




## FCC ISED RF Test Report

<b>Test Report Number</b>	PTK-21041441-C-FCC-IC-DTS
<b>FCC ID</b> <b>ISED ID</b>	2ALBDPT30U 23529-PT30U
<b>Applicant</b> <b>Applicant Address</b> <b>Product Name</b> <b>Model (s)</b> <b>Date of Receipt</b> <b>Date of Test</b> <b>Report Issue Date</b> <b>Test Standards</b> <b>Test Result</b>	Pacific Track, LLC 1300 Bristol Street North, Newport Beach, CA 92660 Electronic Logging Device with BLE PT30 05/05/2021 05/12/2021-05/28/2021 05/28/2021 47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017 <b>PASS</b>
	Issued by:  <b>Vista Compliance Laboratories</b> 1261 Puerta Del Sol, San Clemente, CA 92673 USA <a href="http://www.vista-compliance.com">www.vista-compliance.com</a>
 <hr/> <b>Daniel Bruno (Test Technician)</b>	 <hr/> <b>David Zhang (Technical Manager)</b>
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**REVISION HISTORY**

<b>Report Number</b>	<b>Version</b>	<b>Description</b>	<b>Issued Date</b>
PTK-21041441-C-FCC-IC-DTS	01	Initial report	05/28/2021

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## 1 Test Summary

Test Item	Test Requirement	Test Method	Result
Antenna Requirement	47 CFR Part 15.247	ANSI C63.10-2013 558074 D01 15.247 Meas Guidance v05r02	Pass
AC Power Line Conducted Emissions	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10-2013 558074 D01 15.247 Meas Guidance v05r02	N/A
99% Occupied Bandwidth	RSS-247 Issue 2, Feb 2017	RSS-Gen Issue 5, Mar 2019	Pass
DTS (6 dB) Channel Bandwidth	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10-2013 558074 D01 15.247 Meas Guidance v05r02	Pass
Conducted Maximum Output Power	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10-2013 558074 D01 15.247 Meas Guidance v05r02	Pass
Power Spectral Density	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10-2013 558074 D01 15.247 Meas Guidance v05r02	Pass
Conducted Band-Edge & Unwanted Emissions	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10-2013 558074 D01 15.247 Meas Guidance v05r02	Pass
Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10-2013 558074 D01 15.247 Meas Guidance v05r02	Pass

## 2 General Information

### 2.1 Applicant

<b>Applicant</b>	Pacific Track, LLC
<b>Applicant address</b>	1300 Bristol Street North, Suite 100, Newport Beach, CA, 92660
<b>Manufacturer</b>	Pacific Track, LLC
<b>Manufacturer Address</b>	1300 Bristol Street North, Suite 100, Newport Beach, CA, 92660

### 2.2 Product information

<b>Product Name</b>	Electronic Logging Device with BLE
<b>Product Description</b>	Electronic Logging Device with BLE
<b>Model Number</b>	PT30
<b>Family Models</b>	N/A
<b>Serial Number</b>	3B4000170580
<b>Frequency Band</b>	2402-2480MHz
<b>Type of modulation</b>	GFSK
<b>Equipment Class</b>	DTS
<b>Antenna Information</b>	Internal Antenna
<b>Clock Frequencies</b>	N/A
<b>Input Power</b>	12VDC Car Battery
<b>Power Adapter Manufacturer/Model</b>	UNIFIVE / UUX324-1215
<b>Power Adapter SN</b>	H05-0340040
<b>Hardware version</b>	N/A
<b>Software version</b>	N/A
<b>Simultaneous Transmission</b>	N/A
<b>Additional Info</b>	Emission Class B  Power adapter was for testing purposes only. EUT is powered by 12VDC car battery

### 2.3 Test standard and method

<b>Test standard</b>	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017
<b>Test method</b>	ANSI C63.10-2013 558074 D01 15.247 Meas Guidance v05r02

### 3 Modification of EUT / Deviations from Standards

The EUT is an engineering test sample loaded with RF testing firmware specifically designed to support the RF TX/RX measurement in different aspects.

## 4 Test Configuration and Operation

### 4.1 EUT Test Configuration

EUT is powered by 12VDC power adapter and 12VDC car cell battery for testing purpose. EUT was set to continuous transmission mode during TX testing and was set to continuous receiver mode during RX testing.

The test software is used to set EUT to different transmission mode in terms of radio mode, test channel, data rate, etc.

The following software was used for testing and to monitor EUT performance.

Software	Description
EMISoft Vasona	EMC/RF Spurious emission test software used during testing
Putty.exe	To set EUT into continuous TX and RX mode under different modulation, data rate and channel, etc.

### 4.2 Supporting Equipment

Description	Manufacturer	Model #	Serial #
USB to UART Cable	N/A	N/A	N/A
Test Laptop	Dell	XP5	G1H5102

## 5 Uncertainty of Measurement

Test item	Measurement Uncertainty (dB)
RF Output Power (Conducted)	±1.2 dB
Power Spectral Density	±0.9 dB
Unwanted Emission (conducted)	±2.6 dB
Occupied Channel Bandwidth	±5 %
Radiated Emission (9KHz-30MHz)	±3.5 dB
Radiated Emission (30MHz-1GHz)	±4.6 dB
Radiated Emission (1-18GHz)	±4.9 dB
Radiated Emission (18-40GHz)	±3.5 dB

## 6 Test Results

### 6.1 Antenna Requirement

#### 6.1.1 Requirement

Per § 15.203, 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.

#### 6.1.2 Result

Analysis:

- EUT uses internal PCB trace antenna for Bluetooth. No standard RF connector is used.

Conclusion:

- EUT complies with antenna requirement in § 15.203.

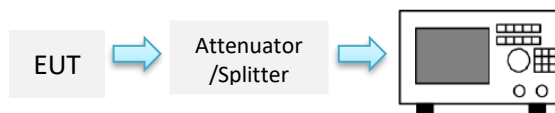
## 6.2 DTS (6 dB) Bandwidth

### 6.2.1 Requirement

§ 15.247 (a)(2), RSS-247 §5.2

Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 KHz.

### 6.2.2 Test Setup



### 6.2.3 Test Procedure

According to section 8.2, option 2, in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.8 of ANSI C63.10-2013:

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW  $\geq 3 \times$  RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\geq 6$  dB.

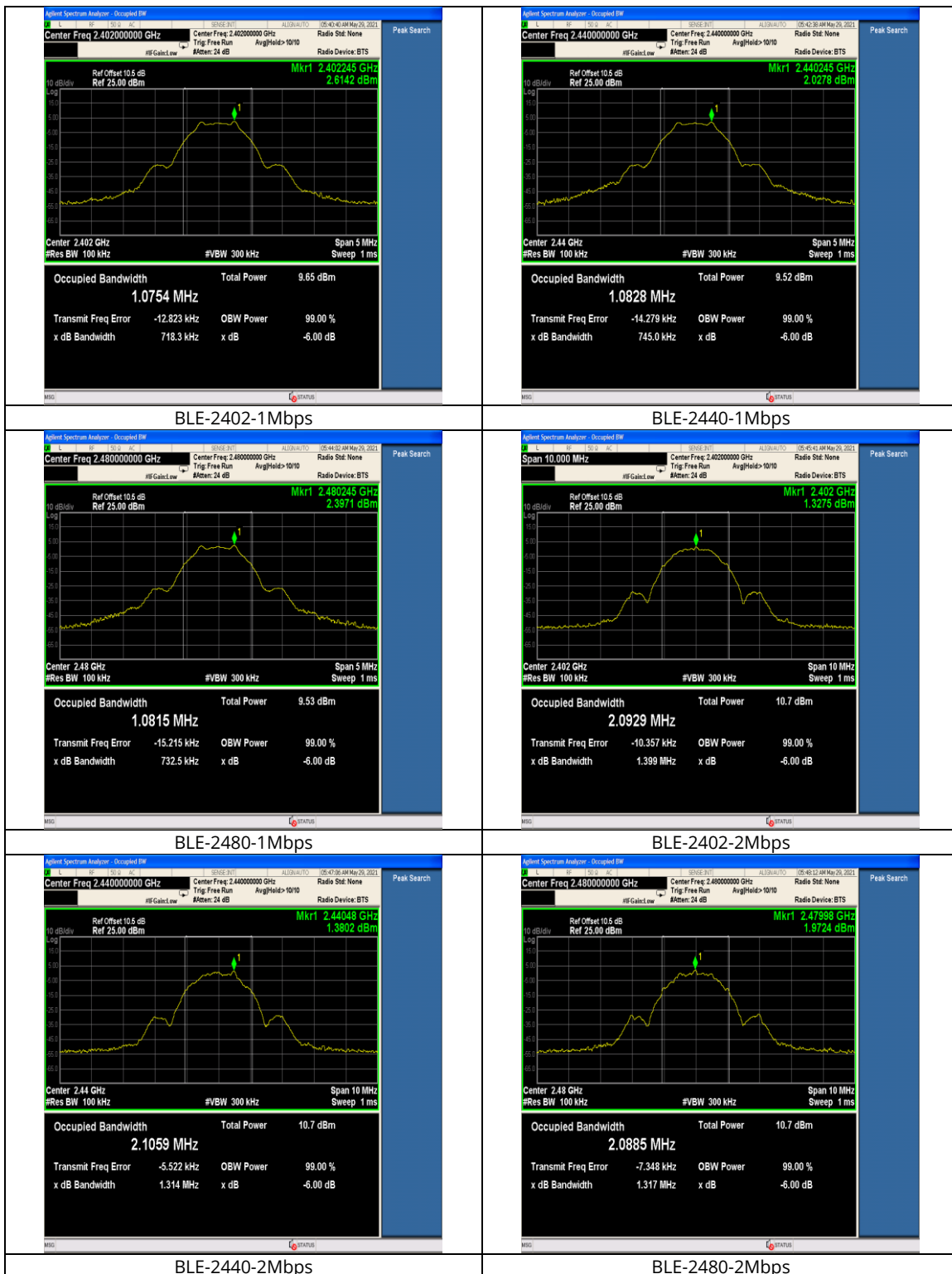
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Use automatic bandwidth measurement capability on instrument to obtain BW result.



#### 6.2.4 Test Result

Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured Bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
BLE	2402	1Mbps	718.3	500	Pass
BLE	2440	1Mbps	745.0	500	Pass
BLE	2480	1Mbps	732.5	500	Pass
BLE	2402	2Mbps	1399	500	Pass
BLE	2440	2Mbps	1314	500	Pass
BLE	2480	2Mbps	1317	500	Pass

### 6.2.5 Test Plots



## 6.3 Occupied Bandwidth (99%)

### 6.3.1 Requirement

RSS-Gen §6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

### 6.3.2 Test Setup



### 6.3.3 Test Procedure

According to section RSS-Gen §6.7

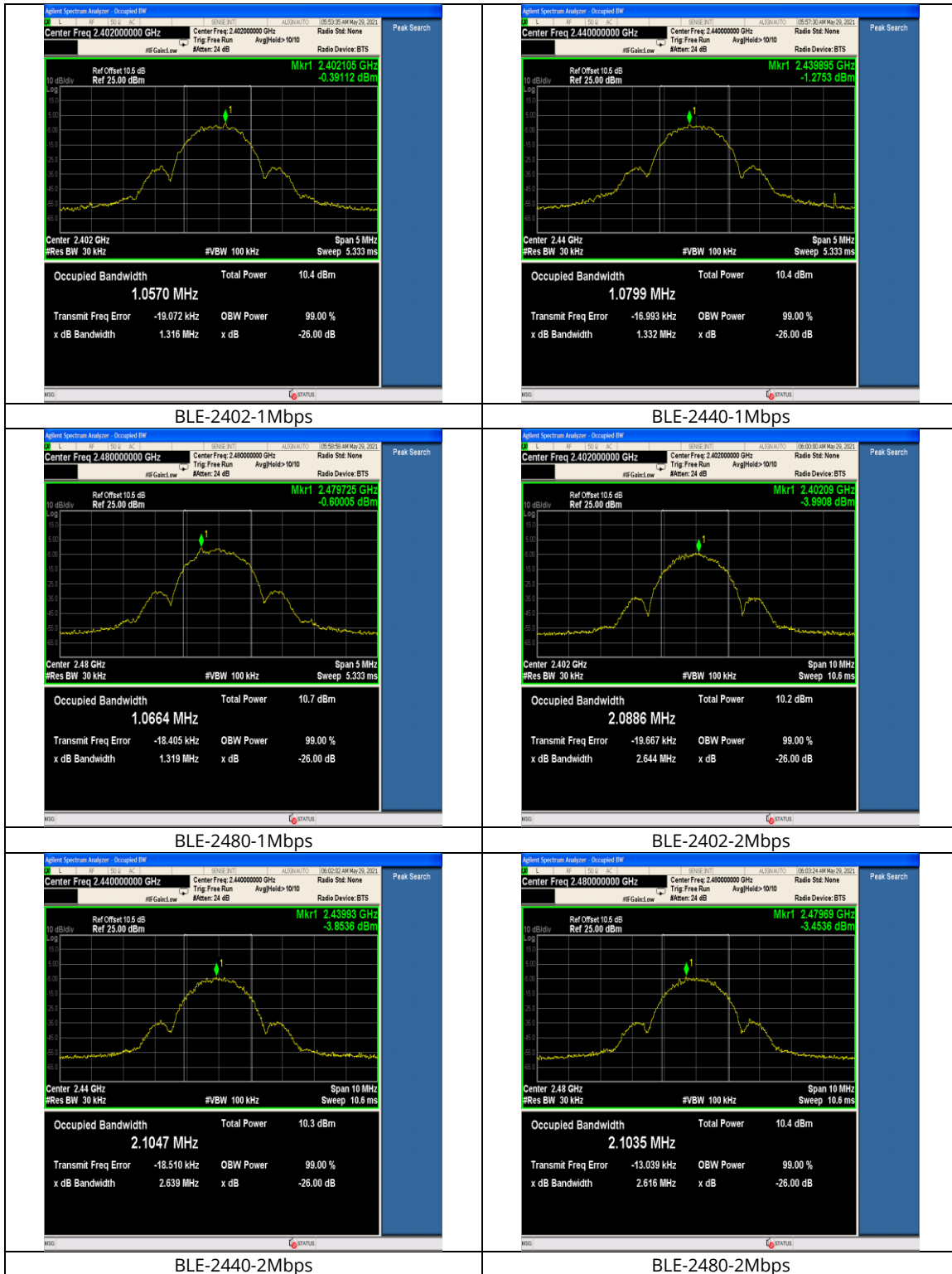
The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW  $\geq 3 \times$  RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\geq 6$  dB.

1. Set RBW = 1% to 5% of the actual occupied BW.
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Span = large enough to capture all products of the modulation process
7. Allow the trace to stabilize.
8. Use automatic bandwidth measurement capability on instrument to obtain BW result.

### 6.3.4 Test Result

Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured 99% OBW (MHz)	Limit (kHz)	Result
BLE	2402	1Mbps	1.0570	N/A	Pass
BLE	2440	1Mbps	1.0799	N/A	Pass
BLE	2480	1Mbps	1.0664	N/A	Pass
BLE	2402	2Mbps	2.0886	N/A	Pass
BLE	2440	2Mbps	2.1047	N/A	Pass
BLE	2480	2Mbps	2.1035	N/A	Pass

### 6.3.5 Test Plots



## 6.4 Maximum Output Power

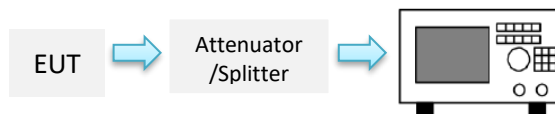
### 6.4.1 Requirement

§ 15.247 (b)(3), RSS-247 §5.4

or systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: the maximum output power is 1 Watt.

If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 6.4.2 Test Setup



### 6.4.3 Test Procedure

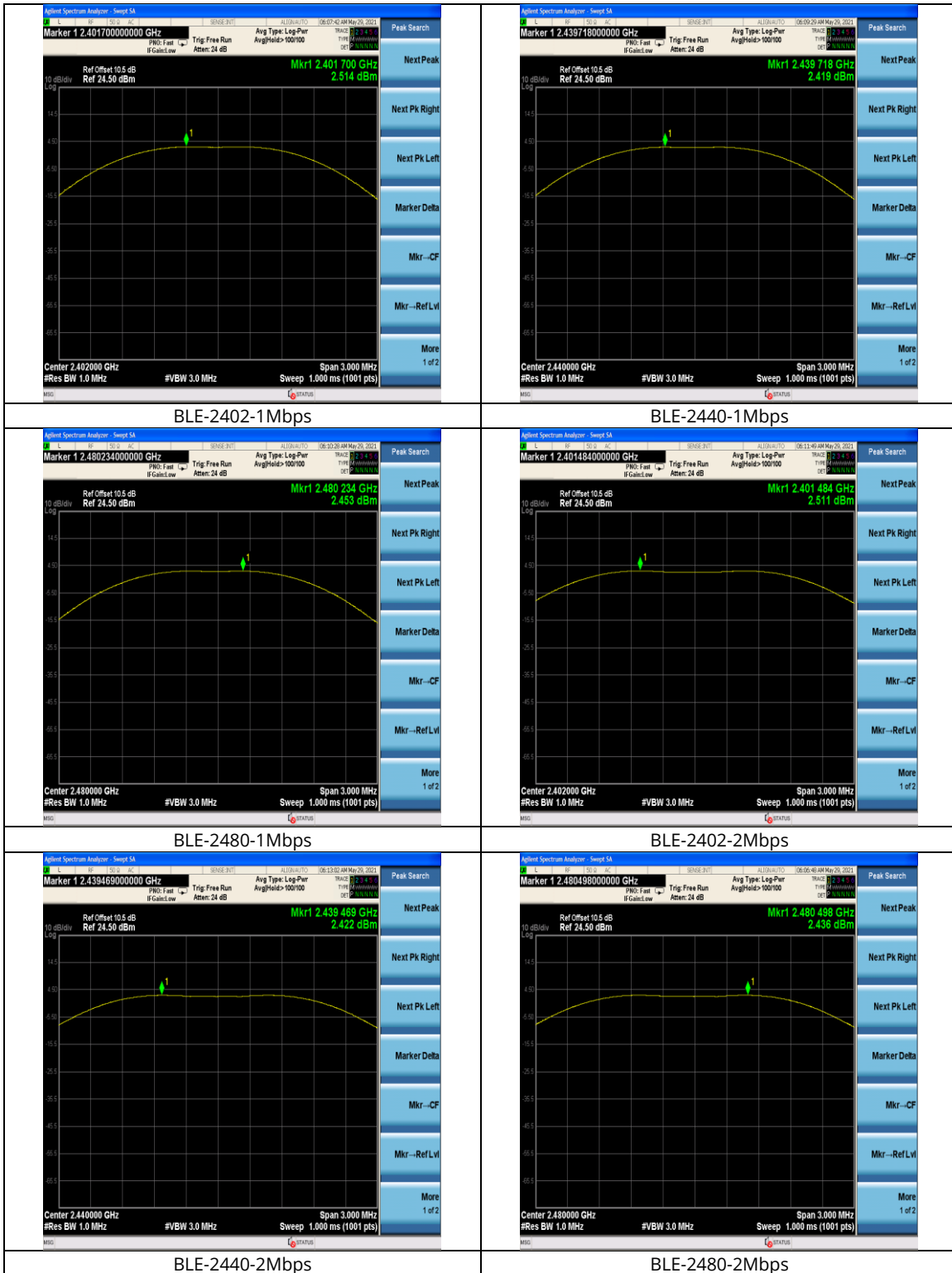
For BLE, power measurement is according to subclause 11.9.1.1 of ANSI C63.10-2013:

1. Set the RBW  $\geq$  DTS bandwidth
2. Set VBW  $\geq$  3 X RBW.
2. Set SPAN  $\geq$  3 X RBW.
3. Sweep time = auto couple.
4. Detector = peak.
5. Trace mode = max hold
6. Allow trace to fully stabilize.
7. Use peak marker function to determine the peak amplitude level.

**6.4.4 Test Result**

Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured Output Power (dBm)	Max Output Power (dBm)	Result
BLE	2402	1Mbps	2.514	30	Pass
BLE	2440	1Mbps	2.419	30	Pass
BLE	2480	1Mbps	2.453	30	Pass
BLE	2402	2Mbps	2.511	30	Pass
BLE	2440	2Mbps	2.422	30	Pass
BLE	2480	2Mbps	2.436	30	Pass

**6.4.5 Test Plots**





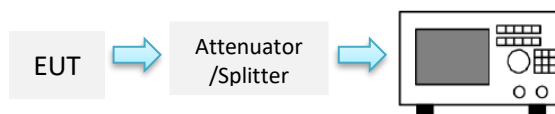
## 6.5 Power Spectral Density

### 6.5.1 Requirement

§ 15.247 (e), RSS-247 §5.2

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power is used to determine the power spectral density.

### 6.5.2 Test Setup



### 6.5.3 Test Procedure

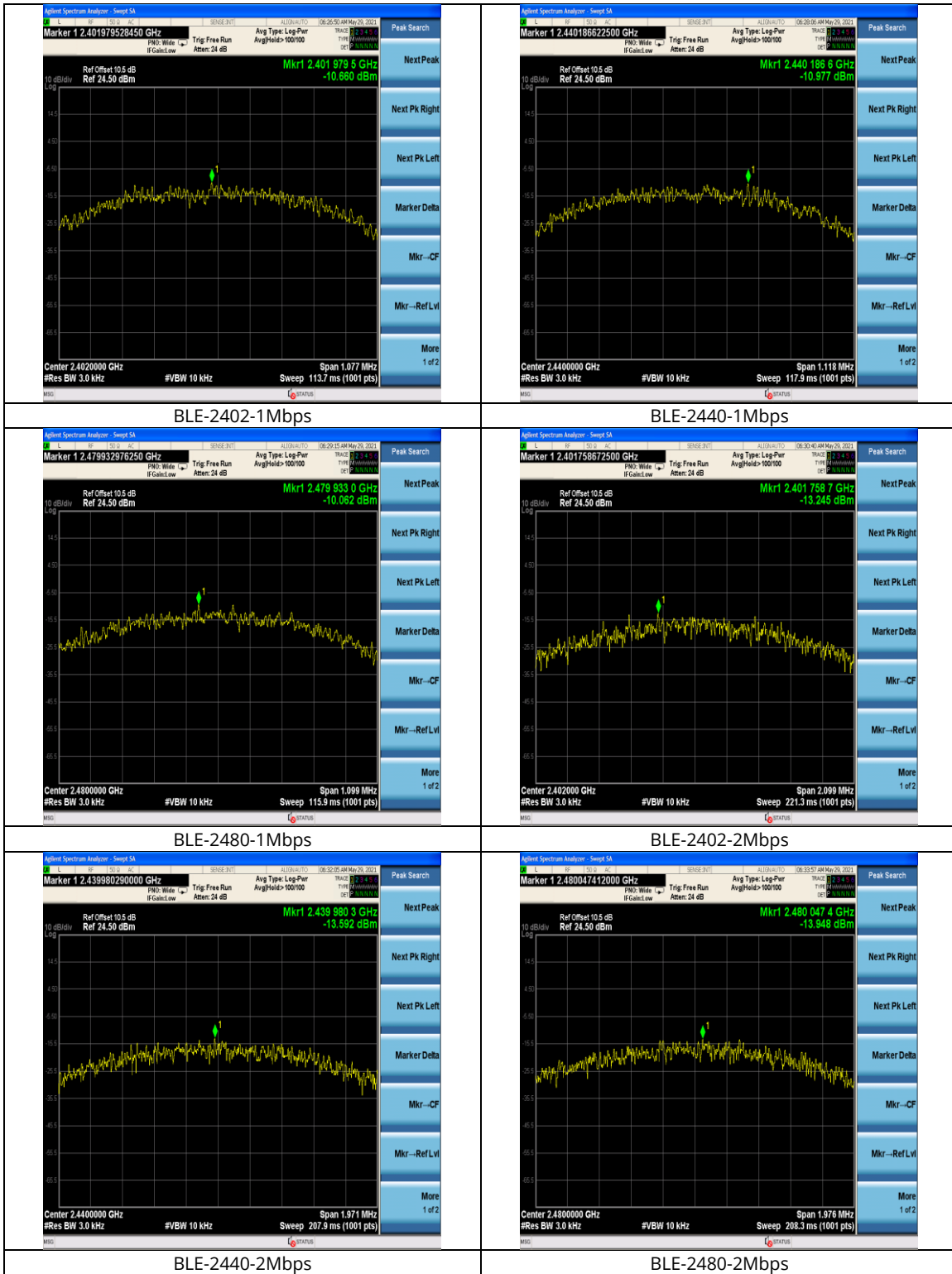
According to section 8.4 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.10.2 PKPSD of ANSI C63.10-2013:

1. Set analyser centre frequency to DTS channel centre frequency.
2. Set the span to 1.5 X DTS bandwidth.
3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
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 within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### 6.5.4 Test Result

Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured PSD (dBm/3KHz)	Max PSD (dBm/3KHz)	Result
BLE	2402	1Mbps	-10.660	8	Pass
BLE	2440	1Mbps	-10.977	8	Pass
BLE	2480	1Mbps	-10.062	8	Pass
BLE	2402	2Mbps	-13.245	8	Pass
BLE	2440	2Mbps	-13.592	8	Pass
BLE	2480	2Mbps	-13.948	8	Pass

**6.5.5 Test Plots**



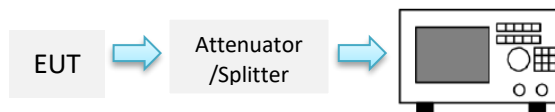
## 6.6 Conducted Band-Edge & Unwanted Emissions Measurement

### 6.6.1 Requirement

§ 15.247 (d), RSS-247 §5.5

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.

### 6.6.2 Test Setup



### 6.6.3 Test Procedure

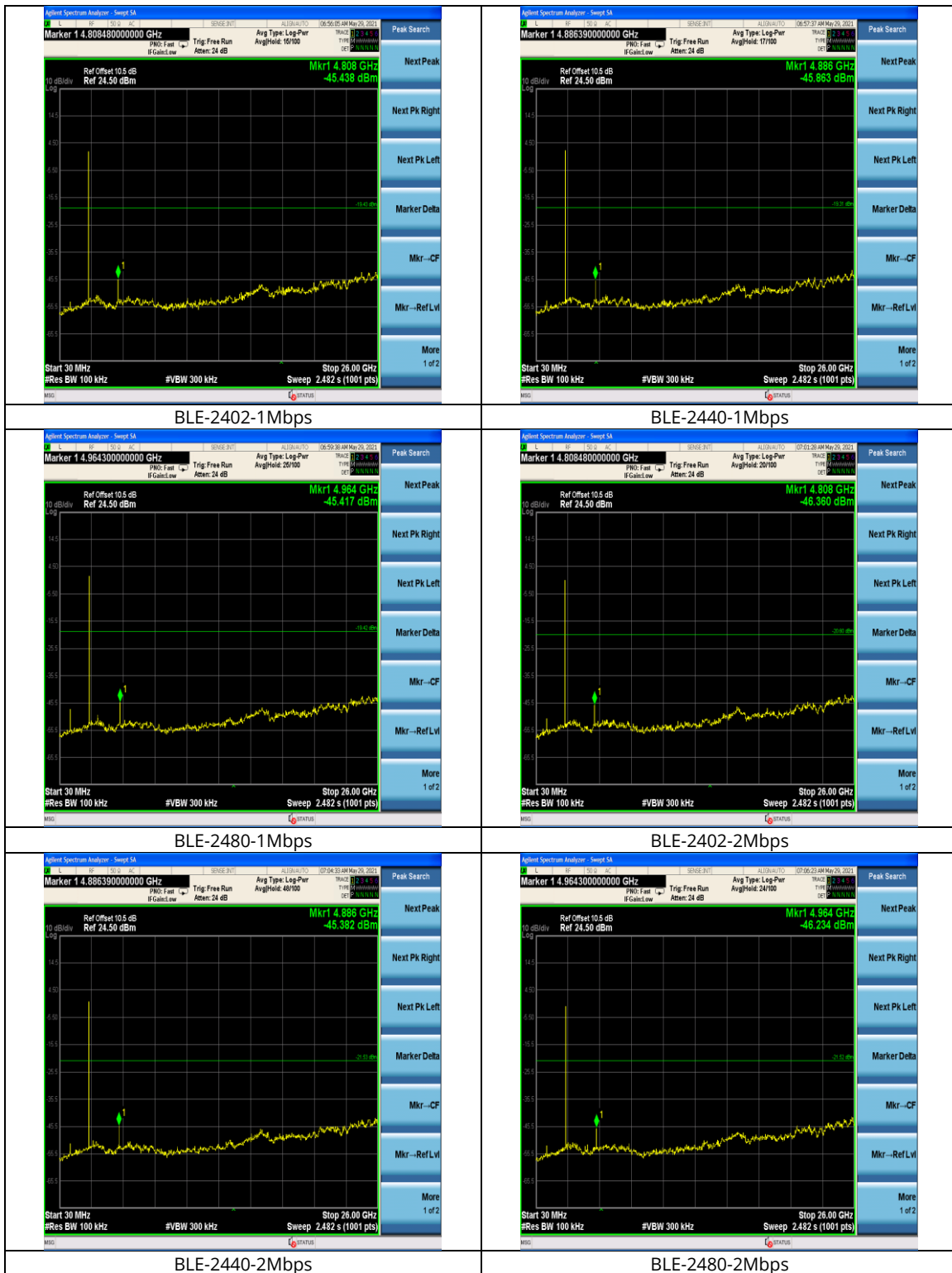
According to section 8.5 Emission level measurement, in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.11.3 in ANSI C63.10-2013:

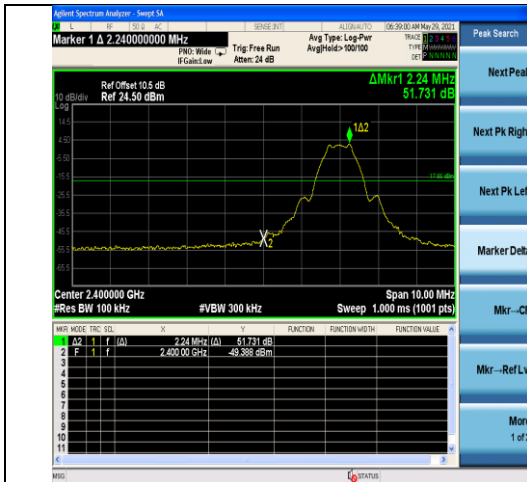
1. Set the centre frequency and span to encompass frequency range to be measured.
2. Set the RBW = 100 kHz.
3. Set the VBW  $\geq 3 \times$  RBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

### 6.6.4 Test Result

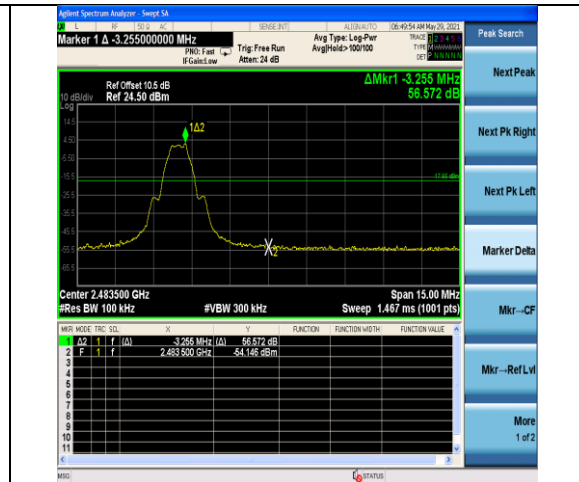
See test plots

### 6.6.5 Test Plots





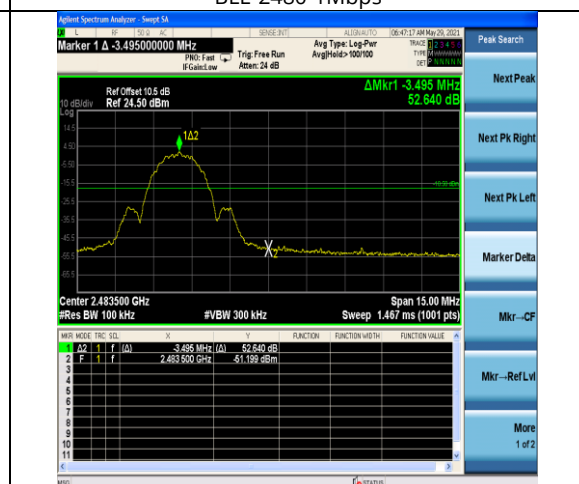
BLE-2402-1Mbps



BLE-2480-1Mbps



BLE-2402-2Mbps



BLE-2480-2Mbps

## 6.7 Radiated Band-Edge & Spurious Emissions into Restricted Frequency Bands

### 6.7.1 Requirement

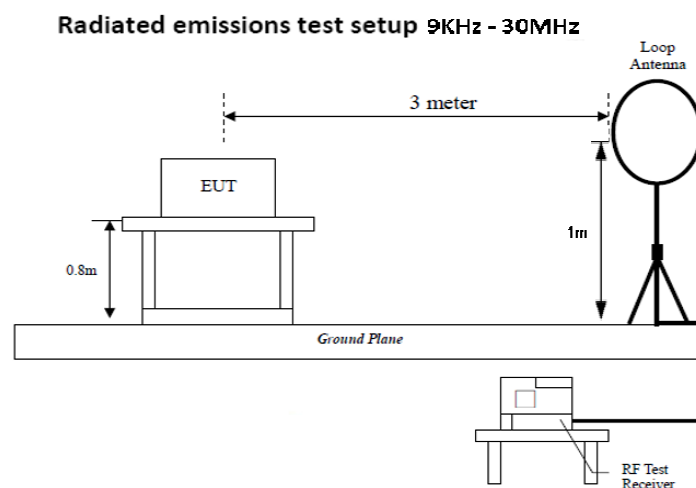
§ 15.247 (d), RSS-247 §5.5

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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

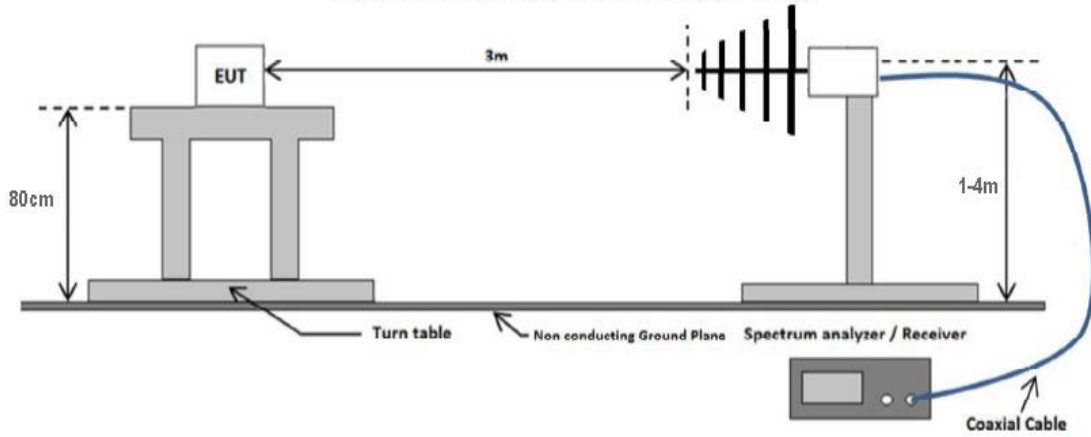
Attenuation below the general limits specified in §15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency Range (MHZ)	Field Strength ( $\mu\text{V}/\text{m}$ )
0.009~0.490	2400/F(KHz)
0.490~1.705	24000/F(KHz)
1.705~30.0	30
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

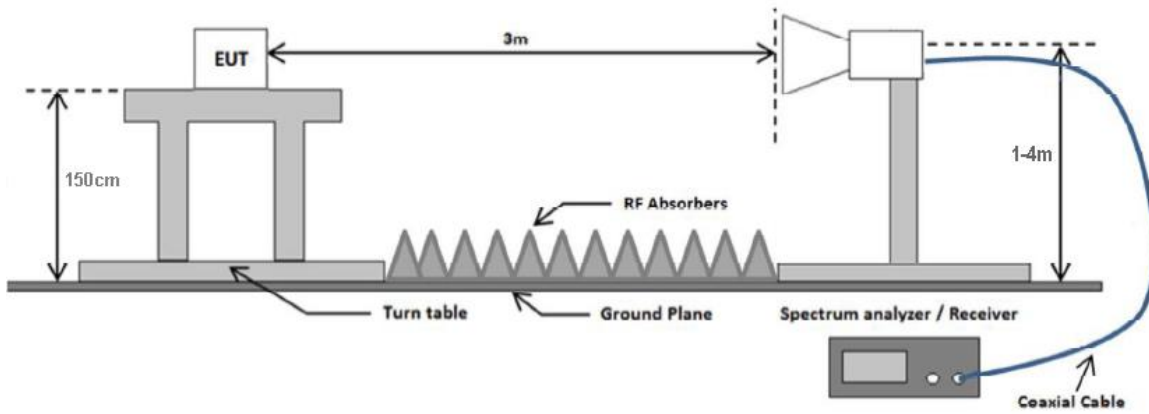
### 6.7.2 Test Setup



**Radiated emissions test setup 30 MHz - 1 GHz**



**Radiated emissions test setup above 1 GHz**





### 6.7.3 Test Procedure

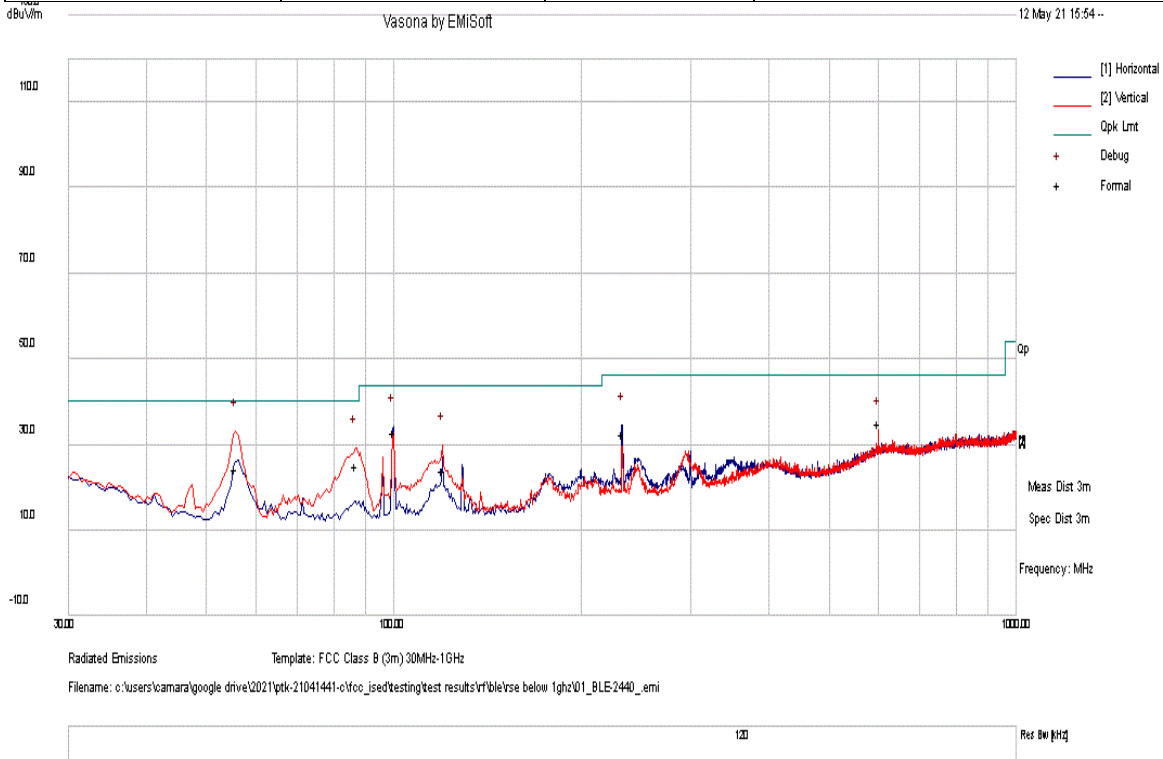
According to section 8.6 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.12.2.7 Radiated spurious emission measurements in ANSI C62.10-2013 as well as the procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 was followed. Boresight antenna mast was used during the scanning to point to EUT to maximize the emission. The process will be repeated in 3 EUT orientations.

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
  - a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
  - b. The EUT was then rotated to the direction that gave the maximum emission.
  - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 300 Hz for frequency below 150KHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for frequency between 150KHz – 30MHz.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency between 30MHz - 1GHz.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak and average measurement at frequency above 1GHz.
7. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

### 6.7.4 Test Result

## RADIATED SPURIOUS EMISSIONS BELOW 1 GHZ

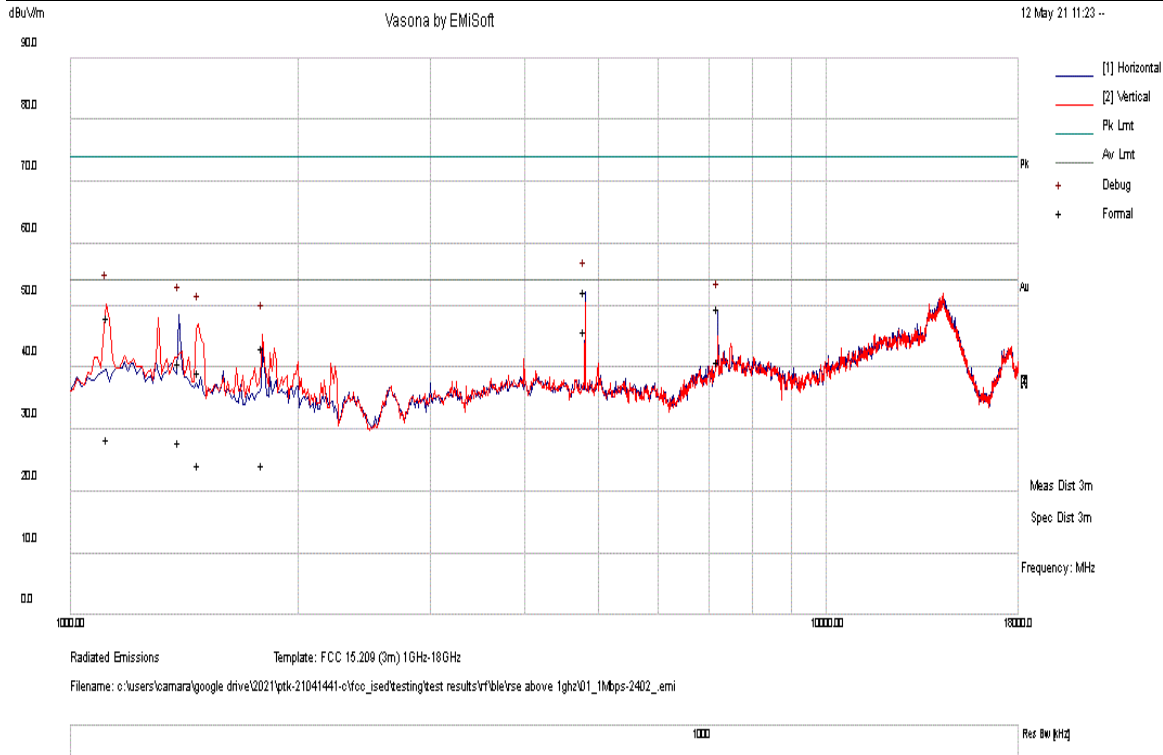
Test Standard:	15.209, 15.247	Mode:	Middle Channel - 1 Mbps
Frequency Range:	30 MHz - 1 GHz	Test Date:	05/12/2021 - 05/28/2021
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
55.68	42.41	2.91	-20.86	24.47	Quasi Max	V	100	262	40.00	-15.53	Pass
99.94	48.62	3.56	-19.11	33.08	Quasi Max	H	217	11	43.50	-10.42	Pass
86.84	41.88	3.41	-20.19	25.10	Quasi Max	V	169	224	40.00	-14.90	Pass
233.21	42.99	5.09	-15.35	32.73	Quasi Max	H	147	0	46.00	-13.27	Pass
599.99	32.86	7.16	-4.90	35.13	Quasi Max	V	100	347	46.00	-10.87	Pass
119.96	38.58	3.87	-18.52	23.94	Quasi Max	V	100	152	43.50	-19.56	Pass

## RADIATED SPURIOUS EMISSIONS ABOVE 1 GHZ

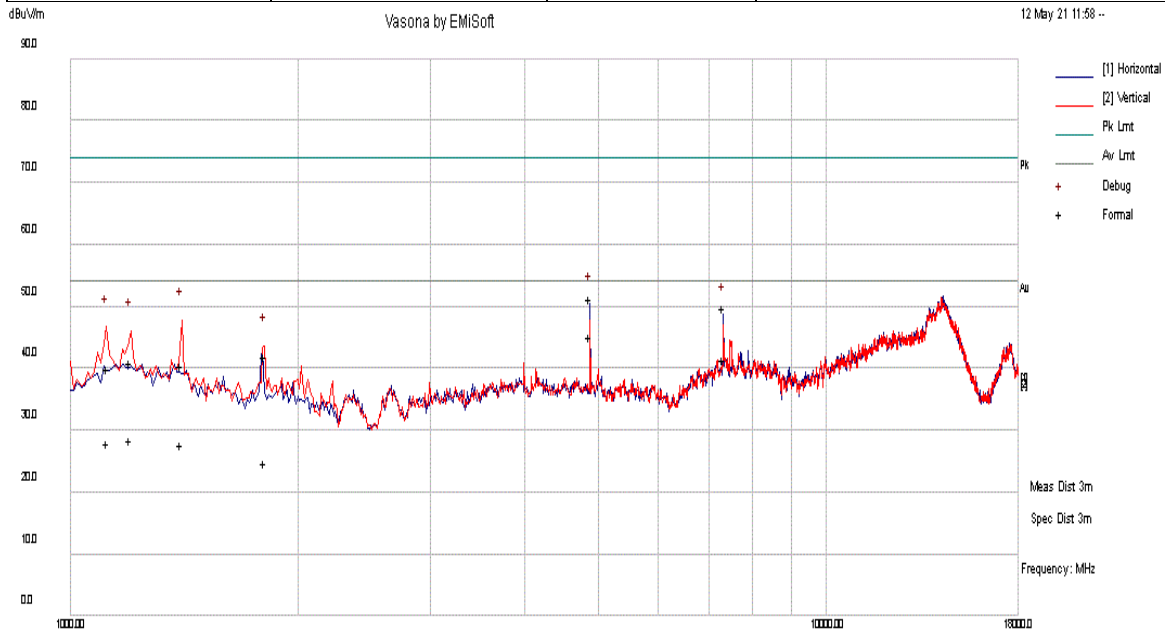
Test Standard:	15.209, 15.247	Mode:	Low Channel - 1Mbps
Frequency Range:	1 GHz - 18 GHz	Test Date:	05/12/2021 - 05/28/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
4804.41	37.23	17.35	-2.25	52.34	Peak Max	H	165	0	74.00	-21.66	Pass
1118.4	38.36	14.13	-4.49	48.00	Peak Max	V	334	241	74.00	-26.00	Pass
7205.34	27.92	20.45	1.20	49.58	Peak Max	H	126	192	74.00	-24.42	Pass
1392.27	33.26	14.68	-7.07	40.87	Peak Max	H	109	0	74.00	-33.13	Pass
1477.86	32.82	14.83	-8.26	39.39	Peak Max	V	370	221	74.00	-34.61	Pass
1798.38	37.86	14.48	-9.05	43.29	Peak Max	V	285	29	74.00	-30.71	Pass
4804.41	30.83	17.35	-2.25	45.94	Average Max	H	165	0	54.00	-8.06	Pass
1118.4	18.78	14.13	-4.49	28.42	Average Max	V	334	241	54.00	-25.58	Pass
7205.34	19.24	20.45	1.20	40.90	Average Max	H	126	192	54.00	-13.10	Pass
1392.27	20.35	14.68	-7.07	27.96	Average Max	H	109	0	54.00	-26.05	Pass
1477.86	17.77	14.83	-8.26	24.34	Average Max	V	370	221	54.00	-29.66	Pass
1798.38	18.85	14.48	-9.05	24.27	Average Max	V	285	29	54.00	-29.73	Pass

**Report#** PTK-21041441-C-FCC-IC-DTS

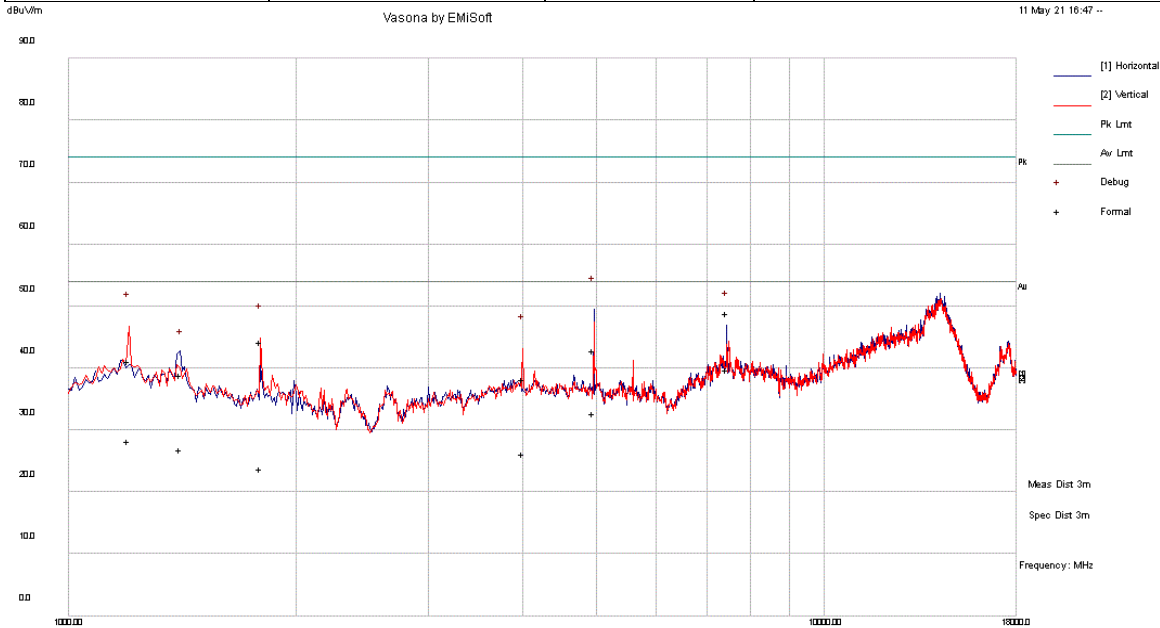
Test Standard:	15.209, 15.247	Mode:	Middle Channel – 1 Mbps
Frequency Range:	1 GHz - 18 GHz	Test Date:	05/12/2021 - 05/28/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass



Radiated Emissions Template: FCC 15.209 (3m) 1GHz-18GHz  
 Filename: c:\users\kamaral\google drive\2021\ptk-21041441-c\fcc\_used\testing\test results\rf\ble\vsr above 1ghz\02\_1Mbps-2440\_emi

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
4879.58	36.17	17.37	-2.16	51.38	Peak Max	H	123	218	74.00	-22.62	Pass
7320.33	27.91	20.67	1.19	49.78	Peak Max	H	113	192	74.00	-24.22	Pass
1401.86	33.07	14.69	-7.14	40.62	Peak Max	V	303	128	74.00	-33.38	Pass
1118.45	30.27	14.13	-4.49	39.91	Peak Max	V	121	16	74.00	-34.09	Pass
1200.44	31.82	14.30	-5.24	40.88	Peak Max	V	361	81	74.00	-33.12	Pass
1808.12	36.56	14.47	-8.97	42.05	Peak Max	V	215	16	74.00	-31.95	Pass
4879.58	29.85	17.37	-2.16	45.07	Average Max	H	123	218	54.00	-8.94	Pass
7320.33	19.66	20.67	1.19	41.52	Average Max	H	113	192	54.00	-12.48	Pass
1401.86	20.23	14.69	-7.14	27.78	Average Max	V	303	128	54.00	-26.22	Pass
1118.45	18.36	14.13	-4.49	28.00	Average Max	V	121	16	54.00	-26.00	Pass
1200.44	19.34	14.30	-5.24	28.40	Average Max	V	361	81	54.00	-25.60	Pass
1808.12	19.43	14.47	-8.97	24.93	Average Max	V	215	16	54.00	-29.07	Pass

Test Standard:	15.209, 15.247	Mode:	High Channel - 1 Mbps
Frequency Range:	1 GHz - 18 GHz	Test Date:	05/12/2021 - 05/28/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass

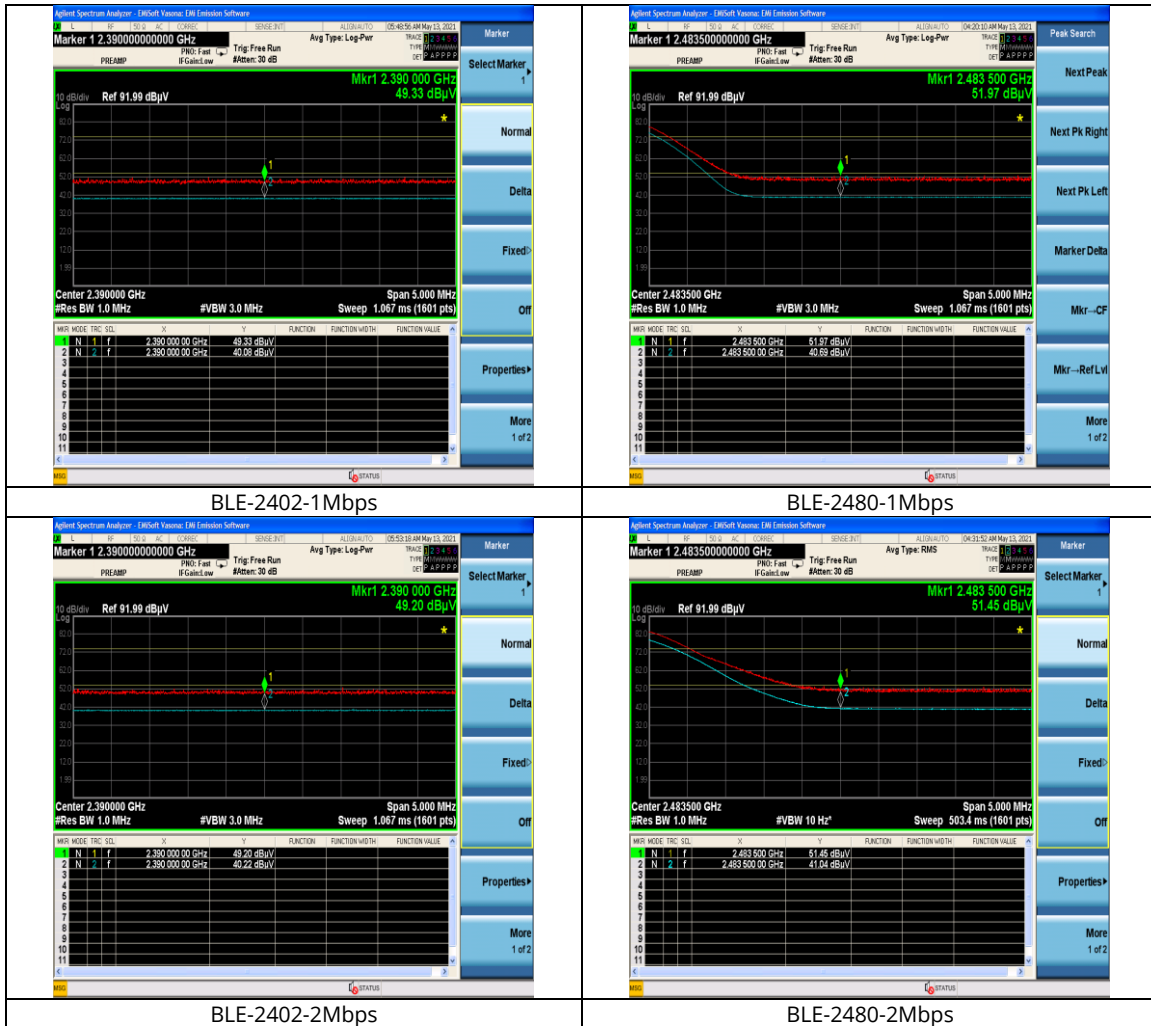


Radiated Emissions Template: FCC 15.209 (3m) 1GHz-18GHz  
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Per BU #114

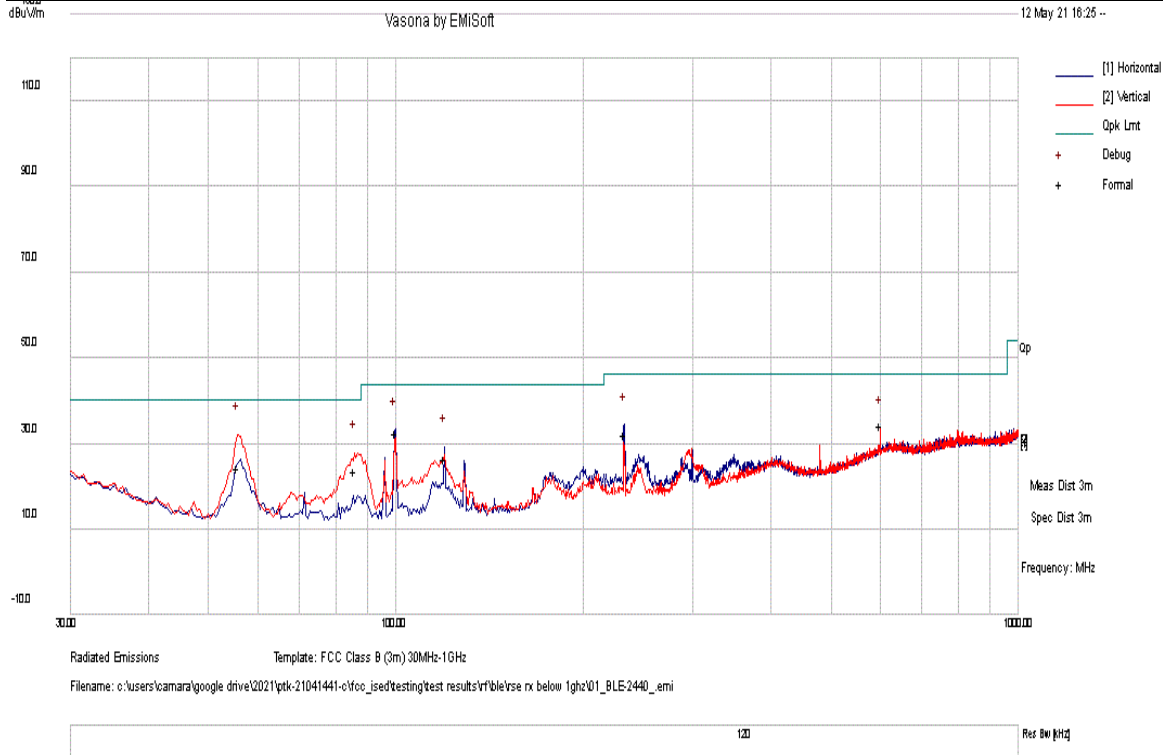
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
4961.14	27.75	17.39	-2.20	42.93	Peak Max	H	116	174	74.00	-31.07	Pass
7439.28	27.08	20.90	0.98	48.96	Peak Max	H	100	131	74.00	-25.04	Pass
1200.71	32.03	14.31	-5.24	41.10	Peak Max	V	352	14	74.00	-32.90	Pass
1798.32	38.78	14.48	-9.05	44.21	Peak Max	V	208	60	74.00	-29.79	Pass
3994.62	25.34	16.74	-3.80	38.28	Peak Max	V	233	171	74.00	-35.72	Pass
1409.49	31.48	14.71	-7.27	38.92	Peak Max	V	129	20	74.00	-35.08	Pass
4961.14	17.58	17.39	-2.20	32.76	Average Max	H	116	174	54.00	-21.24	Pass
7439.28	17.92	20.90	0.98	39.80	Average Max	H	100	131	54.00	-14.20	Pass
1200.71	19.27	14.31	-5.24	28.33	Average Max	V	352	14	54.00	-25.67	Pass
1798.32	18.31	14.48	-9.05	23.73	Average Max	V	208	60	54.00	-30.27	Pass
3994.62	13.20	16.74	-3.80	26.13	Average Max	V	233	171	54.00	-27.87	Pass
1409.49	19.38	14.71	-7.27	26.82	Average Max	V	129	20	54.00	-27.18	Pass

**Restricted Band Measurement Result**



## RECEIVER SPURIOUS EMISSIONS BELOW 1 GHZ

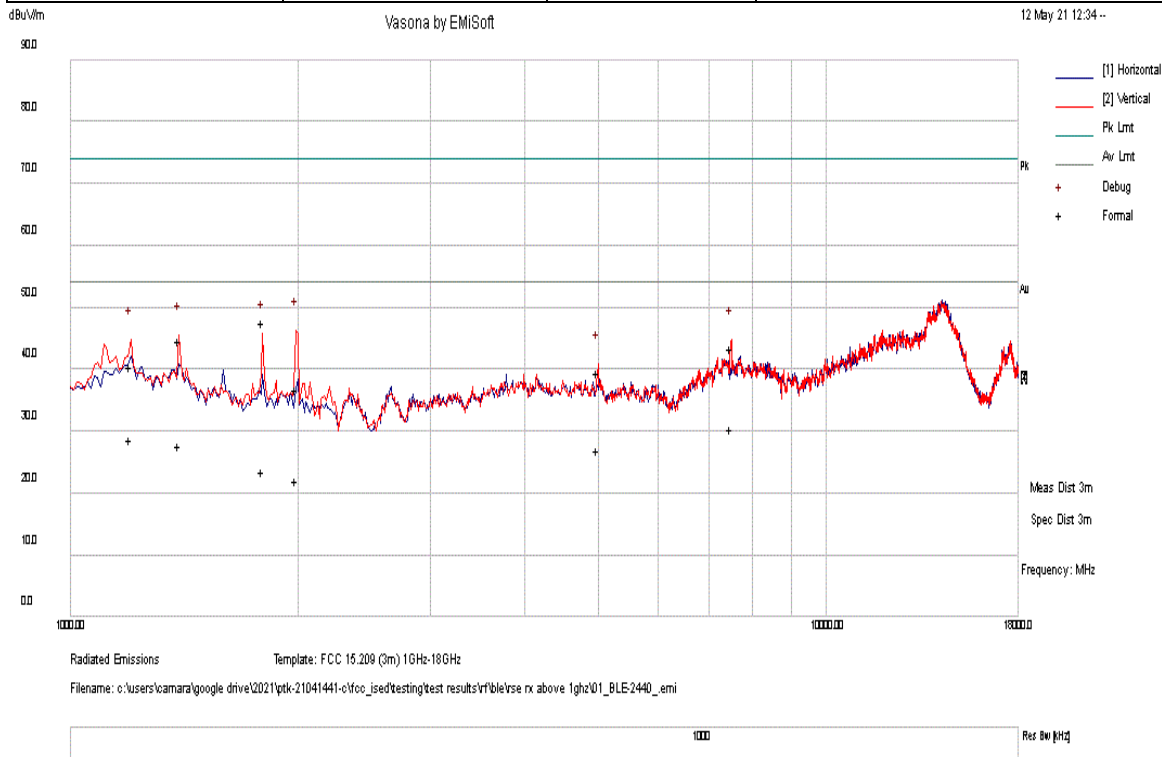
Test Standard:	15.209, 15.247	Mode:	Middle Channel – 1 Mbps
Frequency Range:	30 MHz - 1 GHz	Test Date:	05/12/2021 - 05/28/2021
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
55.63	42.29	2.91	-20.86	24.35	Quasi Max	V	128	276	40.00	-15.65	Pass
99.94	48.22	3.56	-19.11	32.68	Quasi Max	H	295	0	43.50	-10.82	Pass
233.2	42.64	5.09	-15.35	32.38	Quasi Max	H	131	355	46.00	-13.62	Pass
85.94	40.40	3.40	-20.21	23.59	Quasi Max	V	100	228	40.00	-16.41	Pass
599.99	32.15	7.16	-4.90	34.41	Quasi Max	V	204	360	46.00	-11.59	Pass
119.97	41.23	3.87	-18.52	26.59	Quasi Max	H	170	0	43.50	-16.91	Pass

## RECEIVER SPURIOUS EMISSIONS ABOVE 1 GHZ

Test Standard:	15.209, 15.247	Mode:	Middle Channel – 1 Mbps
Frequency Range:	1 GHz - 18 GHz	Test Date:	05/12/2021 - 05/28/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Daniel Bruno
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1988.19	32.08	14.26	-9.52	36.83	Peak Max	V	226	118	74.00	-37.17	Pass
1797.75	42.18	14.48	-9.06	47.60	Peak Max	V	267	360	74.00	-26.40	Pass
1394.24	36.99	14.68	-7.08	44.59	Peak Max	V	316	148	74.00	-29.41	Pass
1199.91	31.33	14.30	-5.23	40.40	Peak Max	V	120	88	74.00	-33.60	Pass
7500.79	21.49	21.01	0.83	43.34	Peak Max	V	400	205	74.00	-30.66	Pass
4996.87	24.22	17.40	-2.06	39.56	Peak Max	V	163	74	74.00	-34.44	Pass
1988.19	17.39	14.26	-9.52	22.14	Average Max	V	226	118	54.00	-31.86	Pass
1797.75	18.15	14.48	-9.06	23.57	Average Max	V	267	360	54.00	-30.43	Pass
1394.24	20.26	14.68	-7.08	27.86	Average Max	V	316	148	54.00	-26.14	Pass
1199.91	19.74	14.30	-5.23	28.81	Average Max	V	120	88	54.00	-25.19	Pass
7500.79	8.62	21.01	0.83	30.47	Average Max	V	400	205	54.00	-23.53	Pass
4996.87	11.65	17.40	-2.06	26.99	Average Max	V	163	74	54.00	-27.01	Pass



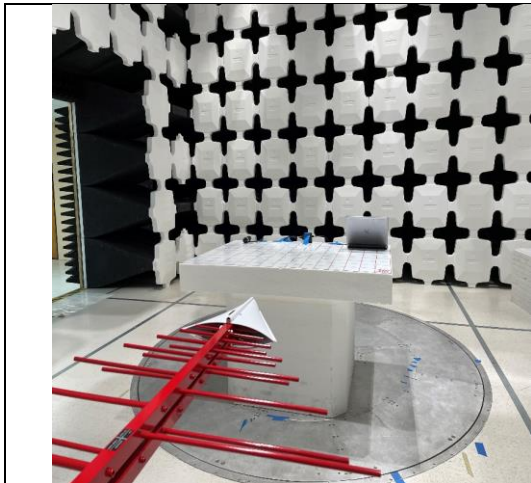
**Radiated Emission between 9KHz – 30MHz test result**

Note: no substantial emission is found other than the noise floor. Different modes have been verified.

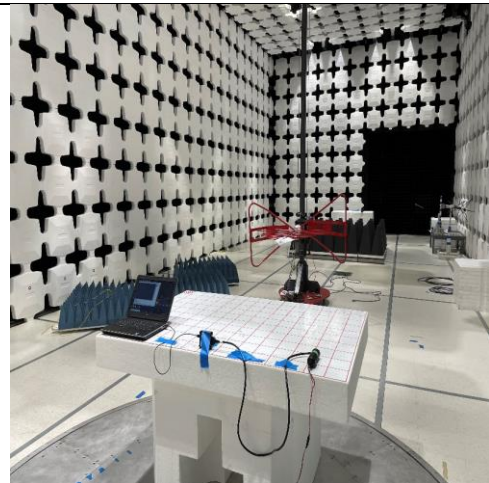
**Radiated Emission between 18GHz – 40GHz test result**

Note: no substantial emission is found other than the noise floor. Different modes have been verified.

**7 EUT and Test Setup Photos**



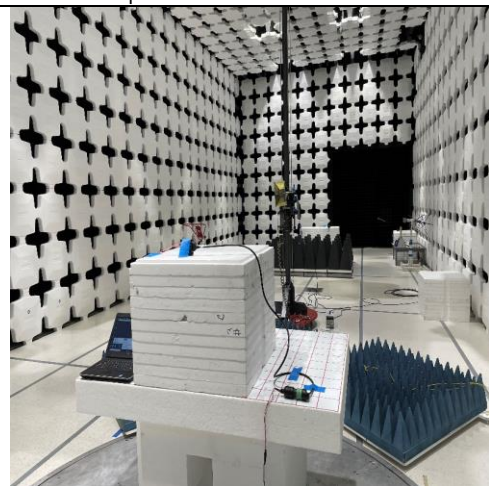
Radiated Spurious Emission-Below 1GHz-Front



Radiated Spurious Emission-Below 1GHz-Back



Radiated Spurious Emission-Above 1GHz-Front



Radiated Spurious Emission-Above 1GHz-Back



## 8 Test Instrument List

Equipment	Manufacturer	Model	Instrument Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	10/18/19	10/18/21
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A	N/A
Spectrum Analyzer	Keysight	N9020A	MY50110074	6/17/20	6/17/21
EMC Test Receiver	R&S	ESL6	100230	6/14/20	6/14/21
LISN (9KHz - 30MHz)	EMCO	3816/2	9705-1066	5/4/21	5/4/22
LISN (9KHz - 30MHz)	Com-Power	LI-550C	20140050	01/29/2021	01/29/2022
LISN (9KHz - 30MHz)	Com-Power	LI-550C	20140051	01/29/2021	01/29/2022
Bi-Log Antenna	ETS-Lindgren	3142E	217921	11/15/2020	11/15/2021
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	5/14/2021	5/14/2022
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	6/24/20	6/24/21
Preamplifier	RF Bay, Inc.	LPA-10-20	11180621	7/16/2020	7/16/2021
True RMS Multi-meter	UNI-T	UT181A	C173014829	5/5/2021	5/5/2022
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	5/15/2021	5/15/2022
RF Attenuator	Pasternack	PE7005-3	VL061	7/16/2020	7/16/2021
Preamplifier 100KHz - 40GHz	Aeroflex	33711-392-77150-11	064	7/16/2020	7/16/2021
EM Center Control	ETS-Lindgren	7006-001	160136	N/A	N/A
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A	N/A
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A	N/A
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	5/16/21	5/16/22
RE test cable(below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	7/16/2020	7/16/2021
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	7/16/2020	7/16/2021
RE test cable (>18GHz)	Sucoflex	104	344903/4	7/16/2020	7/16/2021
Pulse limiter	Com-Power	LIT-930A	531727	7/16/2020	7/16/2021
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	7/16/2020	7/16/2021
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	7/16/2020	7/16/2021
Vector Signal Generator	Keysight	N5182A	US47080548	6/17/20	6/17/21
RF Power Amplifier (80-1000MHz)	Ophir	5226FE	1013/1815	N/A	N/A
RF Power Amplifier (700-6000MHz)	Ophir	5293FE	1063/1815	N/A	N/A
Horn Antenna (1-18GHz)	FT-RF	HA-07M18G-NF	180010HA	N/A	N/A