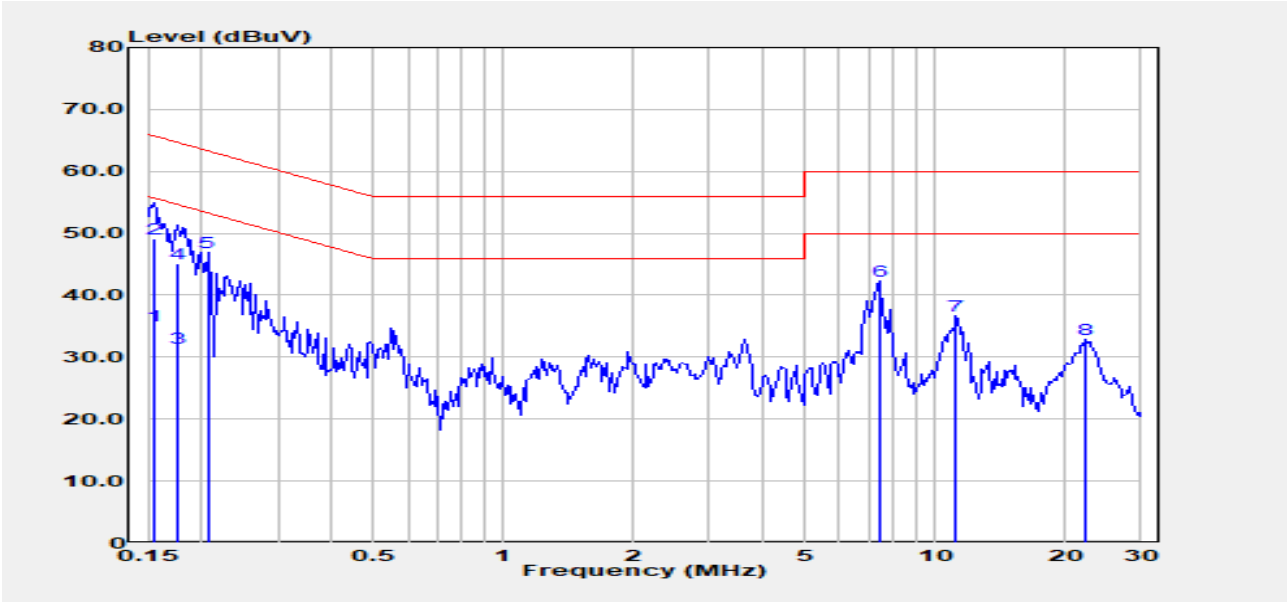
7.5 Measurement Result:

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closest to the limit.

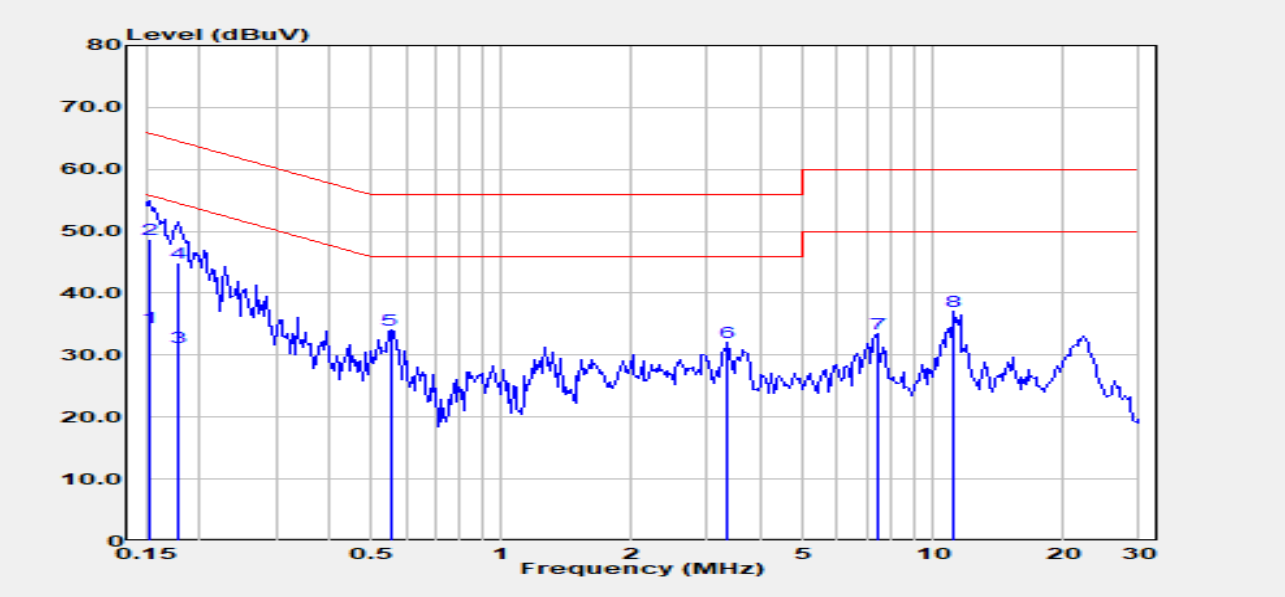
AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:TERF2211002516E2	Test Site	:Conduction C
Test Mode	:IEEE 802.15.4	Test Date	:2023-02-15
Power	:120/60Hz	Temp./Humi.	:22.4/61
Probe	:L1	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.155	Average	24.90	10.27	35.17	55.74	-20.57
0.155	QP	38.80	10.27	49.07	65.74	-16.67
0.176	Average	21.20	10.27	31.47	54.68	-23.21
0.176	QP	34.80	10.27	45.07	64.68	-19.61
0.206	Peak	36.59	10.27	46.87	63.36	-16.49
7.407	Peak	31.72	10.61	42.33	60.00	-17.67
11.198	Peak	25.93	10.69	36.62	60.00	-23.38
22.298	Peak	21.88	10.93	32.82	60.00	-27.18

Report Number	:TERF2211002516E2	Test Site	:Conduction C
Test Mode	:IEEE 802.15.4	Test Date	:2023-02-15
Power	:120/60Hz	Temp./Humi.	:22.4/61
Probe	:N	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.153	Average	24.30	10.28	34.58	55.82	-21.24
0.153	QP	38.40	10.28	48.68	65.82	-17.14
0.178	Average	21.10	10.27	31.37	54.59	-23.22
0.178	QP	34.60	10.27	44.87	64.59	-19.72
0.552	Peak	23.74	10.31	34.05	56.00	-21.95
3.346	Peak	21.27	10.77	32.04	56.00	-23.96
7.407	Peak	23.02	10.56	33.58	60.00	-26.42
11.198	Peak	26.39	10.65	37.04	60.00	-22.96

8 PEAK OUTPUT POWER MEASUREMENT

8.1 Standard Applicable:

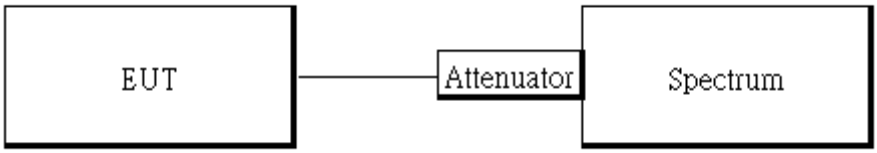
For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt and the e.i.r.p. shall not exceed 4 W.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form 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.

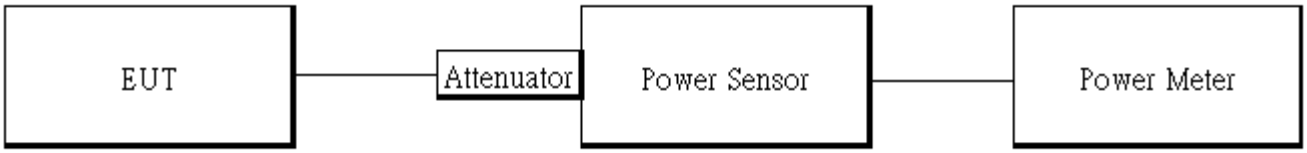
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

8.2 Test Setup

8.2.1 Duty Cycle



8.2.2 Output Power



8.3 Measurement Procedure:

8.3.1 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

8.3.2 Output Power

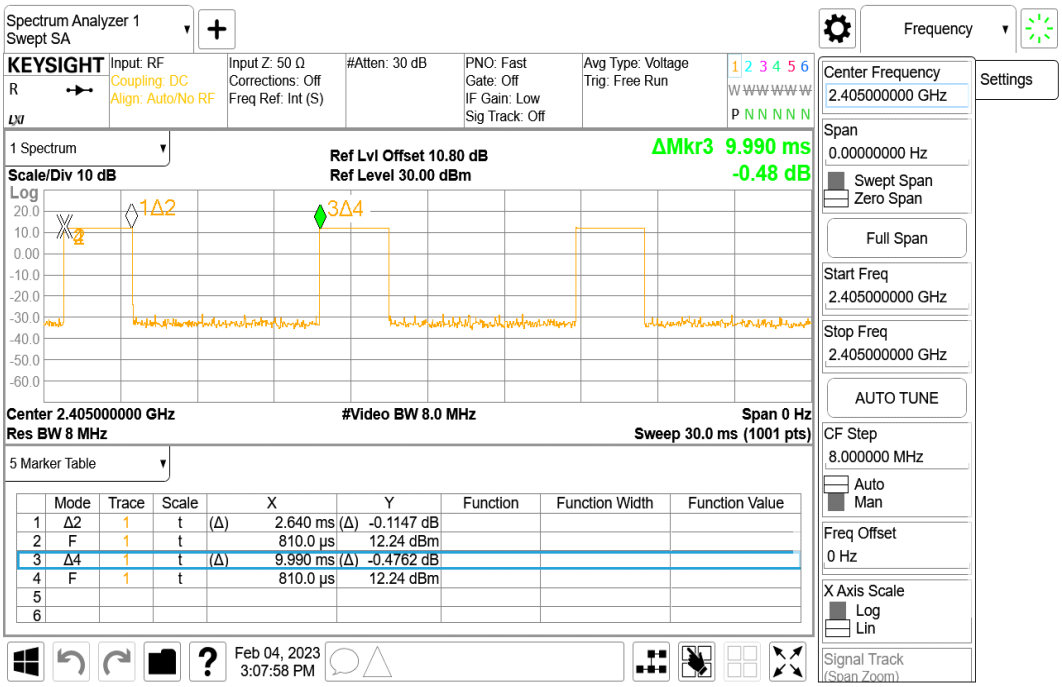
1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
4. Record the max. Reading as observed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

8.4 Duty Factor:

ANT0

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
IEEE 802.15.4	26.43	5.78	0.38	1.00

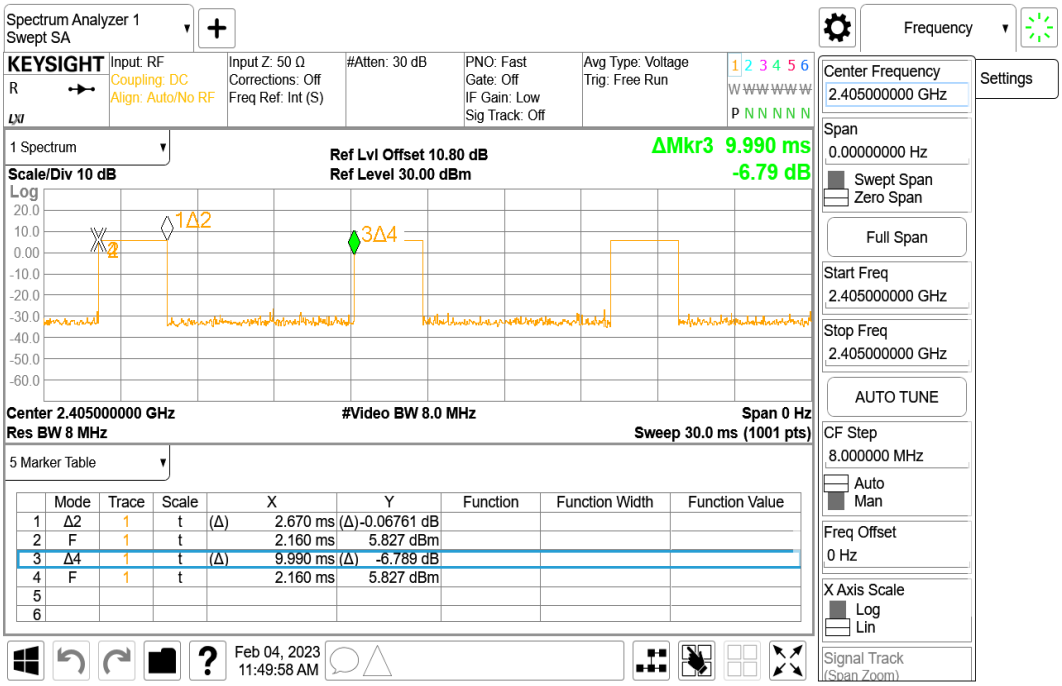
IEEE 802.15.4_LowCH11-2405



ANT1

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
IEEE 802.15.4	26.73	5.73	0.37	1.00

IEEE 802.15.4 _LowCH11-2405



8.5 Output Power:

8.5.1 Peak & Avg

ANT0

IEEE 802.15.4 mode:

CH	Frequency (MHz)	Power set	Peak Power Output (dBm)	Required Limit (dBm)
11	2405	17.5	**23.38**	30
18	2440	17.5	23.25	30
25	2475	17	23.16	30
26	2480	0	5.85	30
CH	**Frequency (MHz)**	**Power set**	**Max. Avg. Output include tune up tolerance Power (dBm)**	**Required Limit (dBm)**
11	2405	17.5	17.83	30
18	2440	17.5	17.70	30
25	2475	17	17.78	30
26	2480	0	1.70	30

Note: Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

ANT1

802.11.5.4 mode:

CH	Frequency (MHz)	Power set	Peak Power Output (dBm)	Required Limit (dBm)
11	2405	16.5	**23.79**	30
18	2440	16.5	23.62	30
25	2475	16	23.39	30
26	2480	0	6.19	30
CH	**Frequency (MHz)**	**Power set**	**Max. Avg. Output include tune up tolerance Power (dBm)**	**Required Limit (dBm)**
11	2405	16.5	17.85	30
18	2440	16.5	17.76	30
25	2475	16	17.68	30
26	2480	0	1.88	30

Note: Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

8.5.2 EIRP

ANT0

EIRP IEEE 802.15.4 mode

CH	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit		
11	2405	17.5	17.83	3.60	21.43	4W=	36	dBm
18	2440	17.5	17.70	3.60	21.30	4W=	36	dBm
25	2475	17	17.78	3.60	21.38	4W=	36	dBm
26	2480	0	1.70	3.60	5.30	4W=	36	dBm

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

ANT1

EIRP IEEE 802.15.4 mode

CH	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit		
11	2405	16.5	17.85	3.20	21.05	4W=	36	dBm
18	2440	16.5	17.76	3.20	20.96	4W=	36	dBm
25	2475	16	17.68	3.20	20.88	4W=	36	dBm
26	2480	0	1.88	3.20	5.08	4W=	36	dBm

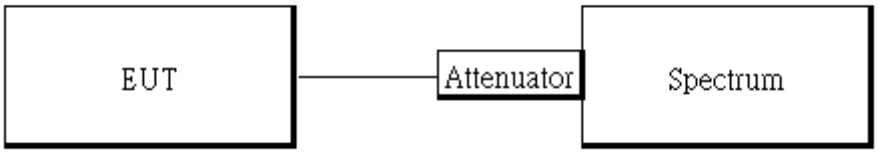
***Note:** EIRP = Average Power + Gain

9 EMISSION BANDWIDTH MEASUREMENT

9.1 Standard Applicable

The minimum 6 dB bandwidth shall be at least 500 kHz .

9.2 Test Setup



9.3 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

9.3.1 FCC measurements

1. The testing follows the Measurement Procedure of the KDB 558074 D01.
2. Set the spectrum analyzer as
   RBW= 100 kHz ,
   VBW = 3 X RBW,
   Span= 2 to 5 times of the OBW,
   Sweep=auto, Detector = Peak, and Max hold.
3. Mark the upper and lower frequencies of -6dB.
4. Repeat above procedures until all test default channel is completed.

9.3.2 ISED measurements

1. The testing follows the Measurement Procedure of the RSS-Gen section 6.7.
2. Set the spectrum analyzer as
   RBW= 1 % to 5% of 99% and -6dB Bandwidth ,
   VBW ≥ 3 X RBW,
   Span= large enough to capture all products of the modulation process
   Sweep=auto, Detector = Peak, and Max hold.
3. Mark the upper and lower frequencies of 99% and -6dB.
4. Repeat above procedures until all test default channel is completed.

9.4 Measurement Result:

ANT0

IEEE 802.15.4 mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2405	1.607	≧ 0.5	PASS
2440	1.612	≧ 0.5	PASS
2480	1.566	≧ 0.5	PASS

ANT1

IEEE 802.15.4 mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
2405	1.610	≧ 0.5	PASS
2440	1.609	≧ 0.5	PASS
2480	1.584	≧ 0.5	PASS

ANT0

IEEE 802.15.4 mode

Frequency (MHz)	99%Bandwidth (MHz)
2405	2.2282
2440	2.2282
2480	2.2291

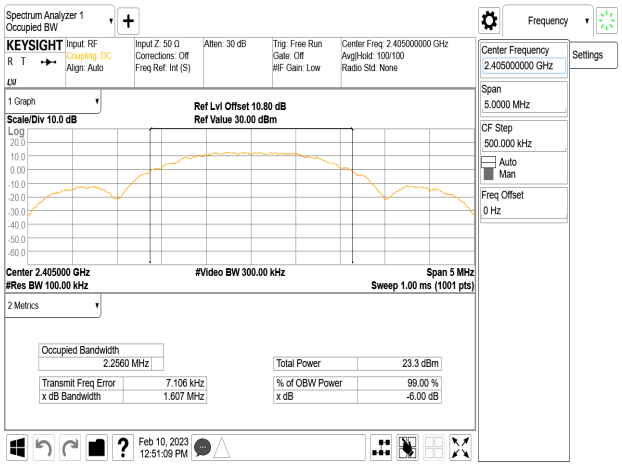
ANT1

IEEE 802.15.4 mode

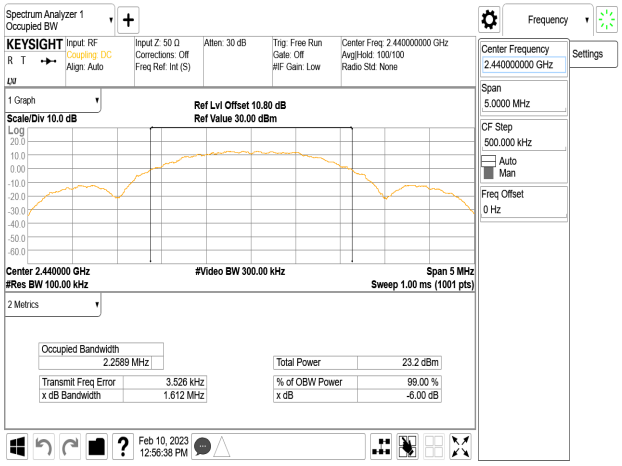
Frequency (MHz)	99%Bandwidth (MHz)
2405	2.2247
2440	2.2204
2480	2.2276

ANT0

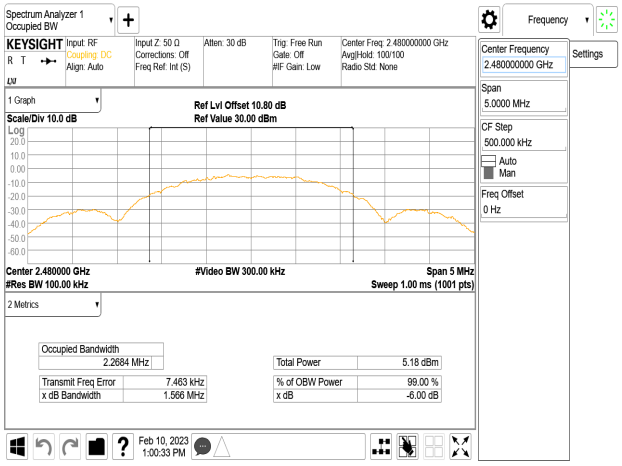
OBW_IEEE 802.15.4 _LowCH11-2405MHz



OBW_IEEE 802.15.4_MidCH18-2440MHz

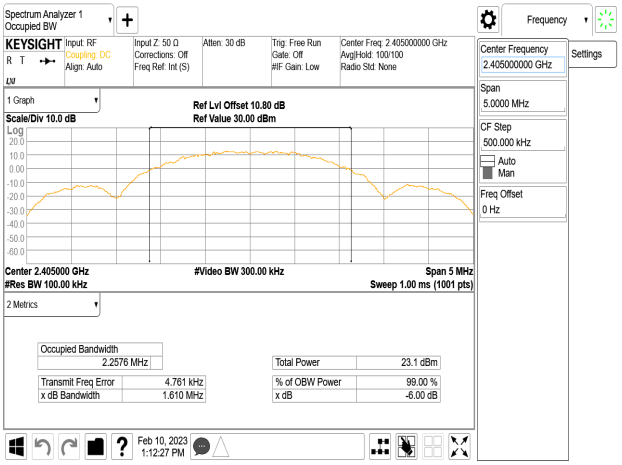


OBW_IEEE 802.15.4_HighCH26-2480MHz

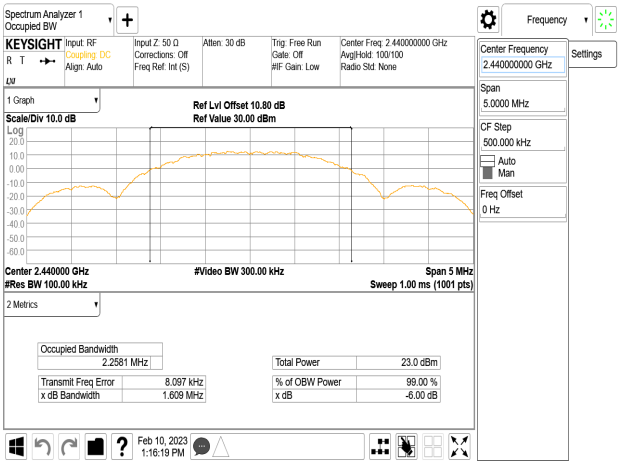


ANT1

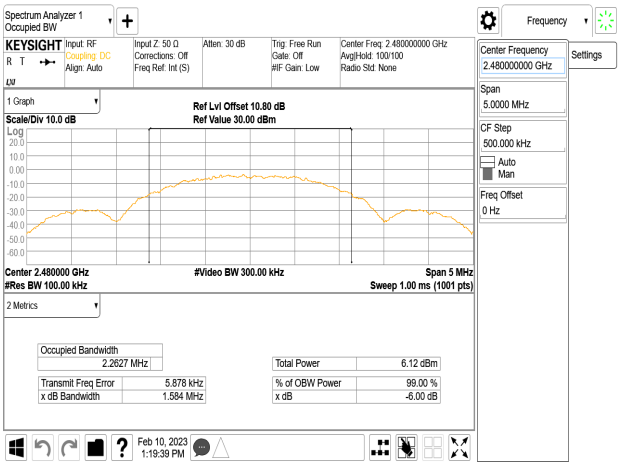
OBW_ IEEE 802.15.4 _LowCH11-2405MHz



OBW_ IEEE 802.15.4_MidCH18-2440MHz

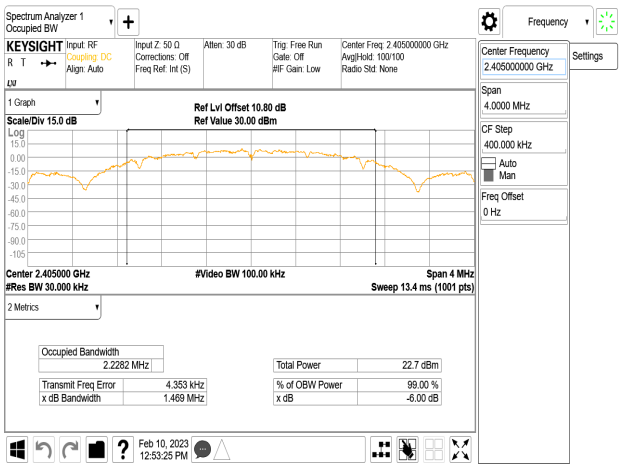


OBW_ IEEE 802.15.4_HighCH26-2480MHz

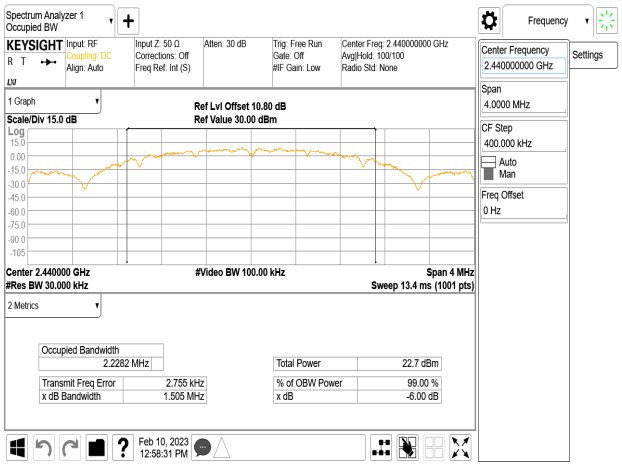


ANT0

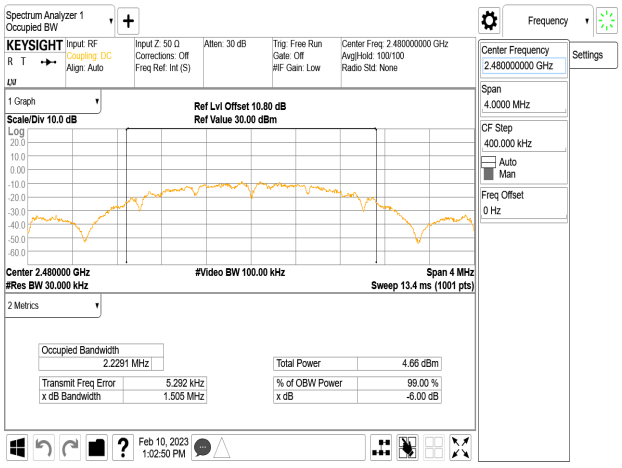
IC OBW_IEEE 802.15.4 _LowCH11-2405MHz



IC OBW_IEEE 802.15.4_MidCH18-2440MHz

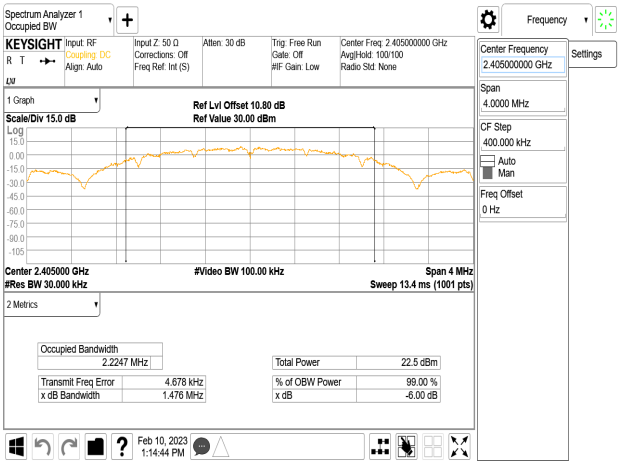


IC OBW_IEEE 802.15.4_HighCH26-2480MHz

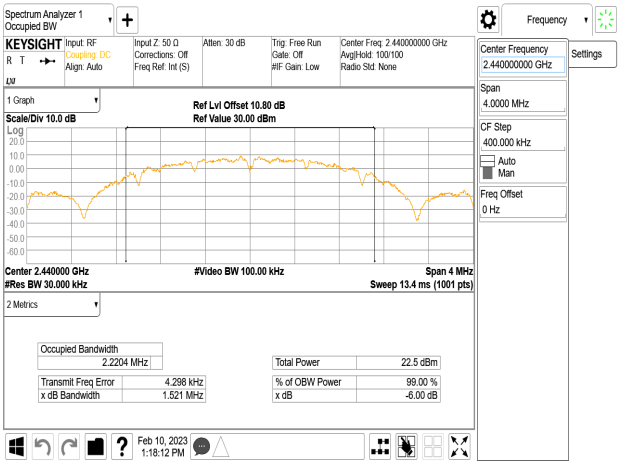


ANT1

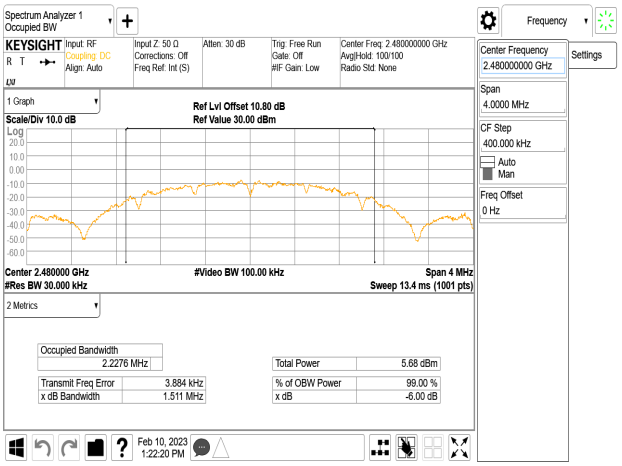
IC OBW_ IEEE 802.15.4 _LowCH11-2405MHz



IC OBW_ IEEE 802.15.4_MidCH18-2440MHz



IC OBW_ IEEE 802.15.4_HighCH26-2480MHz

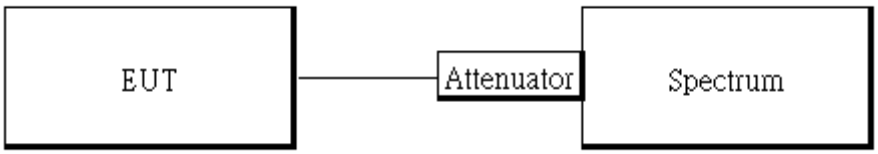


10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

10.1 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, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.9.

10.2 Test Setup



10.3 Measurement Procedure

10.3.1 Reference Level of Emission Limit:

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 100kHz & VBW = 300 kHz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

10.3.2 Conducted Band Edge:

1. To connect Antenna Port of EUT to Spectrum.
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 spectrum analyzer.
4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
6. Set DL as the limit = reading on marker of reference level measurement – 20dBm
7. Mark the highest readings of the emissions outside of 2400MHz~2483.5MHz.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

10.3.3 Conducted Spurious Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Set RBW = 100 kHz & VBW=300 kHz, Detector =Peak, Sweep = Auto
4. Allow trace to fully stabilize.
5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Repeat above procedures until all default test channel measured were complete.

10.4 Measurement Result

ANT0

IEEE 802.15.4_Reference Level of Limit

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)
2405	13.44	-6.56
2440	13.64	-6.36
2480	-4.55	-24.55

NOTE: cable loss as 10.8dB that offsets in the spectrum

NOTE: Refer to next page for plots.

ANT1

IEEE 802.15.4 _Reference Level of Limit

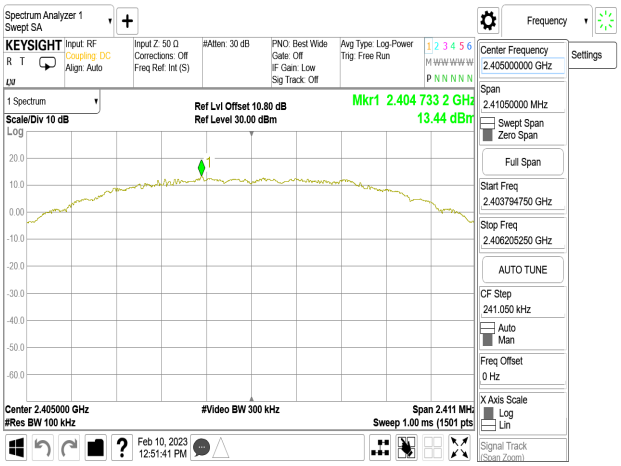
Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)
2405	12.70	-7.30
2440	13.35	-6.65
2480	-4.30	-24.30

NOTE: cable loss as 10.8dB that offsets in the spectrum

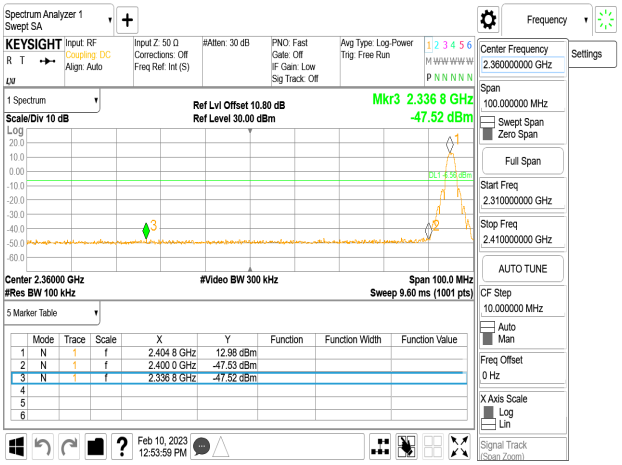
NOTE: Refer to next page for plots.

ANT0

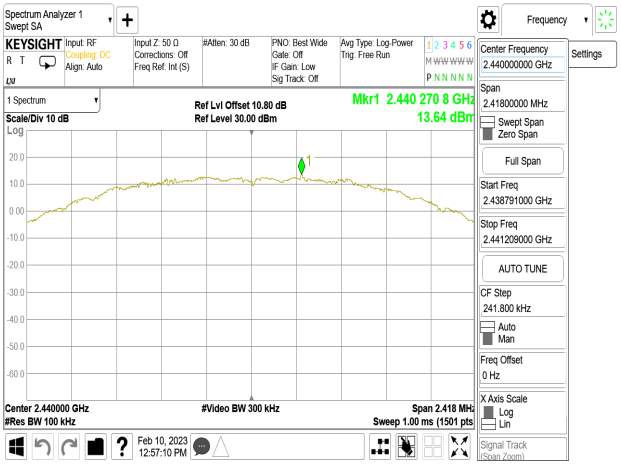
Reference Level_ IEEE 802.15.4 _LowCH11-2405MHz



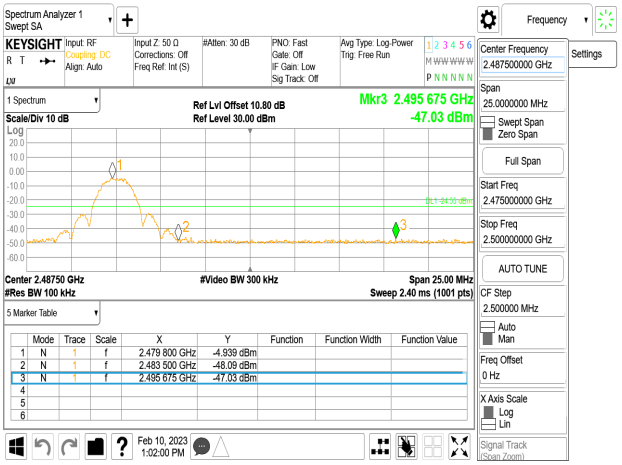
Band Edge_ IEEE 802.15.4_LowCH11-2405MHz



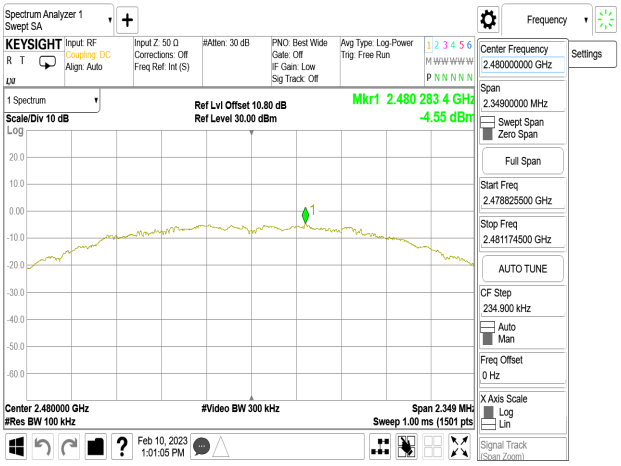
Reference Level_ IEEE 802.15.4_MidCH18-2440MHz



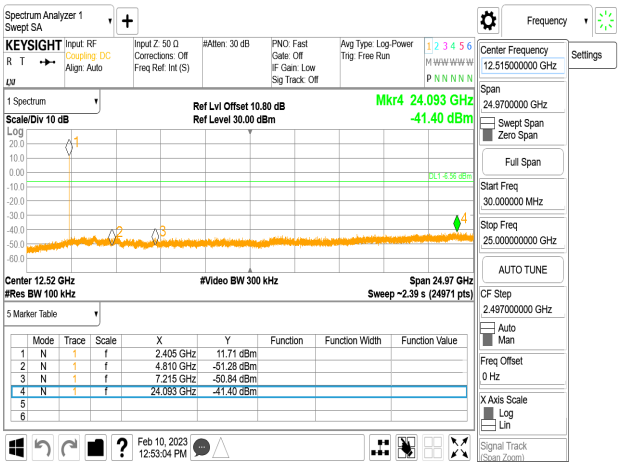
Band Edge_ IEEE 802.15.4_HighCH26-2480MHz



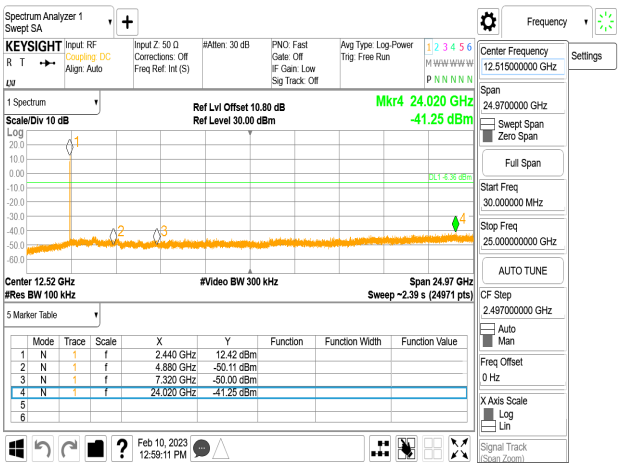
Reference Level_ IEEE 802.15.4_HighCH26-2480MHz



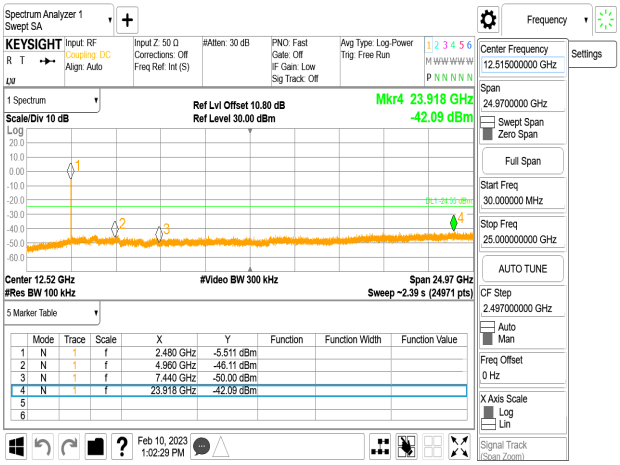
Spurious Emission_ IEEE 802.15.4_LowCH11-2405MHz



Spurious Emission_ IEEE 802.15.4_MidCH18-2440MHz

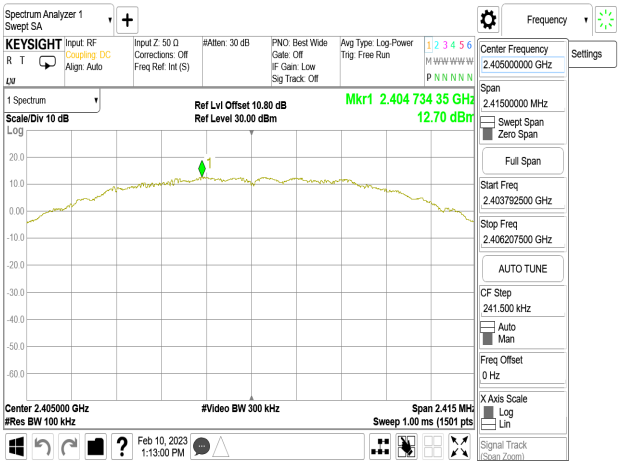


Spurious Emission_ IEEE 802.15.4_HighCH26-2480MHz

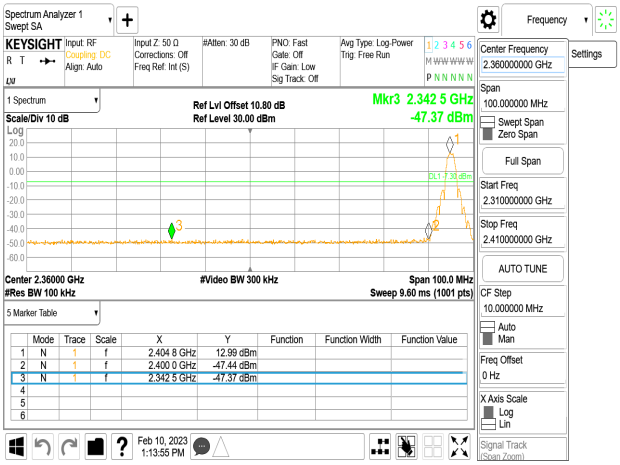


ANT1

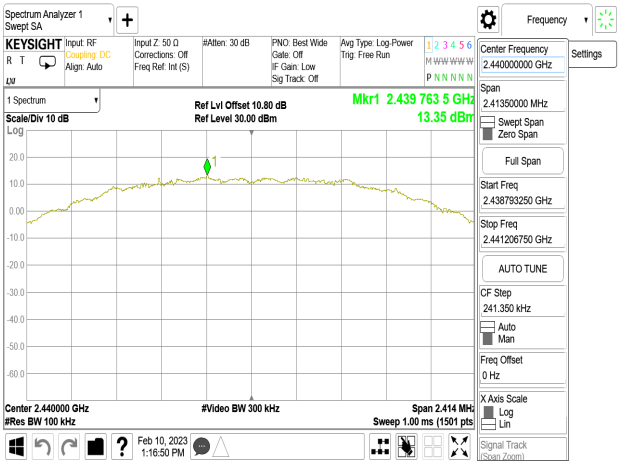
Reference Level_ IEEE 802.15.4 _LowCH11-2405MHz



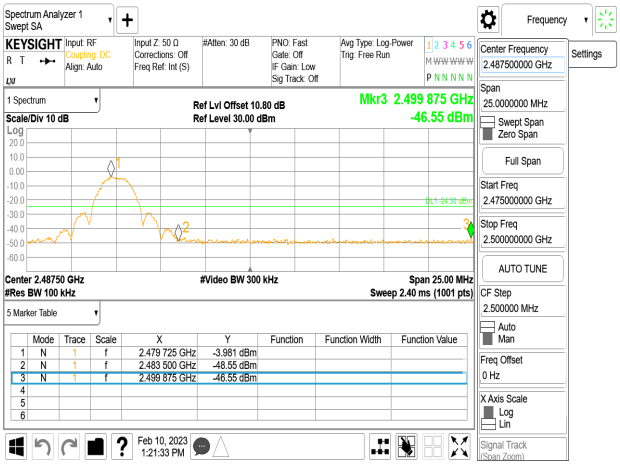
Band Edge_IEEE 802.15.4_LowCH11-2405MHz



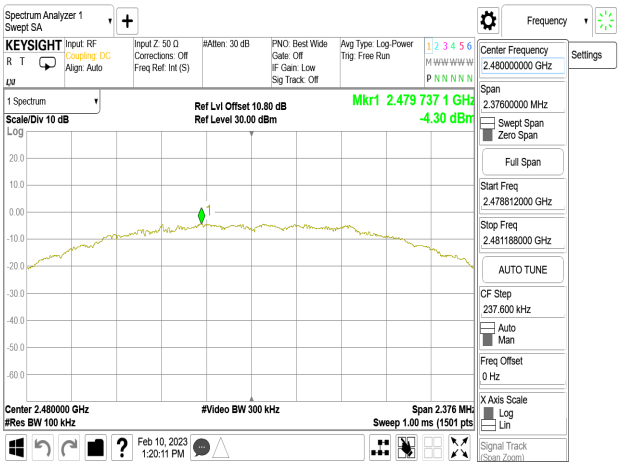
Reference Level_IEEE 802.15.4_MidCH18-2440MHz



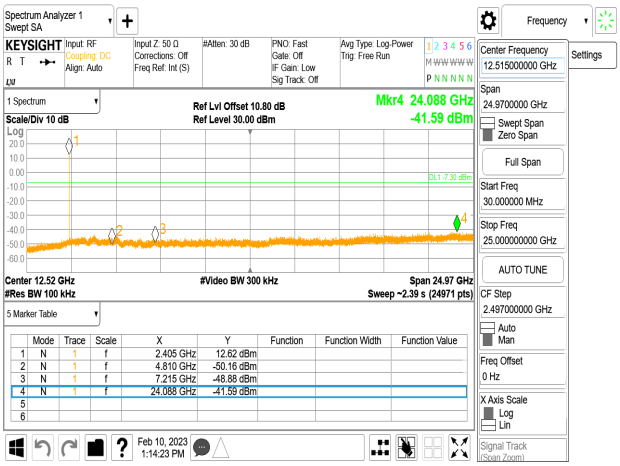
Band Edge_IEEE 802.15.4_HighCH26-2480MHz



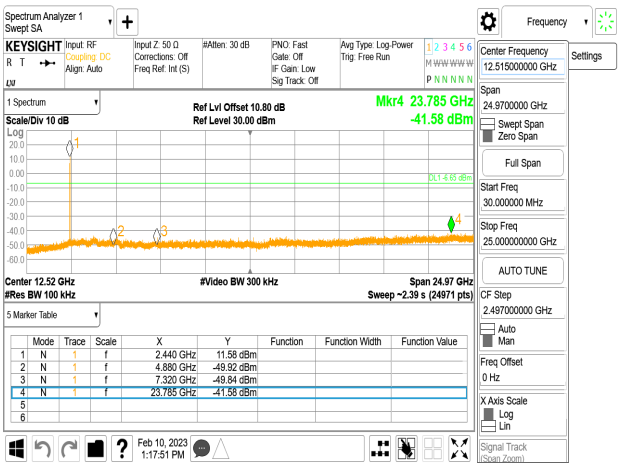
Reference Level_IEEE 802.15.4_HighCH26-2480MHz



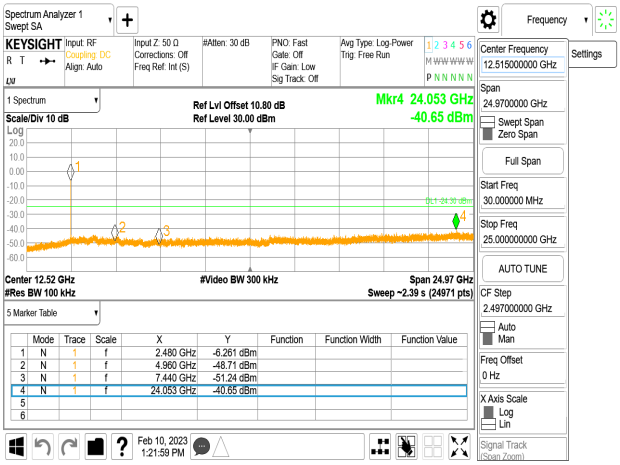
Spurious Emission_IEEE 802.15.4_LowCH11-2405MHz



Spurious Emission_IEEE 802.15.4_MidCH18-2440MHz



Spurious Emission_IEEE 802.15.4_HighCH26-2480MHz



11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

11.1 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.

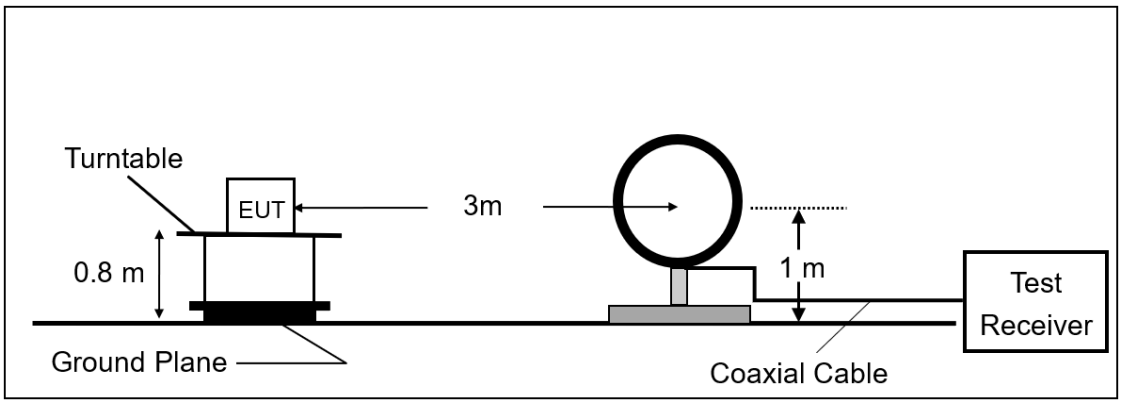
Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

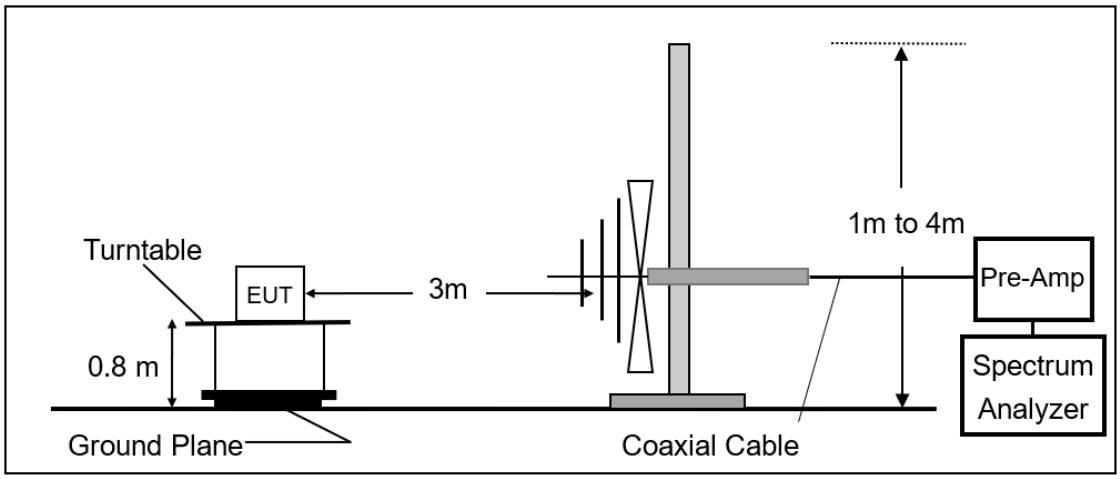
1. The lower limit shall apply at the transition frequencies.

11.2 Test Setup

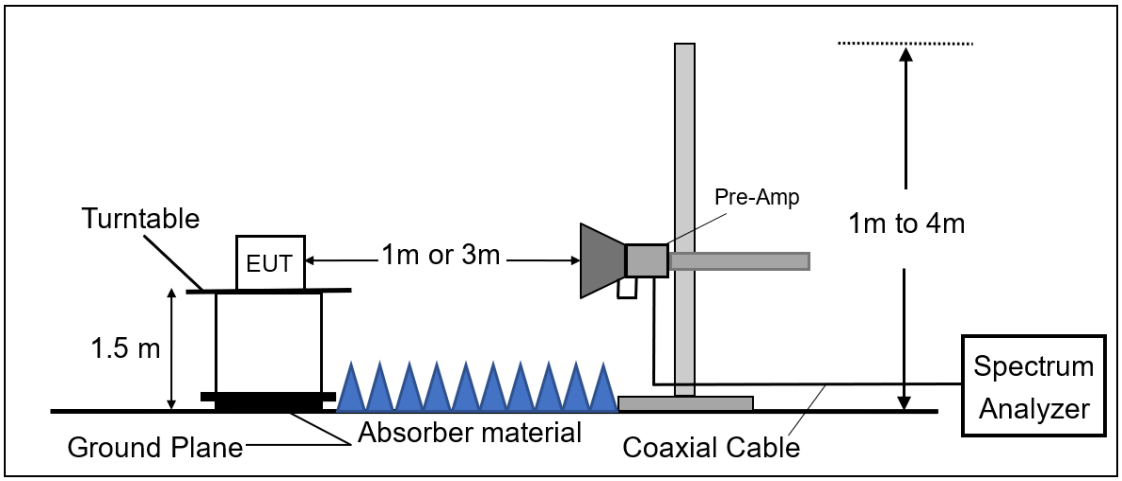
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



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



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



11.3 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.

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. 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.

11.4 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*
RA = Reading Amplitude
AF = Antenna Factor
CL = Cable Attenuation Factor (Cable Loss)
AG = Amplifier Gain

*The limit of the emission level is expressed in dBuV/m, which converts 20*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)

11.5 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.

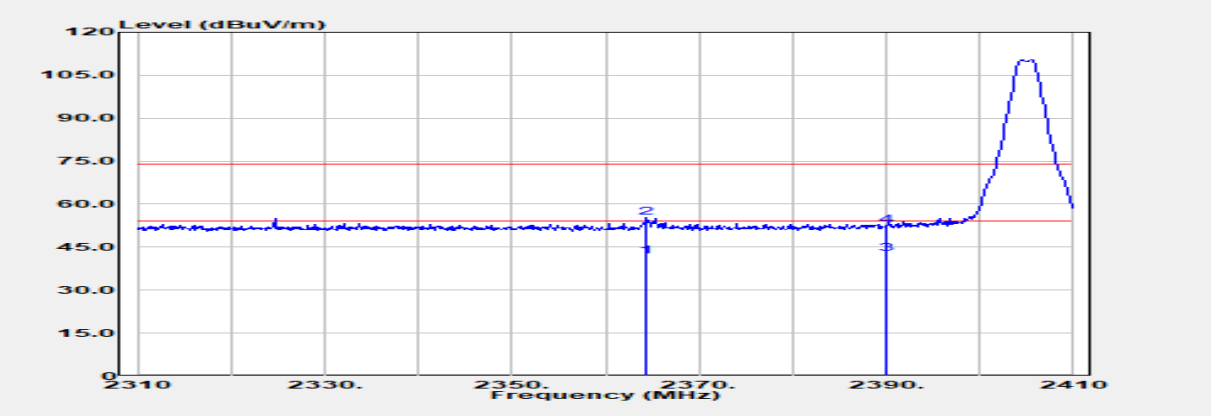
11.6 Measurement Result:

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

11.6.1 Radiated Band Edge Measurement Result

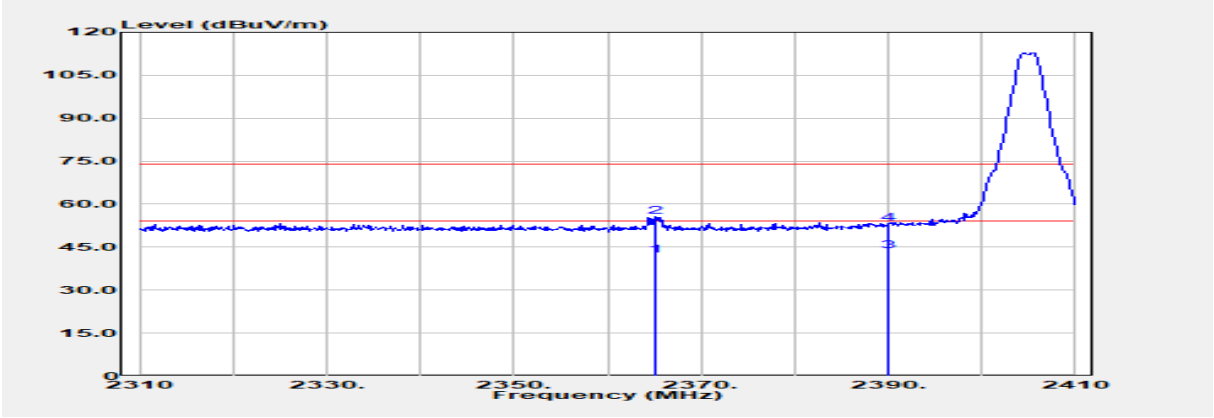
ANT0(monopole)

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2405 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



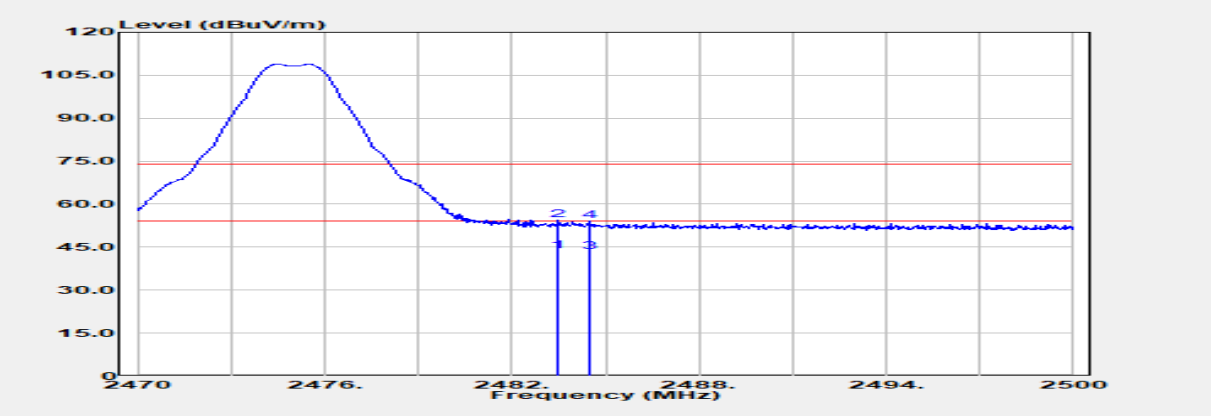
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2364.300	Average	37.80	3.94	41.74	54.00	-12.26
2364.300	Peak	51.34	3.94	55.28	74.00	-18.72
2390.000	Average	38.62	4.03	42.66	54.00	-11.34
2390.000	Peak	48.55	4.03	52.58	74.00	-21.42

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2405 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



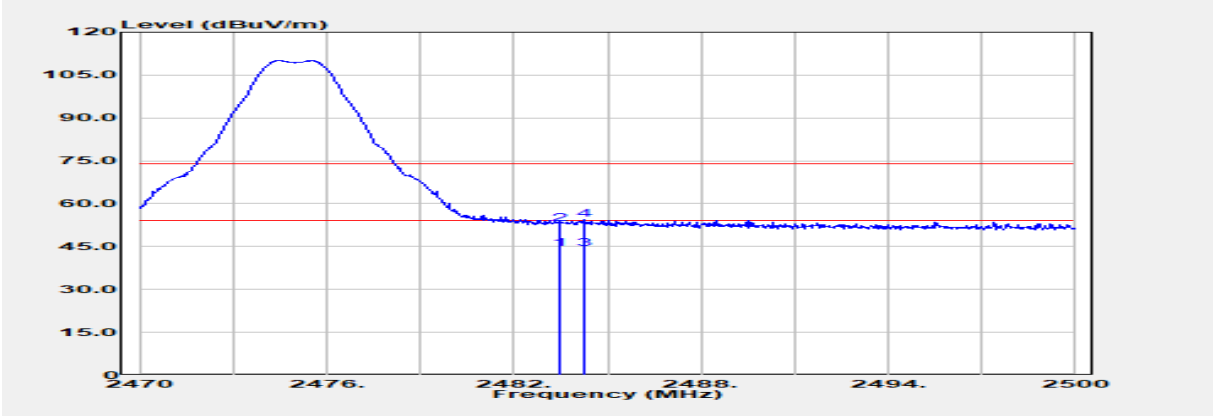
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2365.200	Average	38.02	3.94	41.96	54.00	-12.04
2365.200	Peak	51.75	3.94	55.69	74.00	-18.31
2390.000	Average	39.60	4.03	43.63	54.00	-10.37
2390.000	Peak	49.30	4.03	53.33	74.00	-20.67

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-16
Test Frequency	:2475 MHz	Temp./Humi.	:24.9/50
Test Mode	:Bandedge	Antenna Pol.	:VERTICAL
EUT Pol	:E2 Plane	Engineer	:Andy Wang



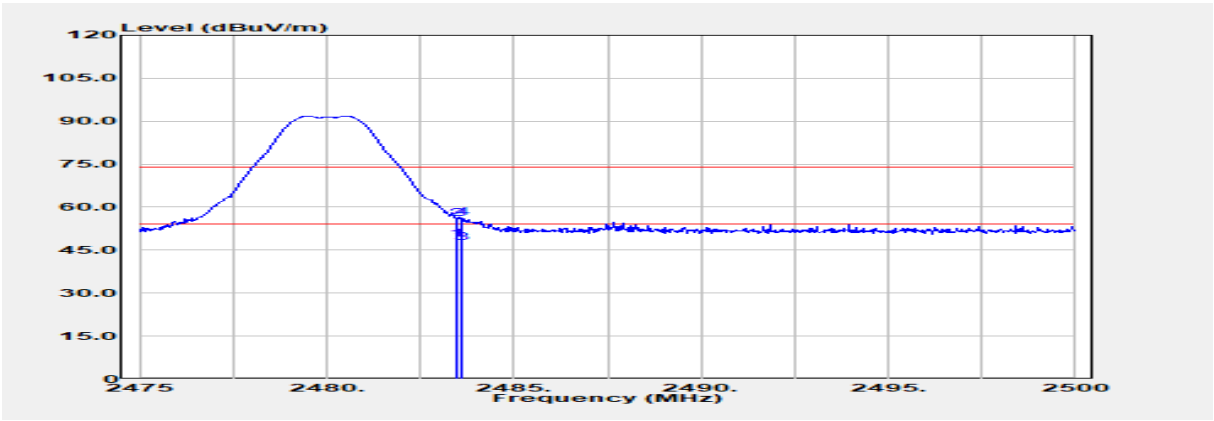
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	39.38	4.20	43.58	54.00	-10.42
2483.500	Peak	50.14	4.20	54.34	74.00	-19.66
2484.460	Average	39.03	4.20	43.23	54.00	-10.77
2484.460	Peak	50.01	4.20	54.21	74.00	-19.79

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-16
Test Frequency	:2475 MHz	Temp./Humi.	:24.9/50
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



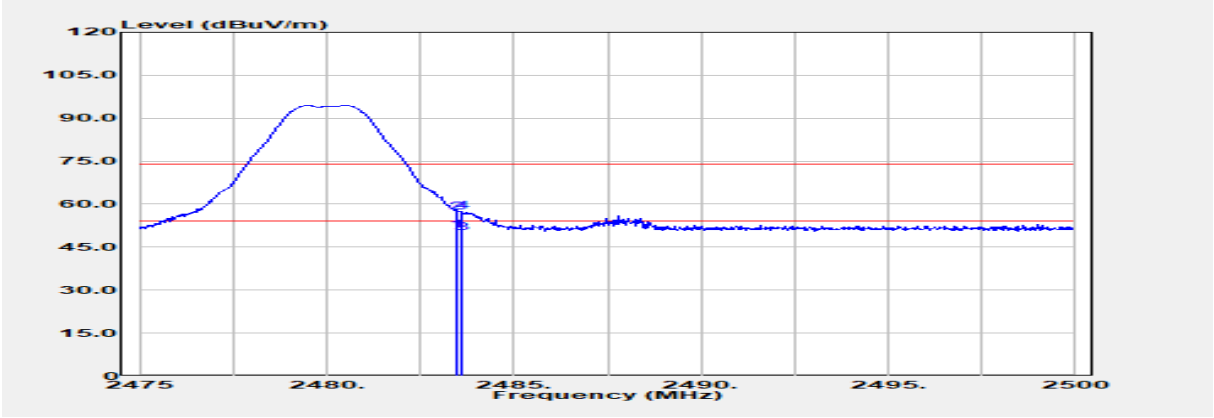
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	40.13	4.20	44.33	54.00	-9.67
2483.500	Peak	48.62	4.20	52.83	74.00	-21.17
2484.280	Average	39.97	4.20	44.17	54.00	-9.83
2484.280	Peak	50.20	4.20	54.40	74.00	-19.60

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	44.41	4.20	48.61	54.00	-5.39
2483.500	Peak	51.78	4.20	55.98	74.00	-18.02
2483.625	Average	43.35	4.20	47.55	54.00	-6.45
2483.625	Peak	52.13	4.20	56.33	74.00	-17.67

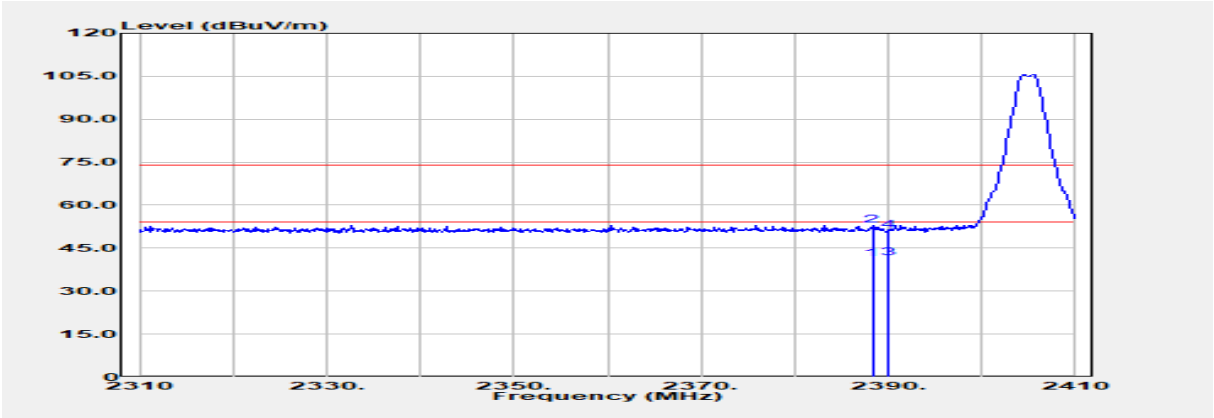
Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	46.59	4.20	50.79	54.00	-3.21
2483.500	Peak	52.89	4.20	57.09	74.00	-16.91
2483.600	Average	45.71	4.20	49.91	54.00	-4.09
2483.600	Peak	53.37	4.20	57.58	74.00	-16.42

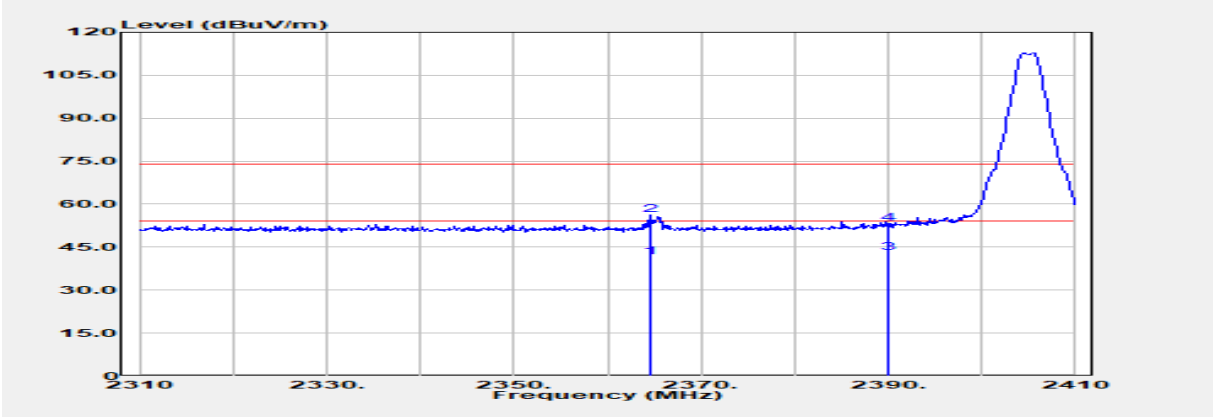
ANT0(dipole)

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2402 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



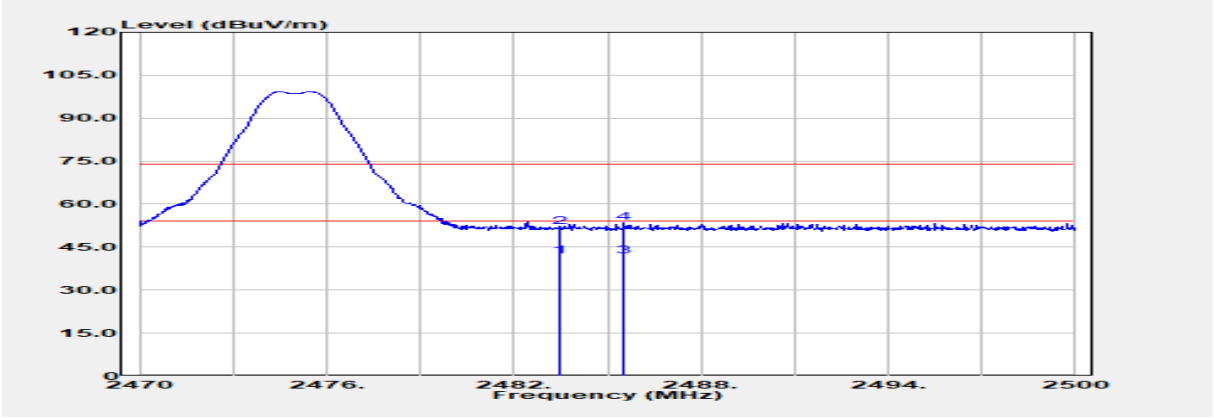
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2388.300	Average	37.28	4.03	41.30	54.00	-12.70
2388.300	Peak	48.97	4.03	53.00	74.00	-21.00
2390.000	Average	37.38	4.03	41.42	54.00	-12.58
2390.000	Peak	47.18	4.03	51.22	74.00	-22.78

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2402 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



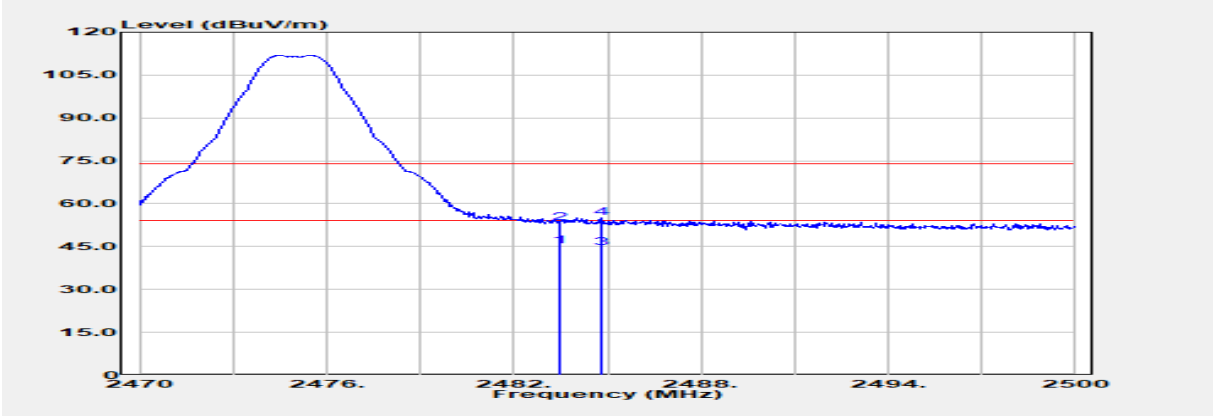
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2364.700	Average	37.52	3.94	41.46	54.00	-12.54
2364.700	Peak	52.33	3.94	56.27	74.00	-17.73
2390.000	Average	38.92	4.03	42.95	54.00	-11.05
2390.000	Peak	49.11	4.03	53.14	74.00	-20.86

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-16
Test Frequency	:2475 MHz	Temp./Humi.	:24.9/50
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



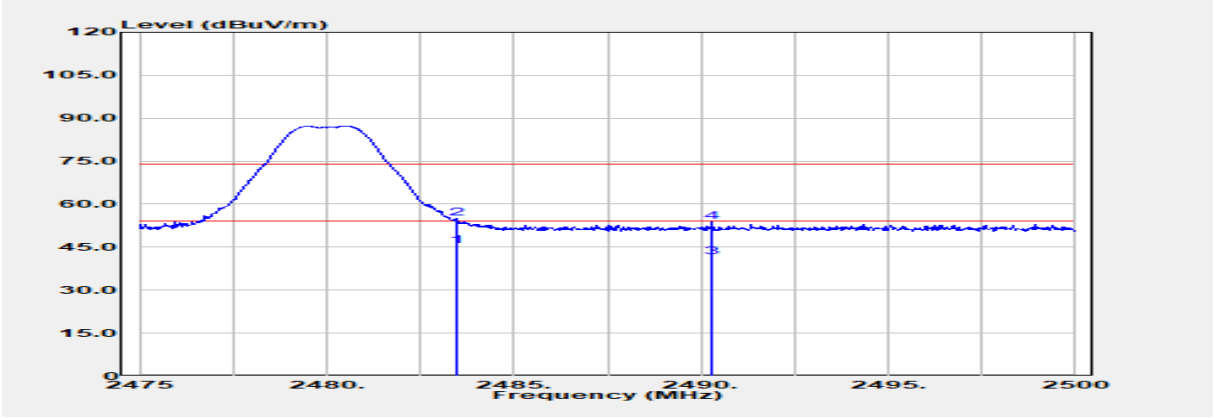
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	37.72	4.20	41.92	54.00	-12.08
2483.500	Peak	47.87	4.20	52.07	74.00	-21.93
2485.540	Average	37.67	4.20	41.86	54.00	-12.14
2485.540	Peak	49.34	4.20	53.53	74.00	-20.47

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-16
Test Frequency	:2475 MHz	Temp./Humi.	:24.9/50
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



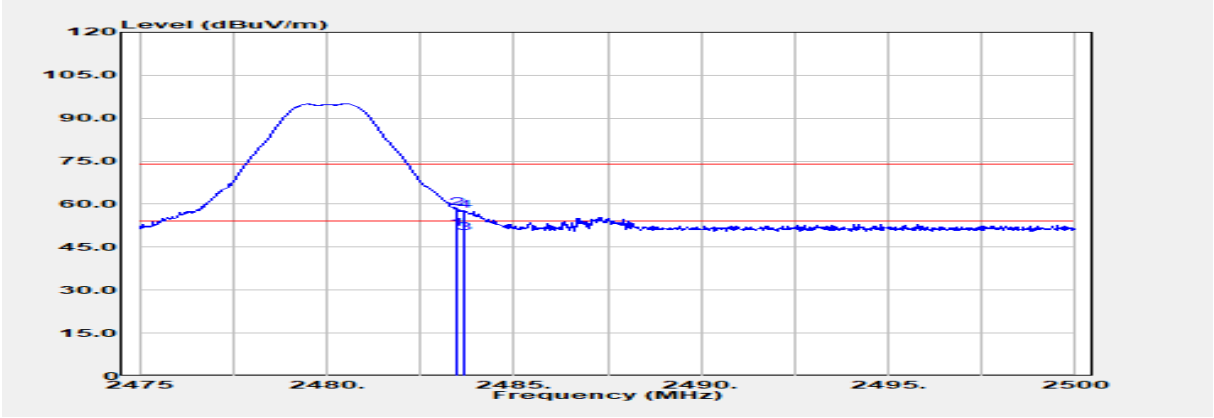
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	40.85	4.20	45.05	54.00	-8.95
2483.500	Peak	49.05	4.20	53.25	74.00	-20.75
2484.790	Average	40.36	4.20	44.56	54.00	-9.44
2484.790	Peak	50.95	4.20	55.15	74.00	-18.85

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	41.27	4.20	45.47	54.00	-8.53
2483.500	Peak	50.93	4.20	55.13	74.00	-18.87
2490.300	Average	37.29	4.18	41.47	54.00	-12.53
2490.300	Peak	49.57	4.18	53.75	74.00	-20.25

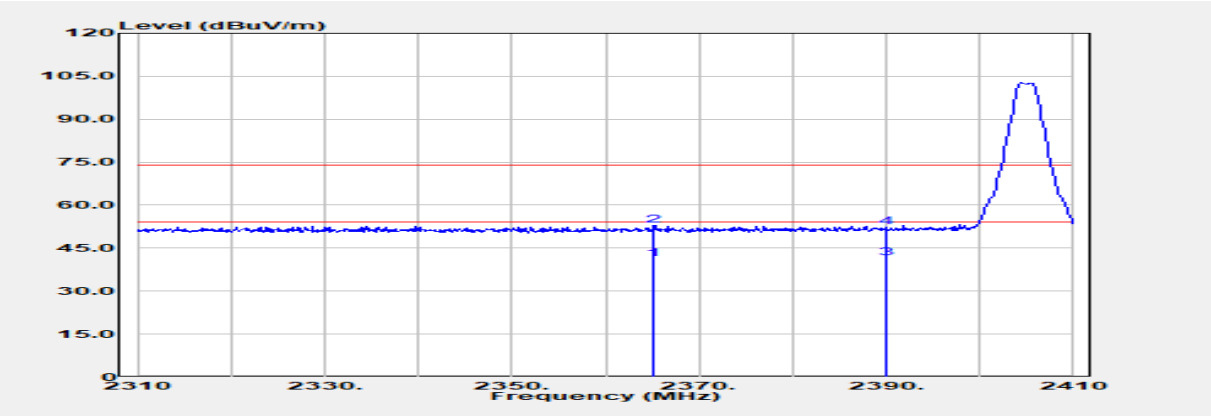
Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	47.22	4.20	51.42	54.00	-2.58
2483.500	Peak	54.49	4.20	58.70	74.00	-15.30
2483.650	Average	45.84	4.20	50.04	54.00	-3.96
2483.650	Peak	53.41	4.20	57.61	74.00	-16.39

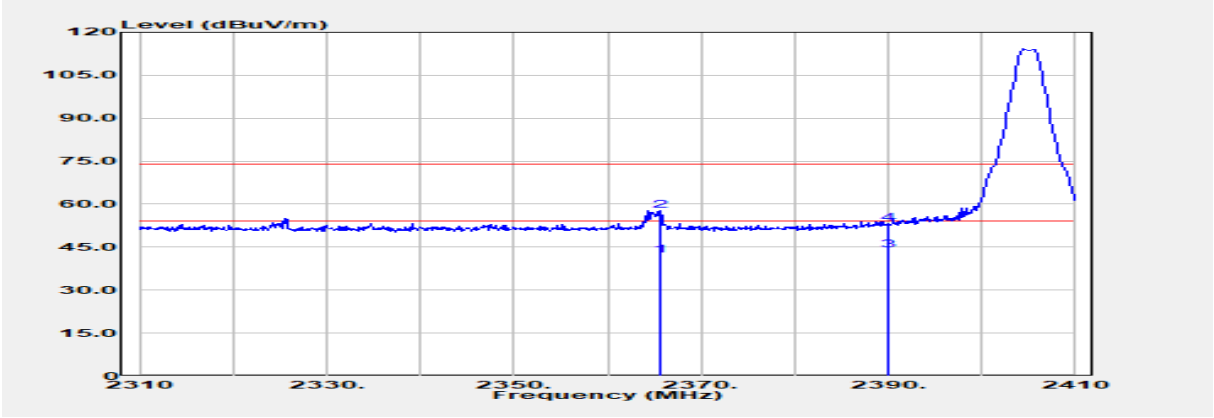
ANT1(dipole)

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2402 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



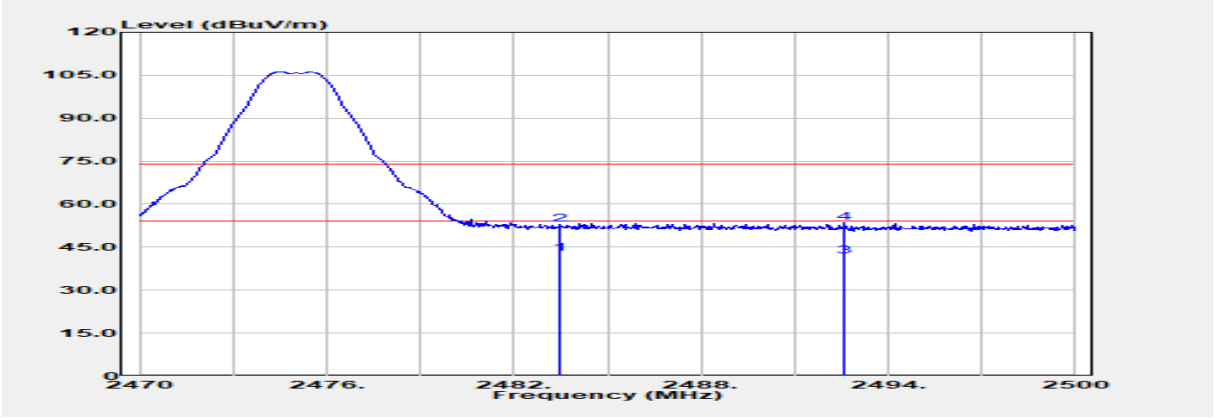
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2365.200	Average	37.20	3.94	41.14	54.00	-12.86
2365.200	Peak	49.04	3.94	52.99	74.00	-21.01
2390.000	Average	37.46	4.03	41.49	54.00	-12.51
2390.000	Peak	48.36	4.03	52.39	74.00	-21.61

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2402 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



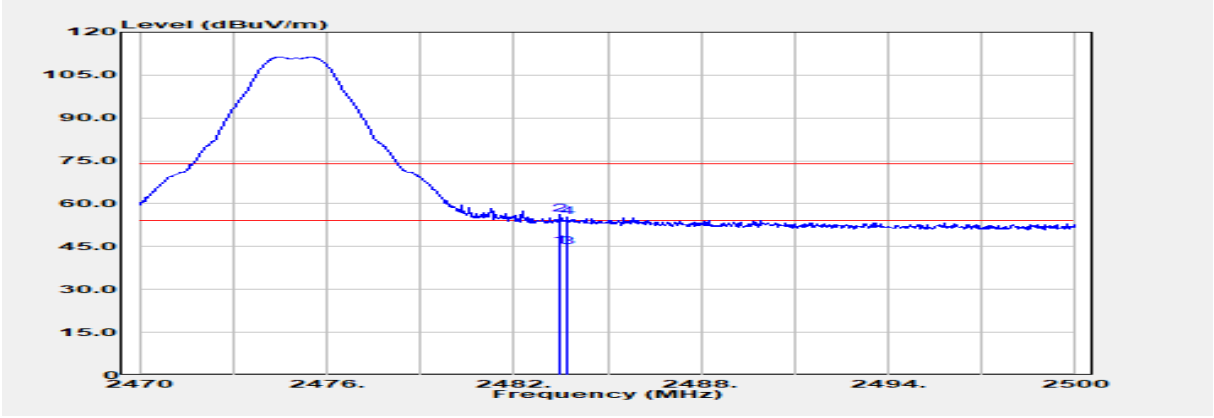
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2365.600	Average	38.05	3.94	41.99	54.00	-12.01
2365.600	Peak	53.75	3.94	57.69	74.00	-16.31
2390.000	Average	39.93	4.03	43.96	54.00	-10.04
2390.000	Peak	49.30	4.03	53.33	74.00	-20.67

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-16
Test Frequency	:2475 MHz	Temp./Humi.	:24.9/50
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



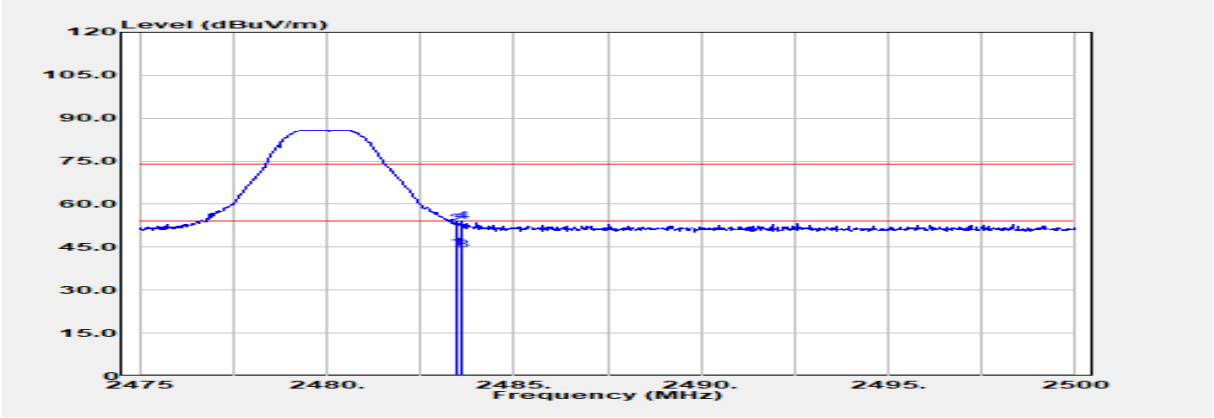
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	38.49	4.20	42.70	54.00	-11.30
2483.500	Peak	48.60	4.20	52.80	74.00	-21.20
2492.620	Average	37.58	4.18	41.76	54.00	-12.24
2492.620	Peak	49.24	4.18	53.42	74.00	-20.58

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-16
Test Frequency	:2475 MHz	Temp./Humi.	:24.9/50
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



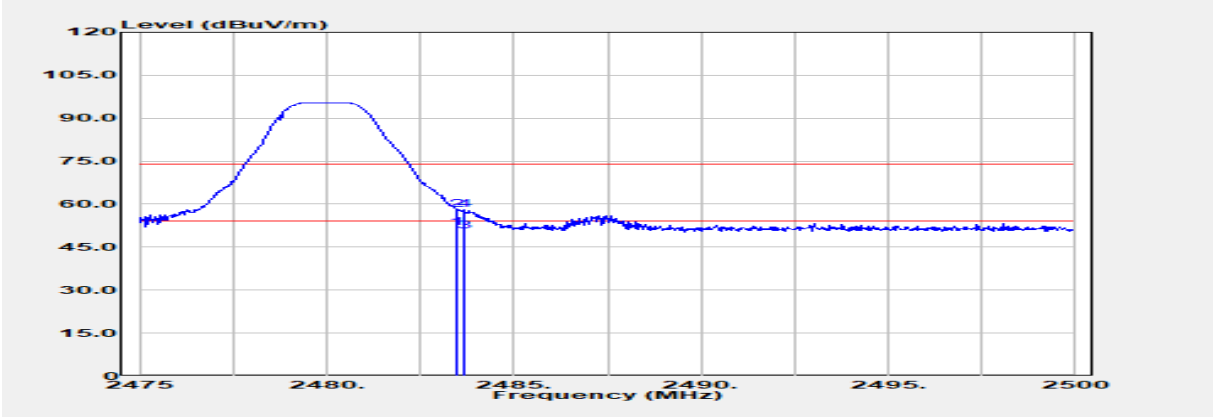
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	40.78	4.20	44.98	54.00	-9.02
2483.500	Peak	52.06	4.20	56.27	74.00	-17.73
2483.740	Average	40.60	4.20	44.80	54.00	-9.20
2483.740	Peak	51.08	4.20	55.28	74.00	-18.72

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	40.25	4.20	44.45	54.00	-9.55
2483.500	Peak	48.71	4.20	52.91	74.00	-21.09
2483.600	Average	39.76	4.20	43.96	54.00	-10.04
2483.600	Peak	49.55	4.20	53.75	74.00	-20.25

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Bandedge	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang

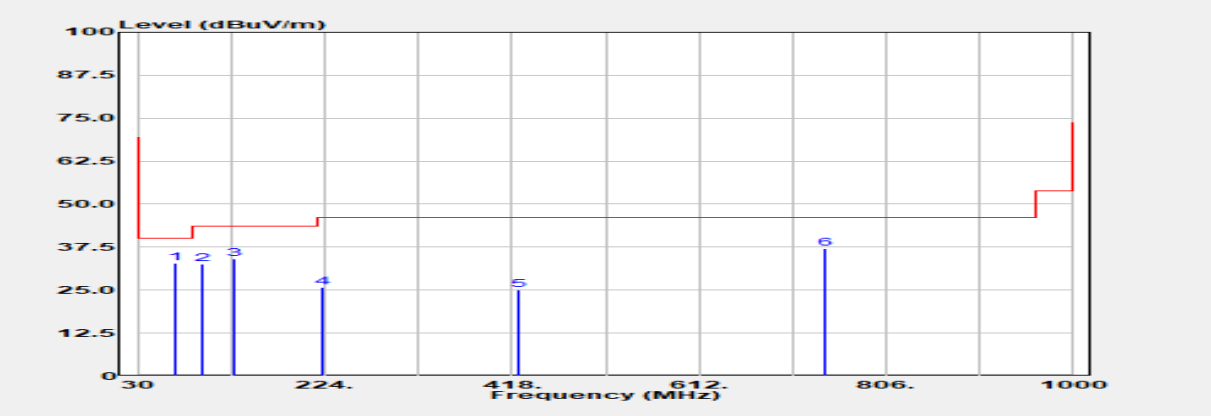


Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.500	Average	47.63	4.20	51.83	54.00	-2.17
2483.500	Peak	53.93	4.20	58.13	74.00	-15.87
2483.650	Average	46.20	4.20	50.40	54.00	-3.60
2483.650	Peak	53.70	4.20	57.90	74.00	-16.10

11.6.2 Radiated Spurious Emission

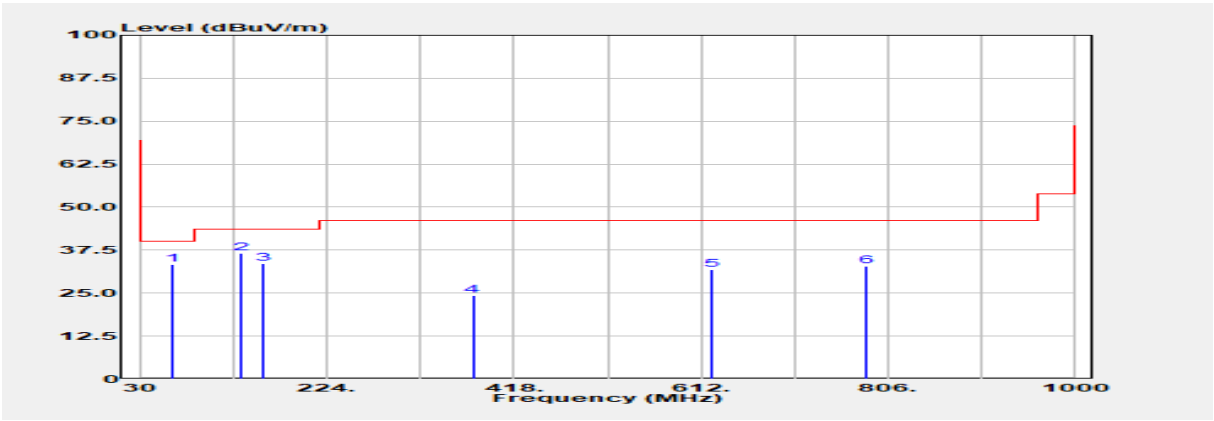
ANT0(monopole)

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-13
Test Frequency	:2440 MHz	Temp./Humi.	:22.1/72
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



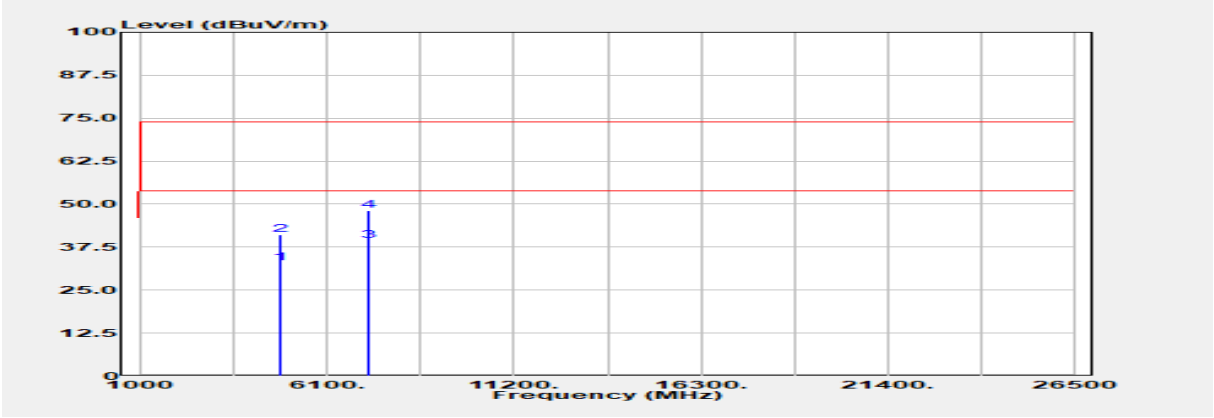
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
69.770	Peak	48.01	-15.26	32.75	40.00	-7.25
97.900	Peak	50.05	-17.53	32.52	43.50	-10.98
129.910	Peak	47.90	-13.85	34.05	43.50	-9.45
222.060	Peak	40.88	-15.13	25.75	46.00	-20.25
424.790	Peak	32.55	-7.50	25.06	46.00	-20.94
742.950	Peak	37.59	-0.54	37.05	46.00	-8.95

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-13
Test Frequency	:2440 MHz	Temp./Humi.	:22.1/72
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



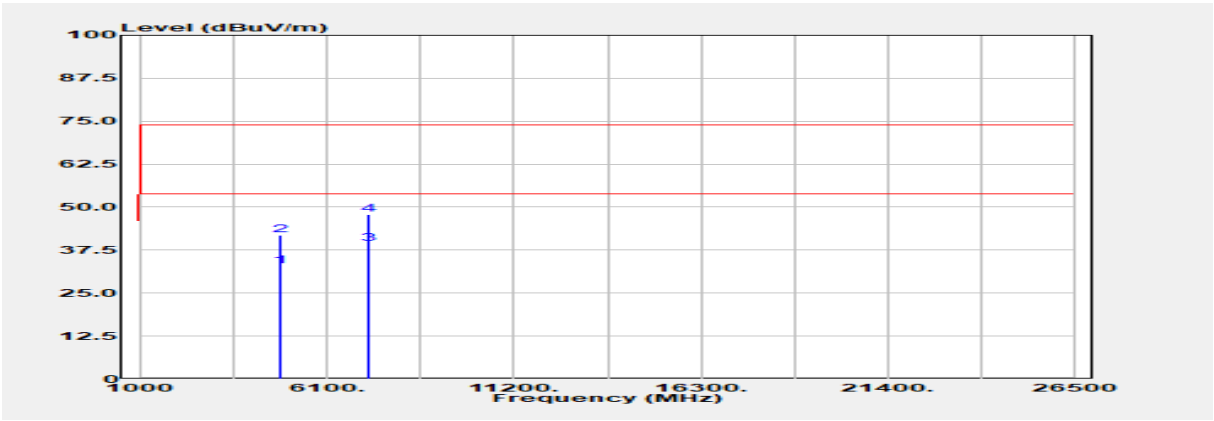
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
64.920	Peak	47.49	-14.21	33.28	40.00	-6.72
135.730	Peak	49.79	-13.19	36.61	43.50	-6.89
158.040	Peak	45.69	-12.05	33.64	43.50	-9.86
375.320	Peak	33.45	-9.03	24.42	46.00	-21.58
623.640	Peak	34.11	-2.29	31.81	46.00	-14.19
783.690	Peak	31.94	0.93	32.87	46.00	-13.13

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2405 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



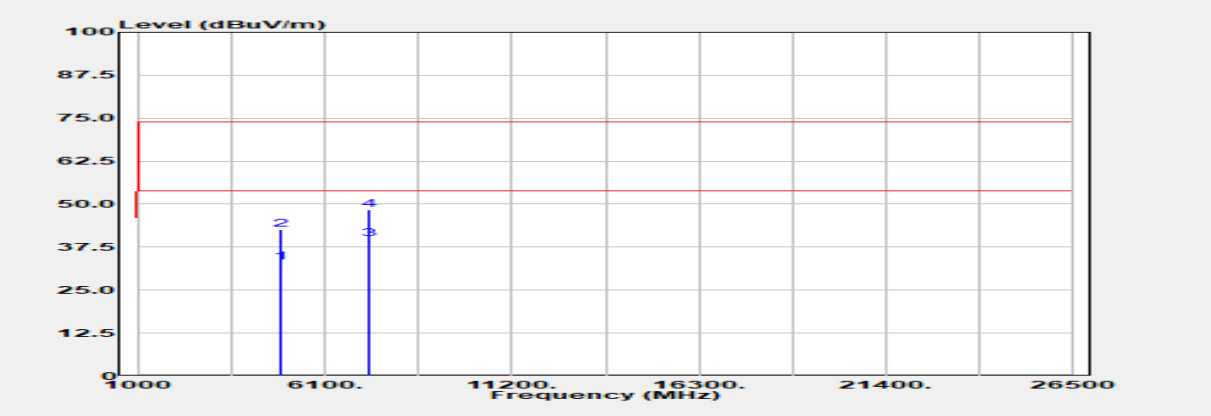
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4810.000	Average	20.36	12.41	32.77	54.00	-21.23
4810.000	Peak	28.68	12.41	41.09	74.00	-32.91
7215.000	Average	19.60	19.86	39.46	54.00	-14.54
7215.000	Peak	28.24	19.86	48.10	74.00	-25.90

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2405 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



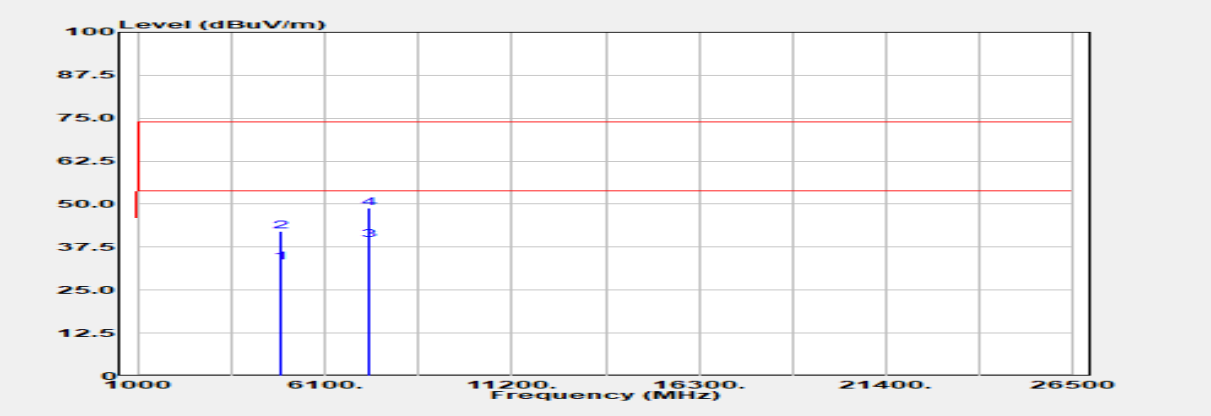
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4810.000	Average	20.35	12.41	32.76	54.00	-21.24
4810.000	Peak	29.36	12.41	41.77	74.00	-32.23
7215.000	Average	19.41	19.86	39.26	54.00	-14.74
7215.000	Peak	28.02	19.86	47.88	74.00	-26.12

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2440 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



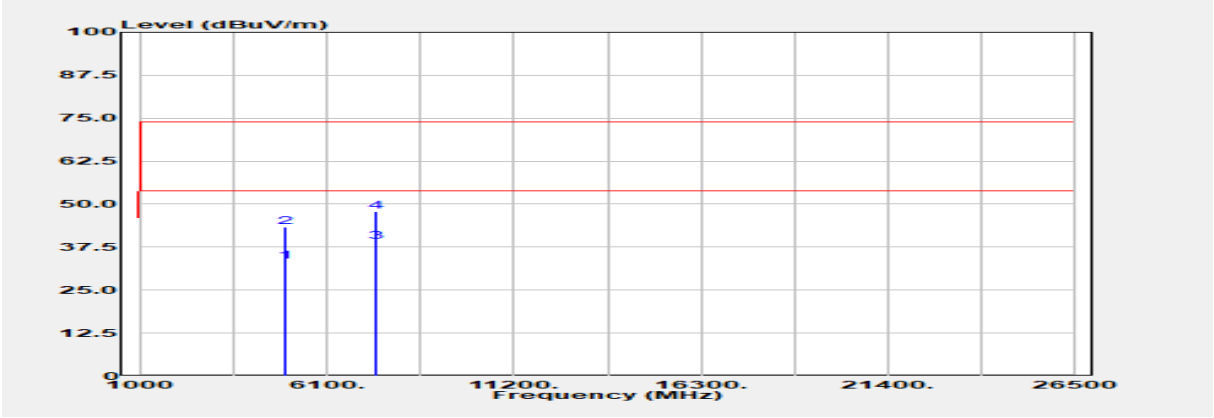
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4880.000	Average	20.56	12.56	33.12	54.00	-20.88
4880.000	Peak	30.04	12.56	42.60	74.00	-31.40
7320.000	Average	19.11	20.69	39.80	54.00	-14.20
7320.000	Peak	27.67	20.69	48.36	74.00	-25.64

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2440 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



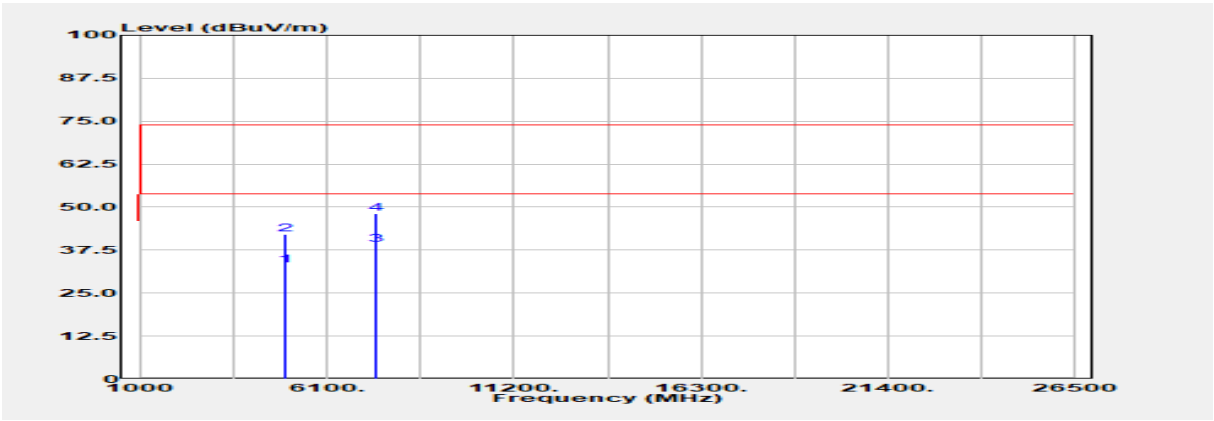
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4880.000	Average	20.42	12.56	32.97	54.00	-21.03
4880.000	Peak	29.51	12.56	42.07	74.00	-31.93
7320.000	Average	19.03	20.69	39.72	54.00	-14.28
7320.000	Peak	28.28	20.69	48.97	74.00	-25.03

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.000	Average	20.75	12.49	33.24	54.00	-20.76
4960.000	Peak	30.75	12.49	43.24	74.00	-30.76
7440.000	Average	18.41	20.58	38.99	54.00	-15.01
7440.000	Peak	27.21	20.58	47.79	74.00	-26.21

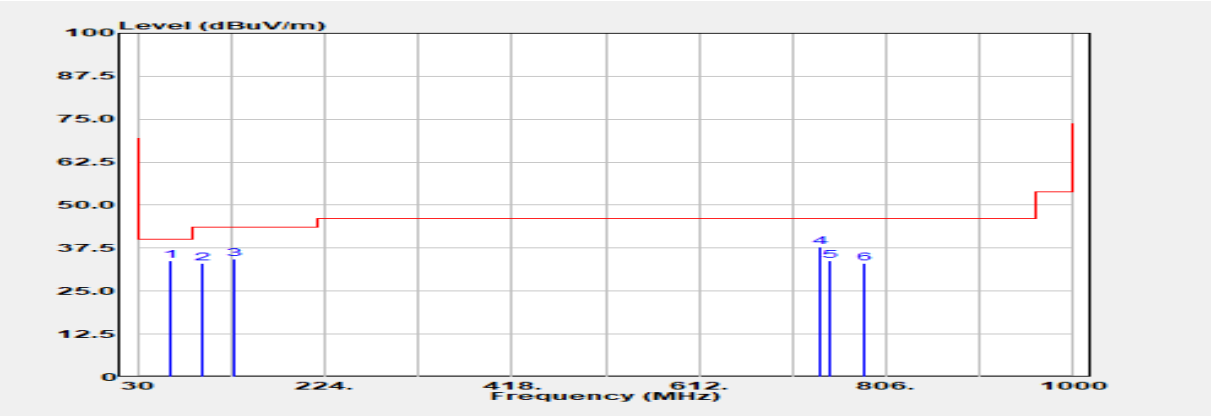
Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.000	Average	20.67	12.49	33.15	54.00	-20.85
4960.000	Peak	29.68	12.49	42.17	74.00	-31.83
7440.000	Average	18.42	20.58	39.00	54.00	-15.00
7440.000	Peak	27.61	20.58	48.19	74.00	-25.81

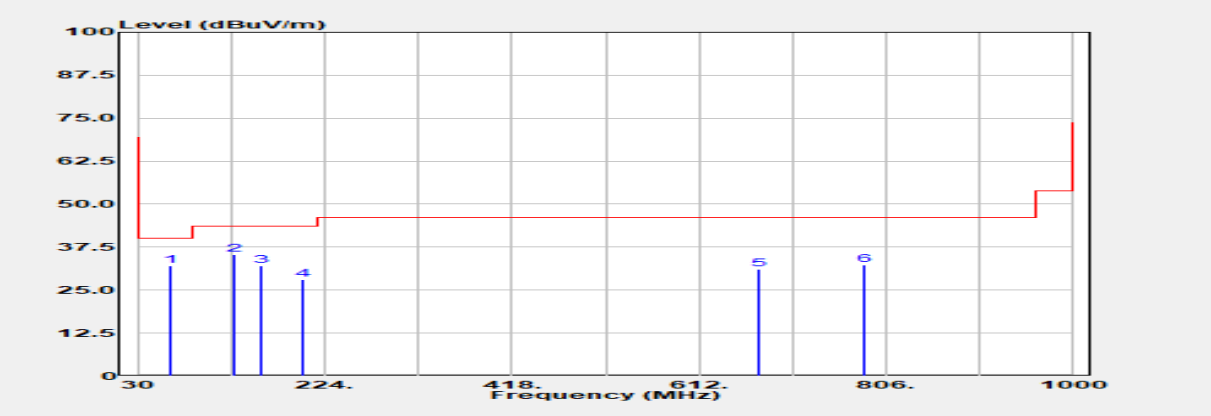
ANT0(dipole)

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-13
Test Frequency	:2440 MHz	Temp./Humi.	:22.1/72
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



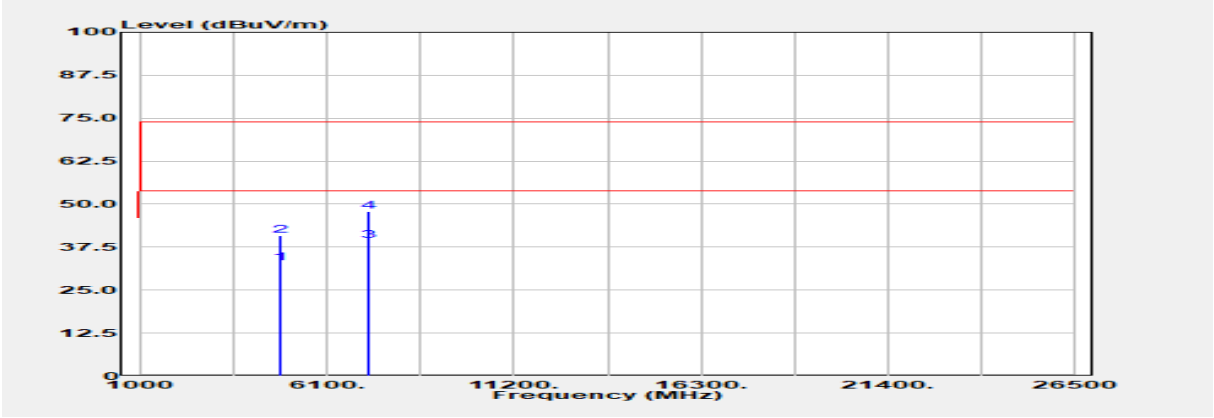
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
63.950	Peak	47.80	-13.96	33.84	40.00	-6.16
97.900	Peak	50.58	-17.53	33.05	43.50	-10.45
130.880	Peak	47.99	-13.73	34.26	43.50	-9.24
737.130	Peak	38.30	-0.45	37.85	46.00	-8.15
746.830	Peak	34.47	-0.62	33.86	46.00	-12.14
783.690	Peak	32.08	0.93	33.01	46.00	-12.99

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-13
Test Frequency	:2440 MHz	Temp./Humi.	:22.1/72
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



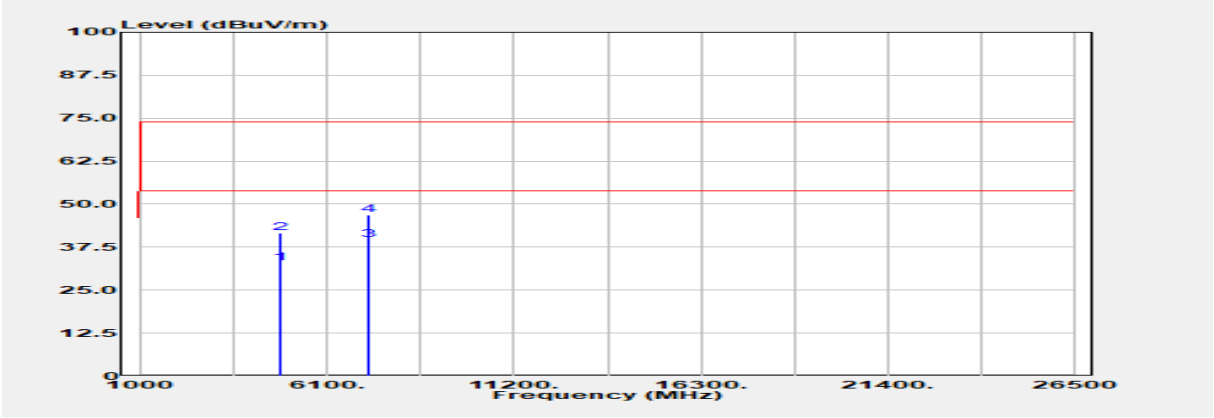
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
64.920	Peak	46.31	-14.21	32.09	40.00	-7.91
130.880	Peak	49.11	-13.73	35.39	43.50	-8.11
157.070	Peak	44.20	-12.15	32.05	43.50	-11.45
201.690	Peak	43.70	-15.62	28.08	43.50	-15.42
675.050	Peak	32.58	-1.56	31.01	46.00	-14.99
783.690	Peak	31.31	0.93	32.24	46.00	-13.76

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2405 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



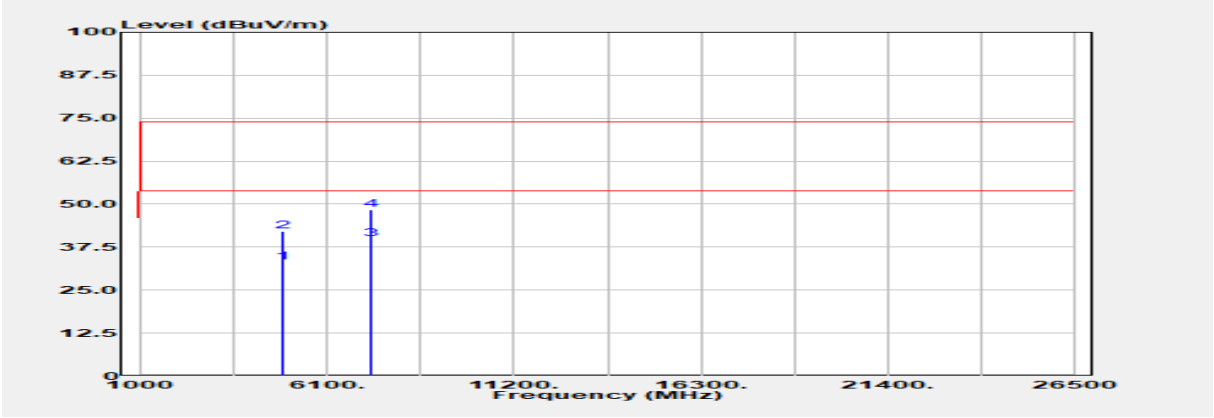
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4810.000	Average	20.49	12.41	32.90	54.00	-21.10
4810.000	Peak	28.56	12.41	40.97	74.00	-33.03
7215.000	Average	19.54	19.86	39.39	54.00	-14.61
7215.000	Peak	28.11	19.86	47.96	74.00	-26.04

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2405 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



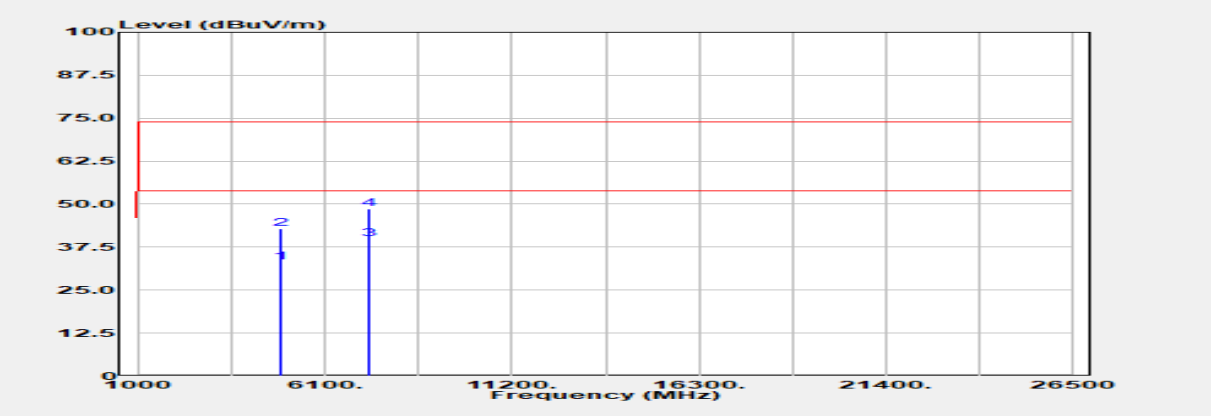
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4810.000	Average	20.43	12.41	32.84	54.00	-21.16
4810.000	Peak	29.13	12.41	41.54	74.00	-32.46
7215.000	Average	19.62	19.86	39.48	54.00	-14.52
7215.000	Peak	26.94	19.86	46.80	74.00	-27.20

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2440 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



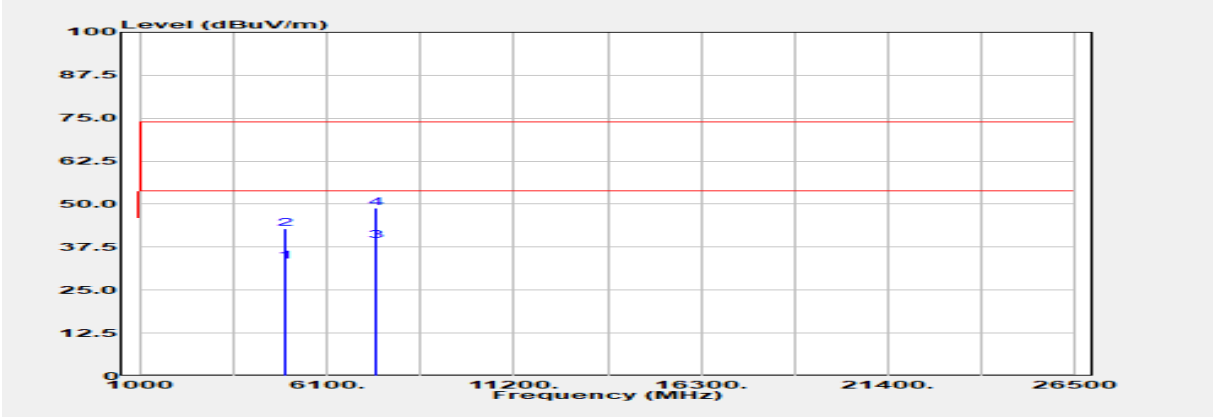
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4880.000	Average	20.46	12.56	33.02	54.00	-20.98
4880.000	Peak	29.51	12.56	42.07	74.00	-31.93
7320.000	Average	19.27	20.69	39.96	54.00	-14.04
7320.000	Peak	27.72	20.69	48.40	74.00	-25.60

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2440 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



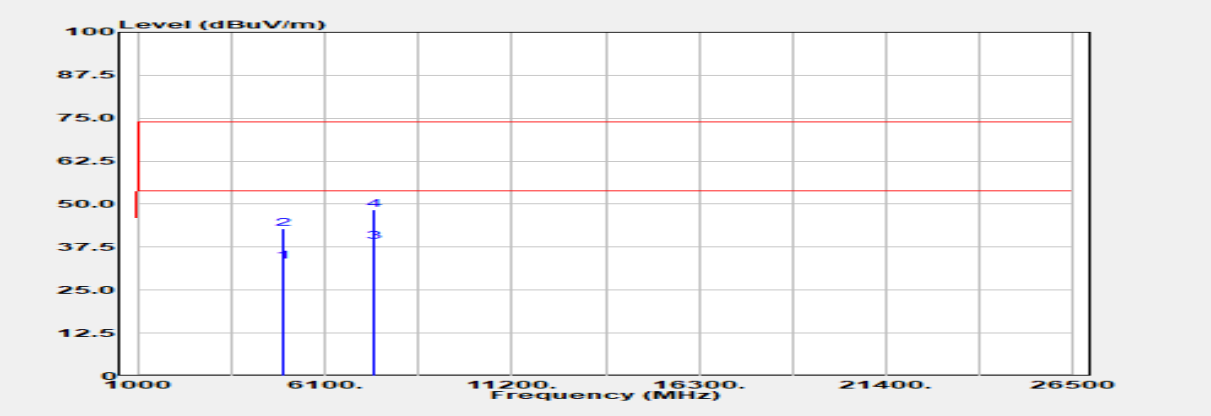
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4880.000	Average	20.40	12.56	32.96	54.00	-21.04
4880.000	Peak	30.20	12.56	42.76	74.00	-31.24
7320.000	Average	19.13	20.69	39.82	54.00	-14.18
7320.000	Peak	27.97	20.69	48.66	74.00	-25.34

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.000	Average	20.91	12.49	33.40	54.00	-20.60
4960.000	Peak	30.24	12.49	42.73	74.00	-31.27
7440.000	Average	18.66	20.58	39.24	54.00	-14.76
7440.000	Peak	28.20	20.58	48.78	74.00	-25.22

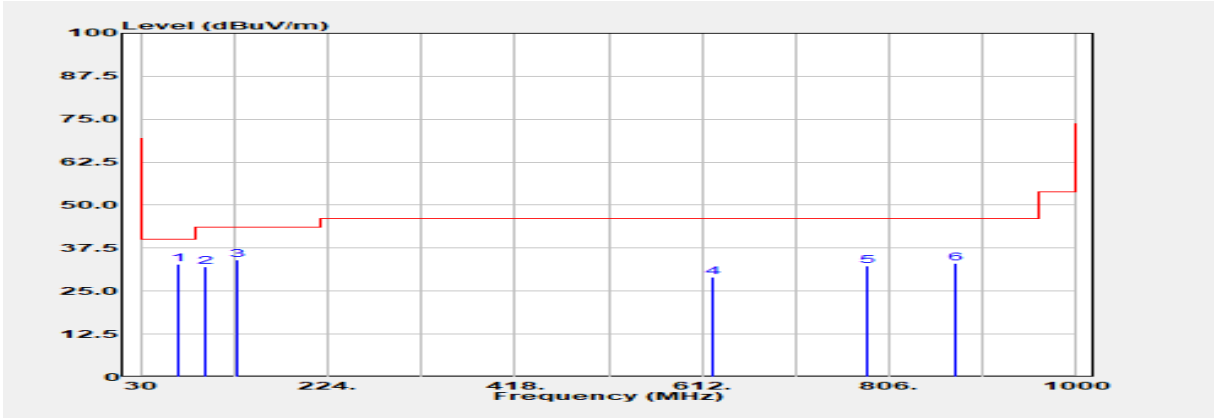
Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.000	Average	20.82	12.49	33.31	54.00	-20.69
4960.000	Peak	30.25	12.49	42.74	74.00	-31.26
7440.000	Average	18.53	20.58	39.11	54.00	-14.89
7440.000	Peak	27.89	20.58	48.47	74.00	-25.53

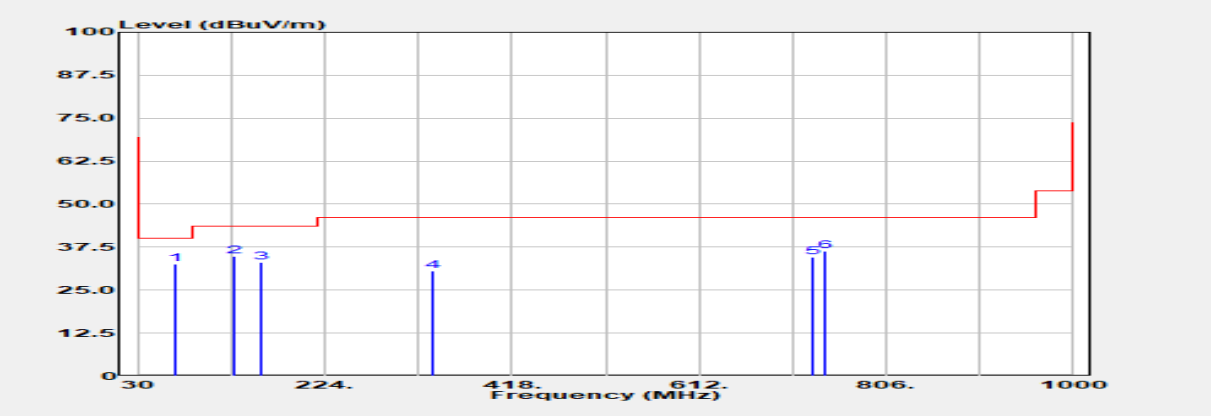
ANT1(dipole)

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-13
Test Frequency	:2440 MHz	Temp./Humi.	:22.1/72
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



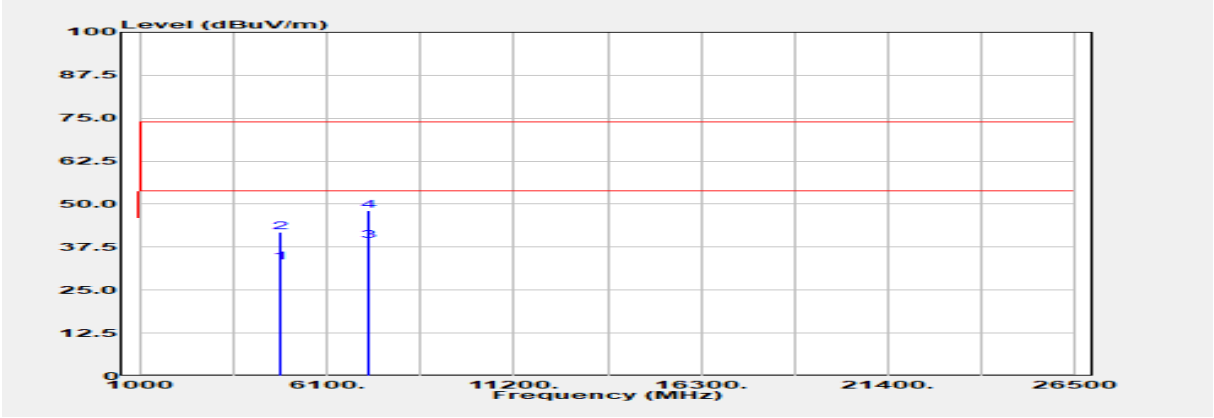
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
69.770	Peak	48.10	-15.26	32.84	40.00	-7.16
97.900	Peak	49.67	-17.53	32.15	43.50	-11.35
129.910	Peak	47.99	-13.85	34.14	43.50	-9.36
623.640	Peak	31.33	-2.29	29.04	46.00	-16.96
783.690	Peak	31.50	0.93	32.43	46.00	-13.57
874.870	Peak	30.81	2.34	33.15	46.00	-12.85

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-13
Test Frequency	:2440 MHz	Temp./Humi.	:22.1/72
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



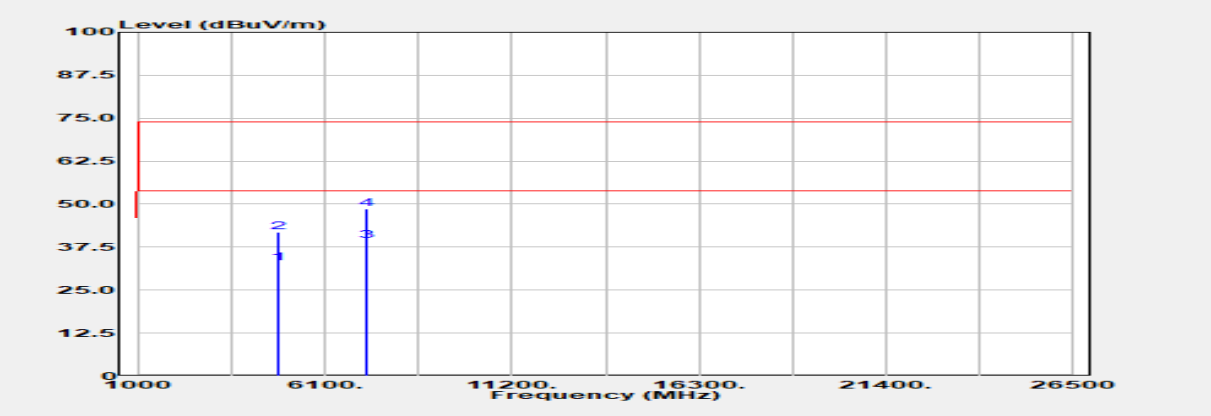
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
69.770	Peak	47.77	-15.26	32.51	40.00	-7.49
129.910	Peak	48.66	-13.85	34.81	43.50	-8.69
157.070	Peak	45.30	-12.15	33.15	43.50	-10.35
336.520	Peak	40.81	-10.26	30.56	46.00	-15.44
729.370	Peak	35.20	-0.65	34.55	46.00	-11.45
742.950	Peak	36.75	-0.54	36.22	46.00	-9.78

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2405 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



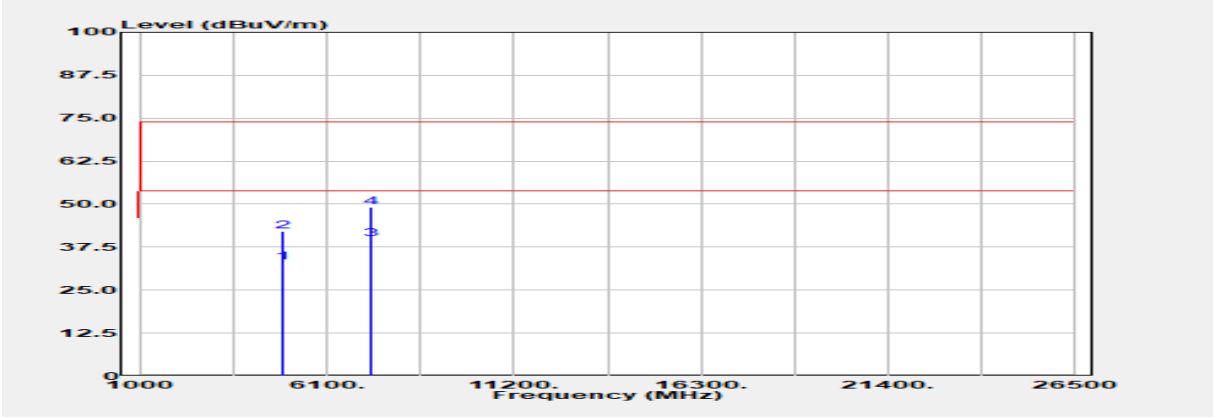
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4810.000	Average	20.72	12.41	33.13	54.00	-20.87
4810.000	Peak	29.34	12.41	41.75	74.00	-32.25
7215.000	Average	19.57	19.86	39.43	54.00	-14.57
7215.000	Peak	28.24	19.86	48.09	74.00	-25.91

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2405 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



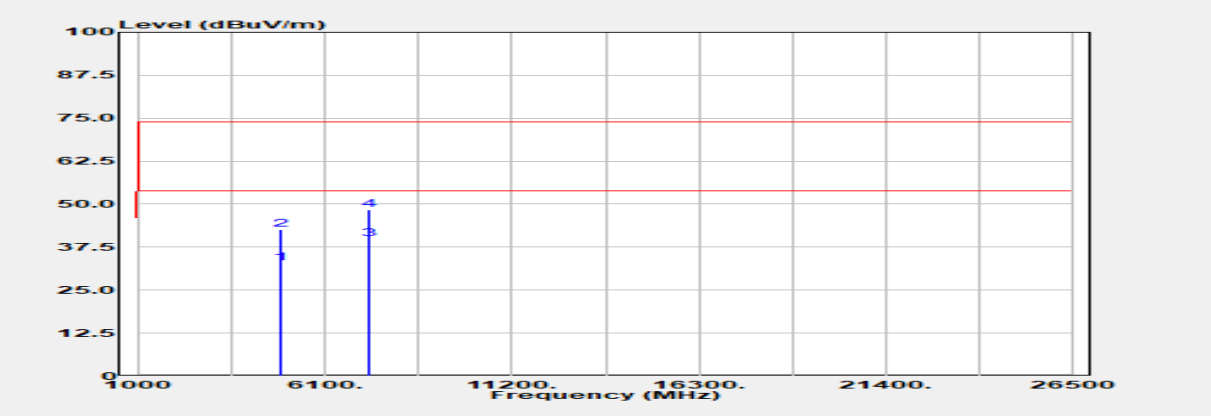
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4810.000	Average	20.43	12.41	32.84	54.00	-21.16
4810.000	Peak	29.56	12.41	41.97	74.00	-32.03
7215.000	Average	19.56	19.86	39.42	54.00	-14.58
7215.000	Peak	28.83	19.86	48.68	74.00	-25.32

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2440 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



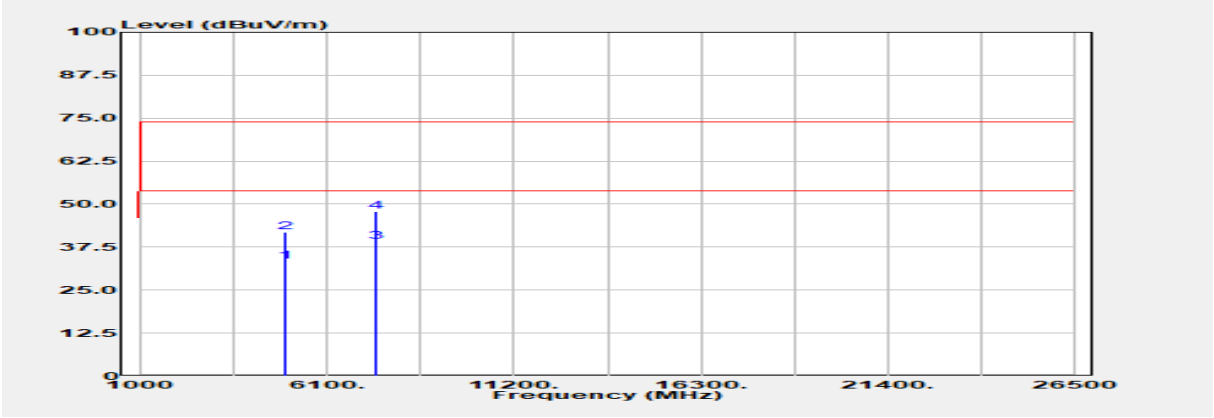
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4880.000	Average	20.48	12.56	33.04	54.00	-20.96
4880.000	Peak	29.49	12.56	42.05	74.00	-31.95
7320.000	Average	19.12	20.69	39.81	54.00	-14.19
7320.000	Peak	28.41	20.69	49.09	74.00	-24.91

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2440 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



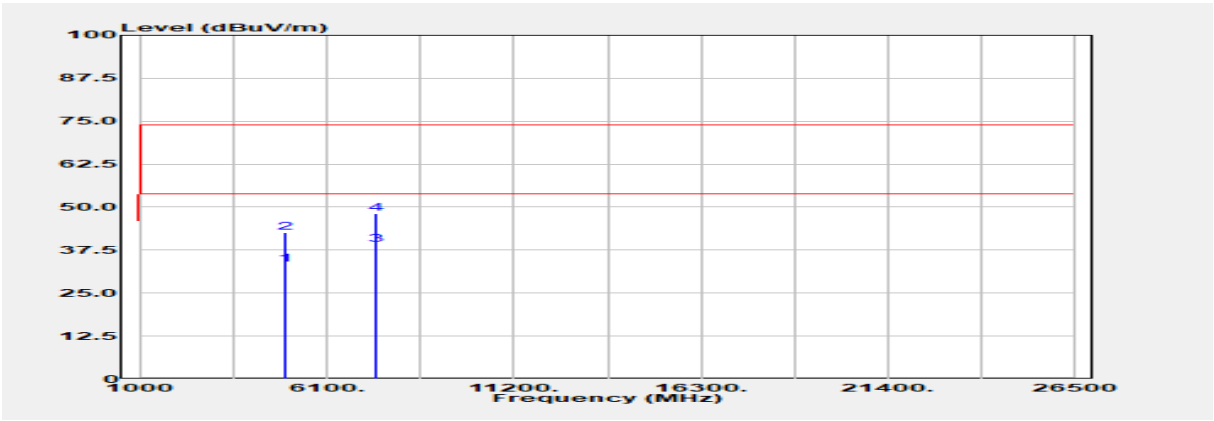
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4880.000	Average	20.39	12.56	32.95	54.00	-21.05
4880.000	Peak	29.94	12.56	42.50	74.00	-31.50
7320.000	Average	19.10	20.69	39.78	54.00	-14.22
7320.000	Peak	27.57	20.69	48.26	74.00	-25.74

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:E2 Plane	Engineer	:Andy Wang



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.000	Average	20.85	12.49	33.33	54.00	-20.67
4960.000	Peak	29.42	12.49	41.91	74.00	-32.09
7440.000	Average	18.58	20.58	39.16	54.00	-14.84
7440.000	Peak	27.28	20.58	47.86	74.00	-26.14

Report Number	:TERF2211002516E2	Test Site	:SAC C
Operation Mode	:IEEE 802.15.4	Test Date	:2023-02-12
Test Frequency	:2480 MHz	Temp./Humi.	:21.6/68
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:E2 Plane	Engineer	:Andy Wang



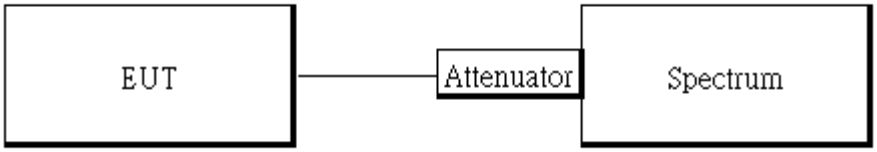
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.000	Average	20.79	12.49	33.28	54.00	-20.72
4960.000	Peak	30.01	12.49	42.50	74.00	-31.50
7440.000	Average	18.49	20.58	39.07	54.00	-14.93
7440.000	Peak	27.56	20.58	48.14	74.00	-25.86

12 POWER SPECTRAL DENSITY

12.1 Standard Applicable:

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

12.2 Test Setup



12.3 Measurement Procedure:

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 3 kHz. & the VBW = 10 kHz
5. For defining Restricted Band Edge Limit:
   Set the RBW = 100kHz & VBW = 300 kHz.
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level.

12.4 Measurement Result:

ANT0

IEEE 802.15.4 mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2405	2.110	8	PASS
2440	2.080	8	PASS
2480	-16.740	8	PASS

NOTE: cable loss as 10.8dB that offsets in the spectrum

ANT1

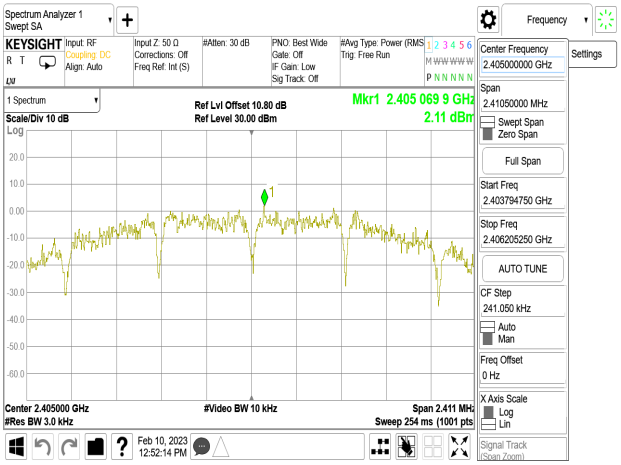
IEEE 802.15.4 mode

Frequency (MHz)	RF Power Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Result
2405	1.760	8	PASS
2440	1.660	8	PASS
2480	-15.450	8	PASS

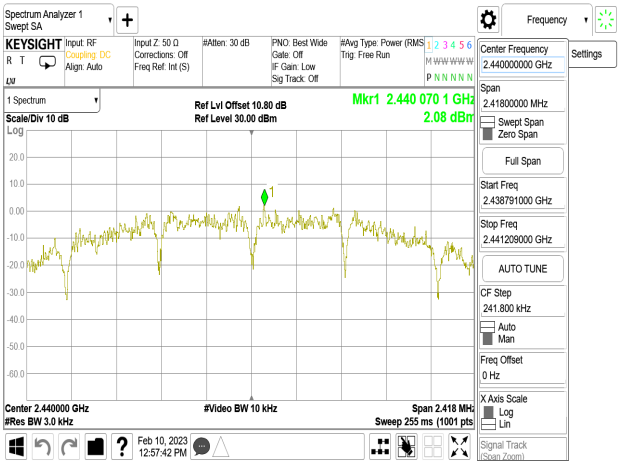
NOTE: cable loss as 10.8dB that offsets in the spectrum

ANT0

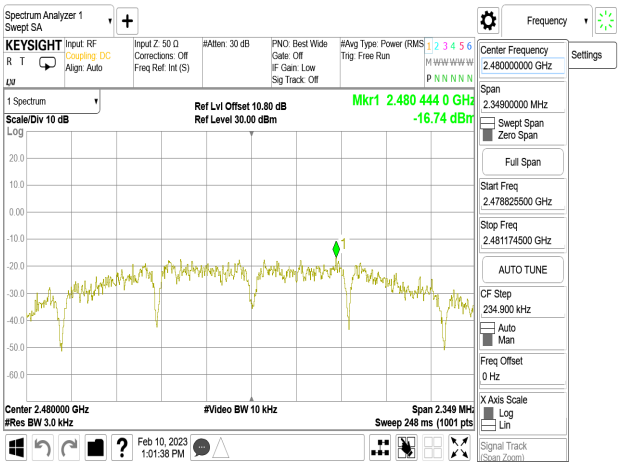
PSD_IEEE 802.15.4 _LowCH11-2405MHz



PSD_IEEE 802.15.4_MidCH18-2440MHz

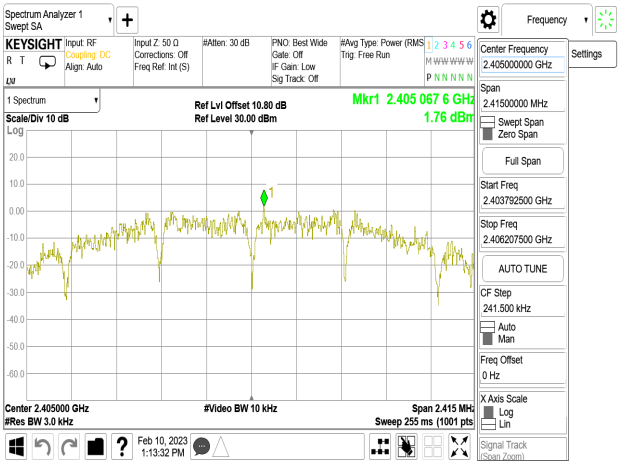


PSD_IEEE 802.15.4_HighCH26-2480MHz

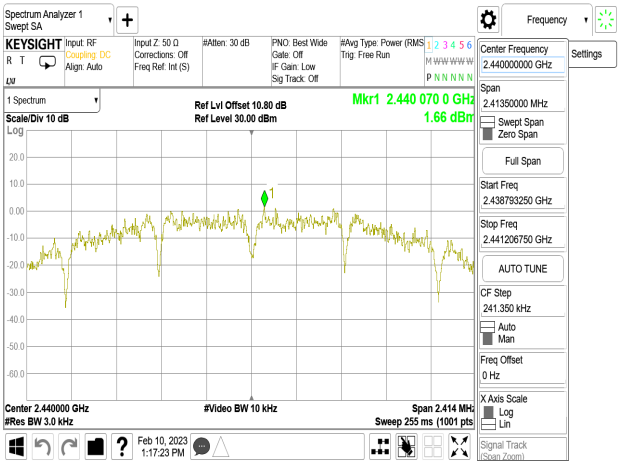


ANT1

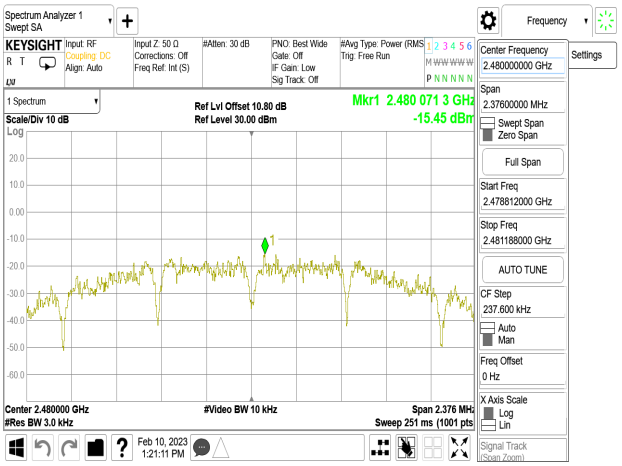
PSD_ IEEE 802.15.4 _LowCH11-2405MHz



PSD_ IEEE 802.15.4_MidCH18-2440MHz



PSD_ IEEE 802.15.4_HighCH26-2480MHz



13 ANTENNA REQUIREMENT

13.1 Standard Applicable:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

13.2 Antenna Connected Construction:

The antenna complies with this requirement and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~