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Phone: +1 (949) 393-1123
Web: www.vista-compliance.com
Email: info@vista-compliance.com

RF Test Report

Test Report Number	HME-23071962-LCG-FCC-IC-DTS
FCC ID	BYM1414
ISED ID	1860A-1414
Applicant	HM Electronics Inc
Applicant Address	2848 Whiptail Loop, Carlsbad, CA 92010 USA
Product Name	Wireless Beltpack
Model (s)	1414
Date of Receipt	10/21/2024 – 12/13/2024
Date of Test	12/13/2024
Report Issue Date	12/13/2024
Test Standards	47 CFR Part 15.247 RSS-247 Issue 3, Aug 2023
Test Result	**PASS**

Issued by:

Vista Compliance Laboratories
1261 Puerta Del Sol, San Clemente, CA 92673 USA
www.vista-compliance.com

Lining	
Lining Li (Test Engineer)	**David Zhang (Technical Manager)**

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REVISION HISTORY

Report Number	Version	Description	Issued Date
HME-23071962-LCG-FCC-IC-DTS	01	Initial report	12/13/2024

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Occupied Bandwidth	RSS-Gen Issue 5, Feb 2021	RSS-Gen Issue 5, Feb 2021	Pass
Conducted Maximum Output Power	47 CFR Part 15.247 RSS-247 Issue 3, Aug 2023	ANSI C63.10 (2013)	Pass
Power Spectral Density	47 CFR Part 15.247 RSS-247 Issue 3, Aug 2023	ANSI C63.10 (2013)	Pass
Conducted Band-Edge & Unwanted Emissions	47 CFR Part 15.247 RSS-247 Issue 3, Aug 2023	ANSI C63.10 (2013)	Pass
Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	47 CFR Part 15.247 RSS-247 Issue 3, Aug 2023	ANSI C63.10 (2013)	Pass
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2 General Information

2.1 Applicant

Applicant	HM Electronics Inc
Applicant address	2848 Whiptail Loop, Carlsbad, CA 92010 USA
Manufacturer	HM Electronics Inc
Manufacturer Address	2848 Whiptail Loop, Carlsbad, CA 92010 USA

2.2 Product information

Product Name	Wireless Beltpack
Model Number	1414
Family Models	N/A
Serial Number	067DD41F
Frequency Band	Bluetooth BDR/EDR/BLE: 2402-2480MHz DECT radio: 1920-1930MHz
Type of modulation	Bluetooth BDR/EDR: GFSK, π/4 DQPSK, 8DPSK Bluetooth BLE: GFSK DECT: GFSK
Equipment Class	DTS, PUT
Antenna Information	Bluetooth: Integral PCB/Printed Inverted-F quarter wave antenna, 1.5 dBi peak gain DECT radio: two Integral antennas, - PCB/Printed Inverted-F quarter wave antenna, 2.2 dBi peak gain - Plated Inverted-F, soldered onto PCB, 2.35 dBi peak gain
Clock Frequencies	N/A
Input Power	Detachable/Rechargeable Li-ion battery, 3.7VDC
Power Adapter Manufacturer/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Simultaneous Transmission	BLE and DECT can transmit simultaneously which has been evaluated in current report
Additional Info	N/A

2.3 Test standard and method

Test standard	47 CFR Part 15.247 RSS-247 Issue 3, Aug 2023
Test method	ANSI C63.10-2013 558074 D01 15.247 Meas Guidance v05r02

3 Test Site Information

Lab performing tests	Vista Laboratories, Inc.
Lab Address	1261 Puerta Del Sol, San Clemente, CA 92673 USA
Phone Number	+1 (949) 393-1123
Website	www.vista-compliance.com

Test Condition	Temperature	Humidity	Atmospheric Pressure
RF Testing	23.5°C	58.2%	996 mbar
Radiated Emission Testing	23.5°C	58.2%	996 mbar

4 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.

5 Test Configuration and Operation

5.1 EUT Test Configuration

EUT's RF antenna port is connected to spectrum analyzer through RF test cable for measurement.

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
BluetTest3	Bluetooth RF testing used for sending RF command to set EUT into RF test mode

5.2 Supporting Equipment

Description	Manufacturer	Model #	Serial #
Laptop	Dell	Latitude E6440	FFF4JC2
Debugger	Qualcomm	TRBI 200	N215998

6 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

7 Test Results

7.1 Antenna Requirement

7.1.1 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.

7.1.2 Result

Analysis:

- EUT uses integrated antennas for both BLE and DECT that are permantly attached and not accessible to end user. No standard RF connector is used.

Conclusion:

- EUT complies with antenna requirement in § 15.203.

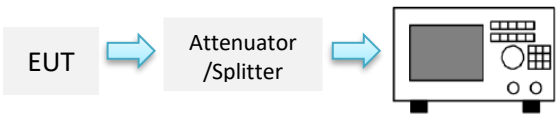
7.2 DTS (6 dB) Bandwidth

7.2.1 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.

7.2.2 Test Setup



7.2.3 Test Procedure

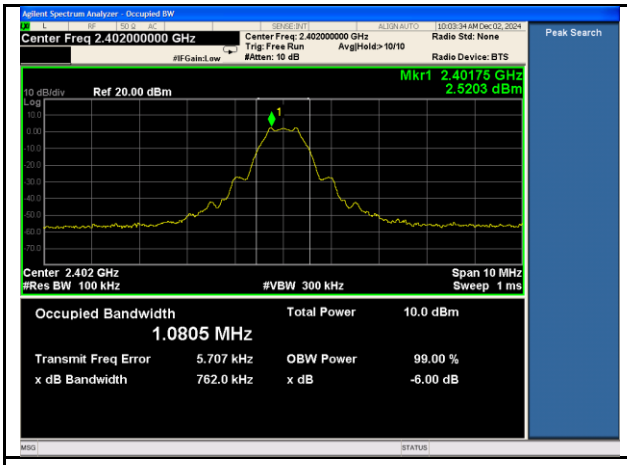
According to section 8.2, option 2, in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.8 of ANSI C63.10-2013:

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 ≥ 3 × 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 ≥ 6 dB.

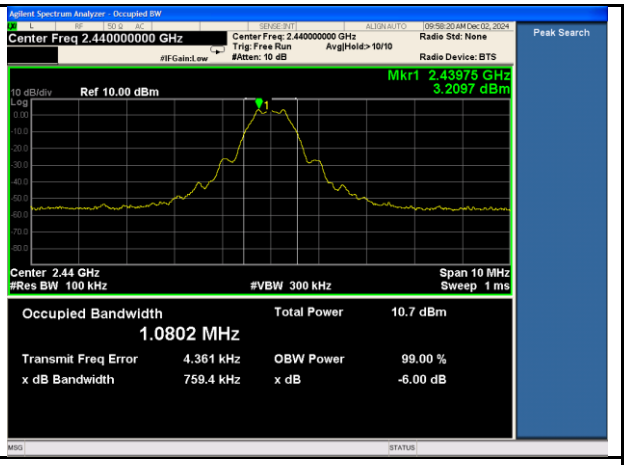
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Use automatic bandwidth measurement capability on instrument to obtain BW result.

7.2.4 Test Result

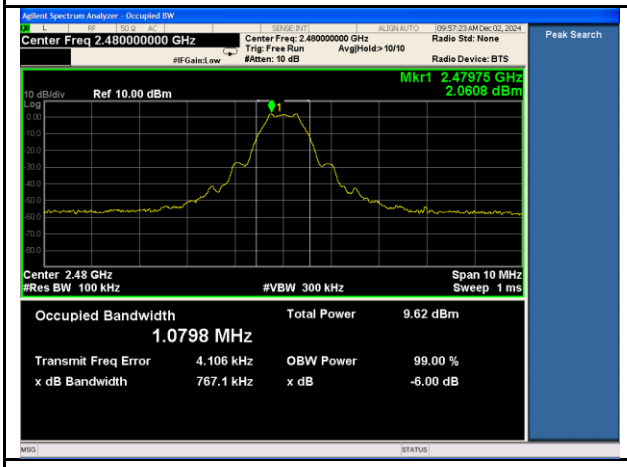
Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured Bandwidth (KHz)	Minimum Bandwidth (KHz)	Result
BLE	2402	1Mbps	762	500	Pass
BLE	2440	1Mbps	759	500	Pass
BLE	2480	1Mbps	767	500	Pass
BLE	2402	2Mbps	1509	500	Pass
BLE	2440	2Mbps	1533	500	Pass
BLE	2480	2Mbps	1500	500	Pass



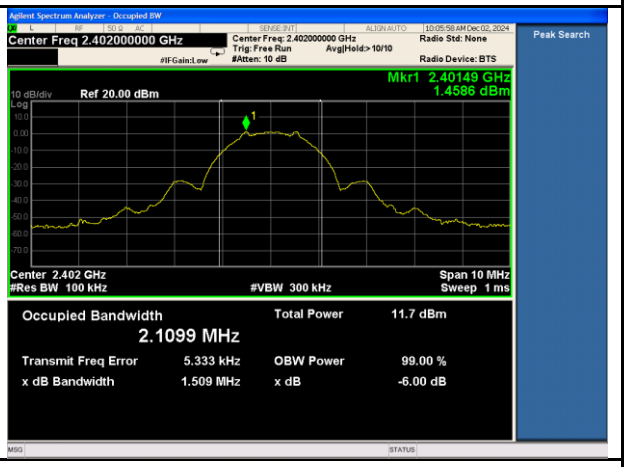
BLE-DTS BW-Low-1Mbps



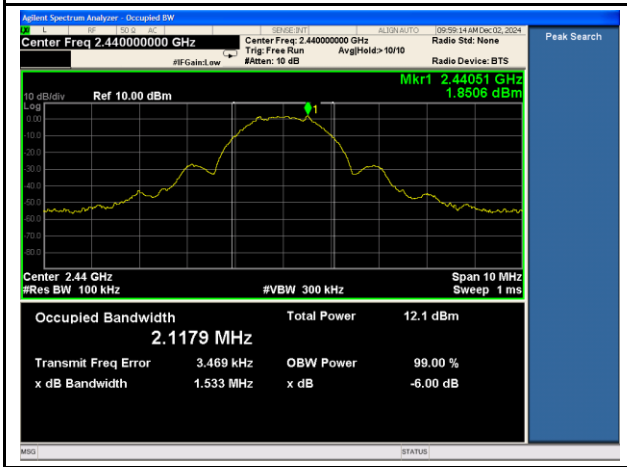
BLE-DTS BW-Mid-1Mbps



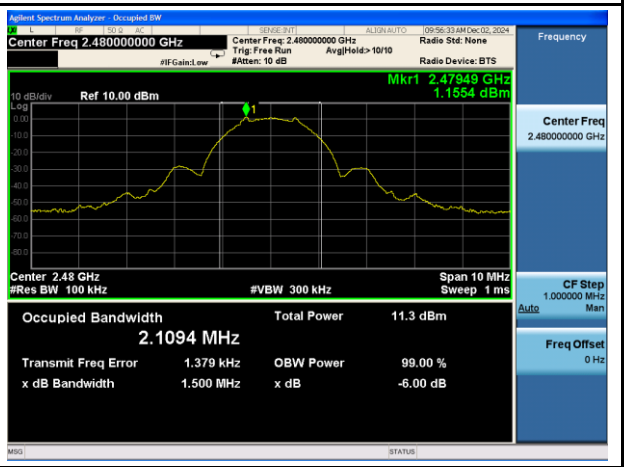
BLE-DTS BW-High-1Mbps



BLE-DTS BW-Low-2Mbps



BLE-DTS BW-Mid-2Mbps



BLE-DTS BW-High-2Mbps

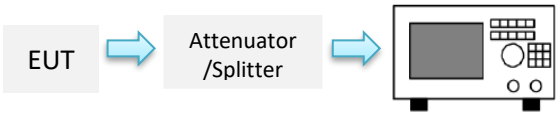
7.3 Occupied Bandwidth (99%)

7.3.1 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.

7.3.2 Test Setup



7.3.3 Test Procedure

According to section RSS-Gen §6.7

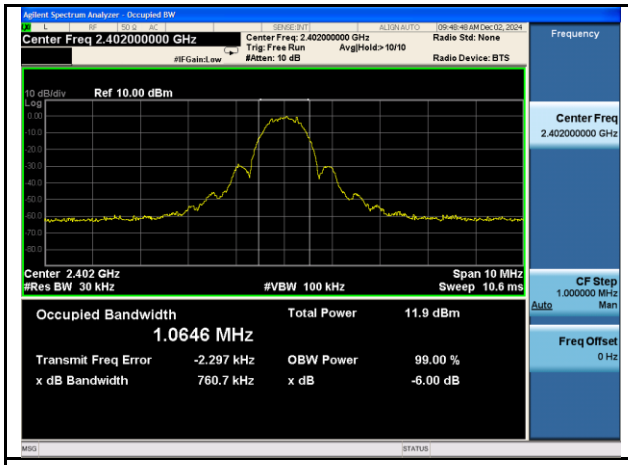
The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this 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 ≥ 6 dB.

1. Set RBW = 1% to 5% of the actual occupied BW.
2. Set the video bandwidth (VBW) ≥ 3 x 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.

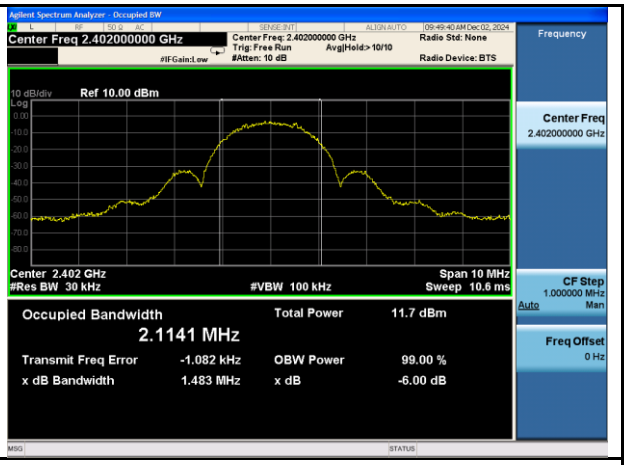
7.3.4 Test Result

Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured 99% OBW (KHz)	Limit (KHz)	Result
BLE	2402	1Mbps	1064.6	N/A	Pass
BLE	2440	1Mbps	1059.7	N/A	Pass
BLE	2480	1Mbps	1066.1	N/A	Pass
BLE	2402	2Mbps	2114.1	N/A	Pass
BLE	2440	2Mbps	2107.3	N/A	Pass
BLE	2480	2Mbps	2094.6	N/A	Pass

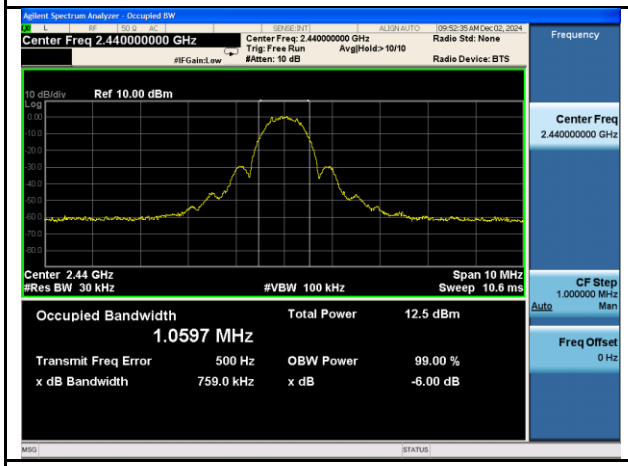
7.3.5 Test Plots



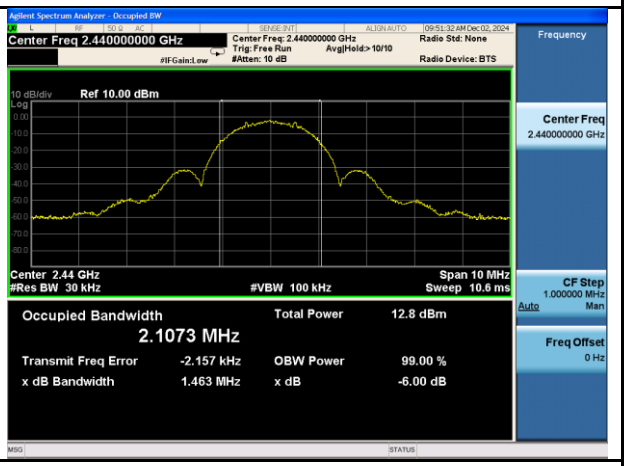
BLE-OBW-Low-1Mpbs



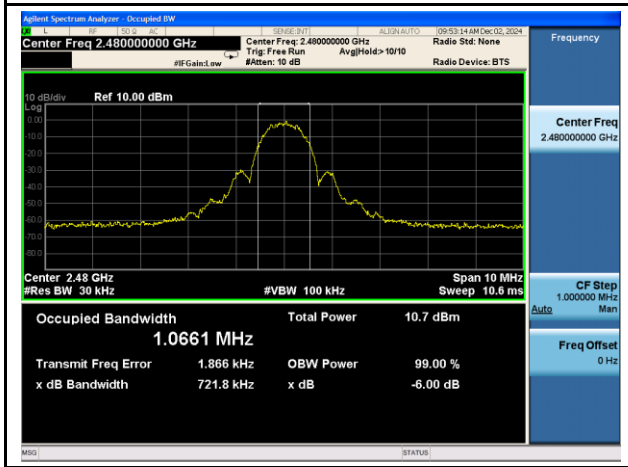
BLE-OBW-Low-2Mpbs



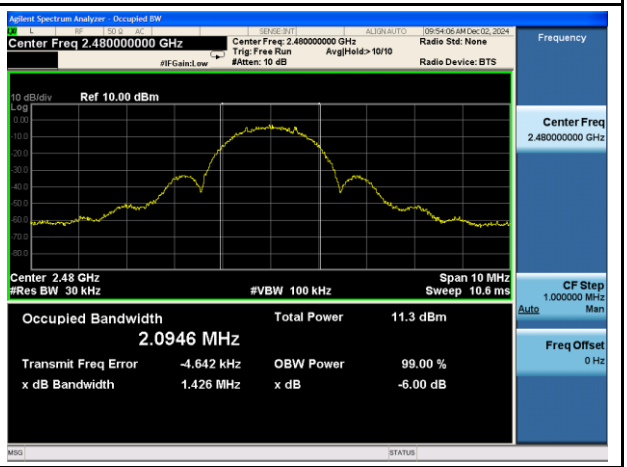
BLE-OBW-Mid-1Mpbs



BLE-OBW-Mid-2Mpbs



BLE-OBW-High-2Mpbs



BLE-OBW-High-2Mpbs

7.4 Maximum Output Power

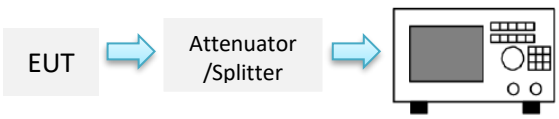
7.4.1 Requirement

§ 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.

7.4.2 Test Setup



7.4.3 Test Procedure

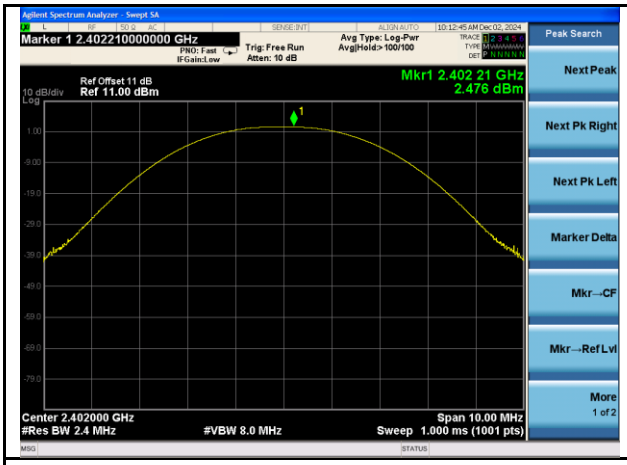
For BLE, power measurement is according to subclause 11.9.1.1 of ANSI C63.10-2013:

1. Set the RBW ≥ DTS bandwidth
2. Set VBW ≥ 3 X RBW.
2. Set SPAN ≥ 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.

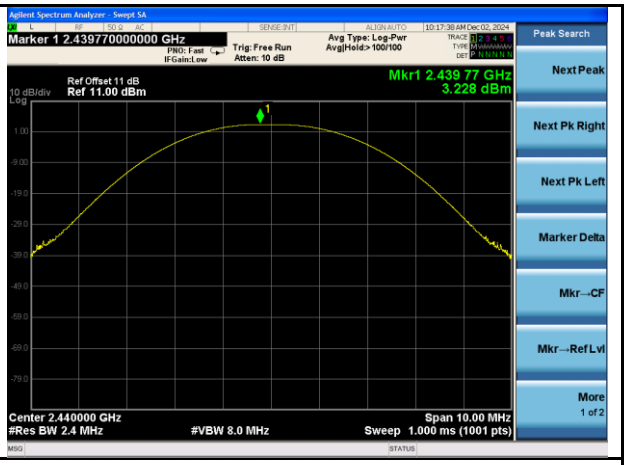
7.4.4 Test Result

Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured Output Power (dBm)	Max Output Power (dBm)	Result
BLE	2402	1Mbps	2.476	30	Pass
BLE	2440	1Mbps	3.228	30	Pass
BLE	2480	1Mbps	2.203	30	Pass
BLE	2402	2Mbps	2.614	30	Pass
BLE	2440	2Mbps	3.214	30	Pass
BLE	2480	2Mbps	2.334	30	Pass

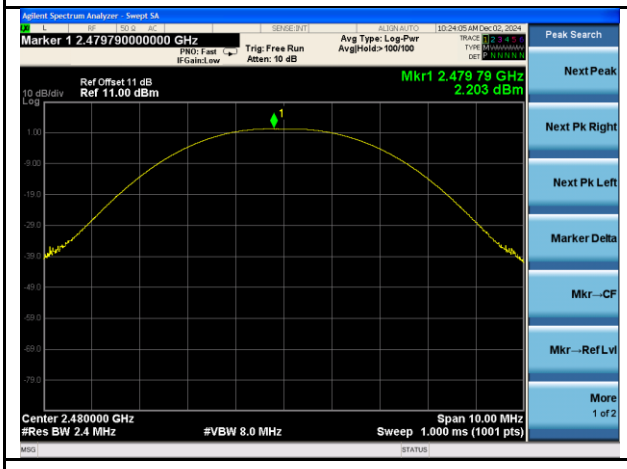
7.4.5 Test Plots



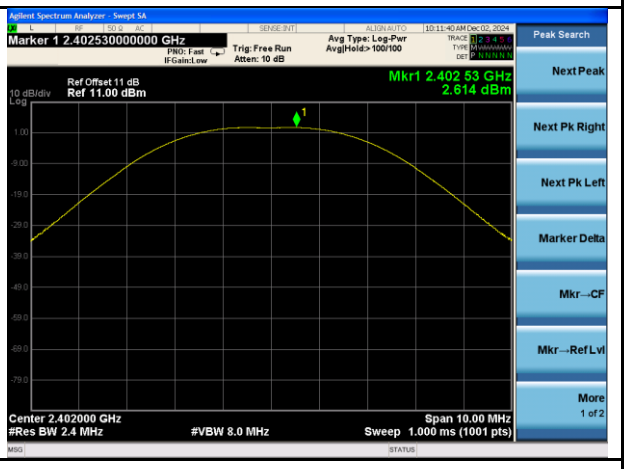
BLE-PWR-Low-1Mbps



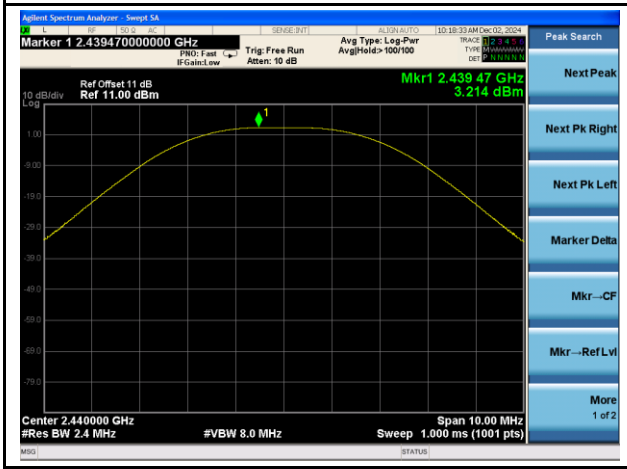
BLE-PWR-Mid-1Mbps



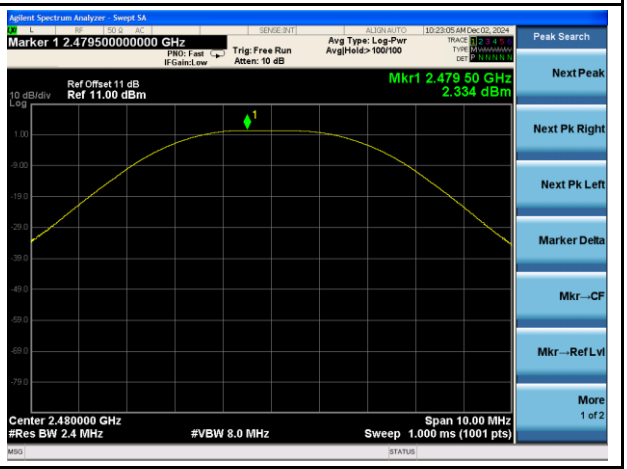
BLE-PWR-High-1Mbps



BLE-PWR-Low-2Mbps



BLE-PWR-Mid-2Mbps



BLE-PWR-High-2Mbps

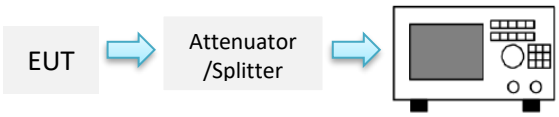
7.5 Power Spectral Density

7.5.1 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.

7.5.2 Test Setup



7.5.3 Test Procedure

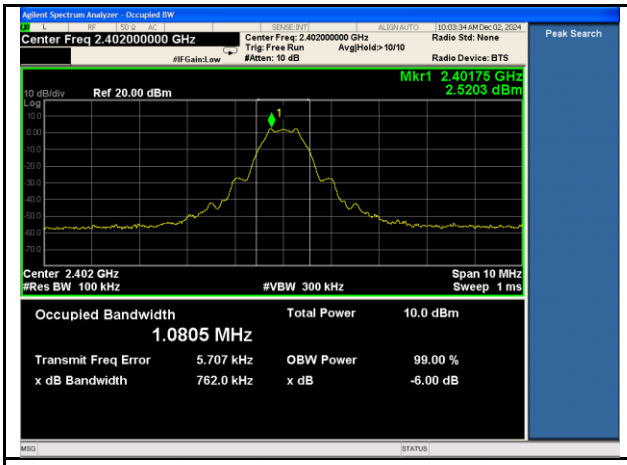
According to section 8.4 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.10.2 PKPSD of ANSI C63.10-2013:

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 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 x 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.

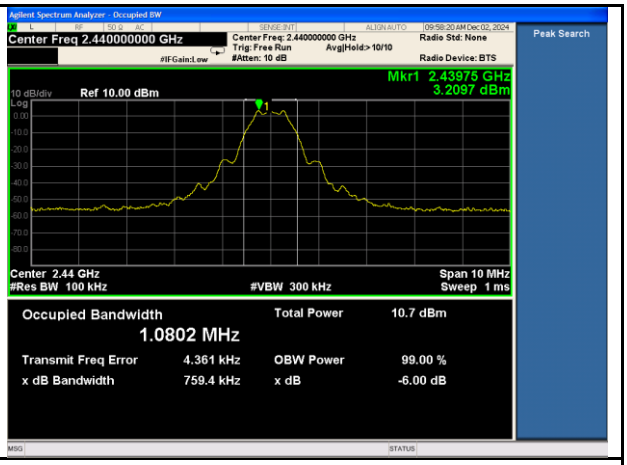
7.5.4 Test Result

Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured PSD (dBm/3KHz)	Max PSD (dBm/3KHz)	Result
BLE	2402	1Mbps	2.52	8	Pass
BLE	2440	1Mbps	3.21	8	Pass
BLE	2480	1Mbps	2.06	8	Pass
BLE	2402	2Mbps	1.46	8	Pass
BLE	2440	2Mbps	1.85	8	Pass
BLE	2480	2Mbps	1.16	8	Pass

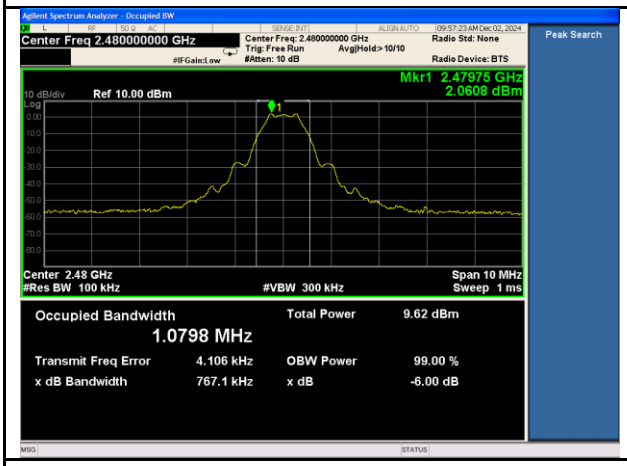
7.5.5 Test Plots



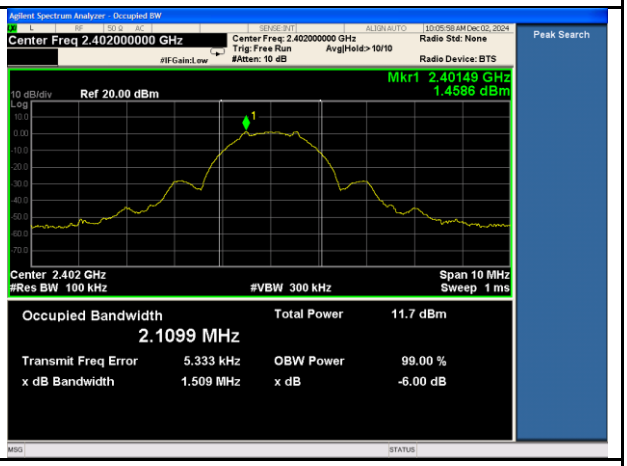
BLE-PSD-Low-1Mbps



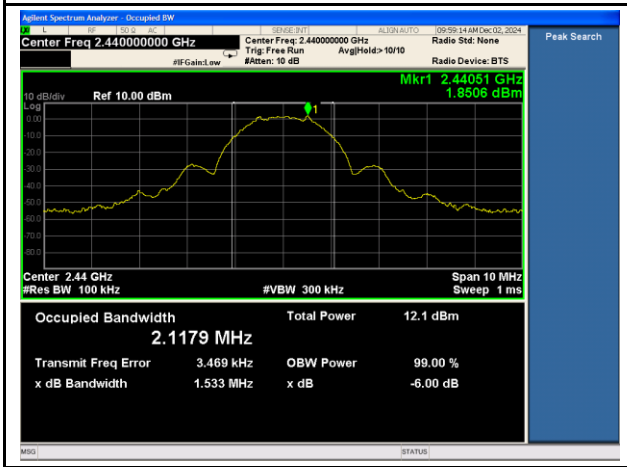
BLE-PSD-Mid-1Mbps



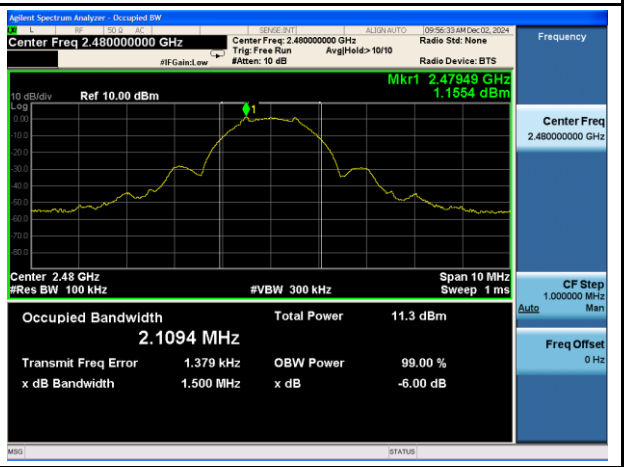
BLE-PSD-High-1Mbps



BLE-PSD-Low-2Mbps



BLE-PSD-Mid-1Mbps



BLE-PSD-High-2Mbps

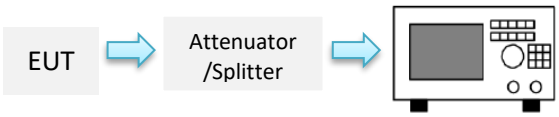
7.6 Conducted Band-Edge Measurement

7.6.1 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.

7.6.2 Test Setup



7.6.3 Test Procedure

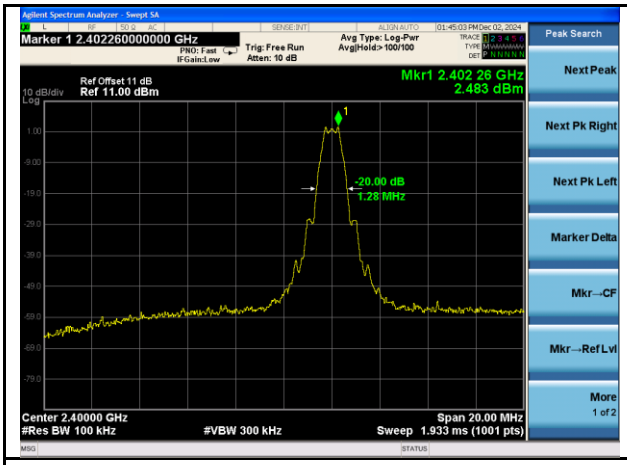
According to section 8.5 Emission level measurement, in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.11.3 in ANSI C63.10-2013:

1. Set the centre frequency and span to encompass frequency range to be measured.
2. Set the RBW = 100 kHz.
3. Set the VBW ≥ 3 X 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.

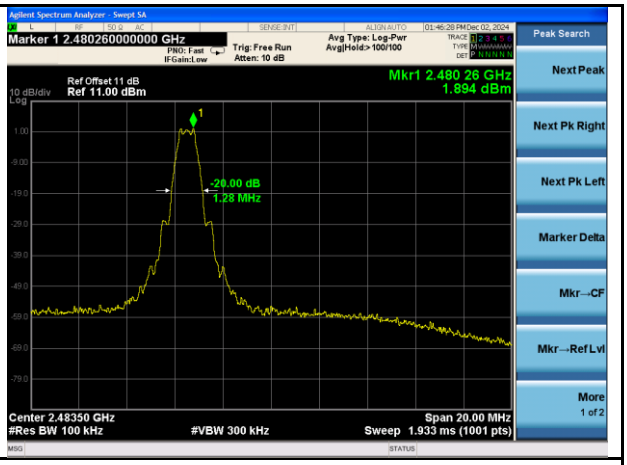
7.6.4 Test Result

See test plots

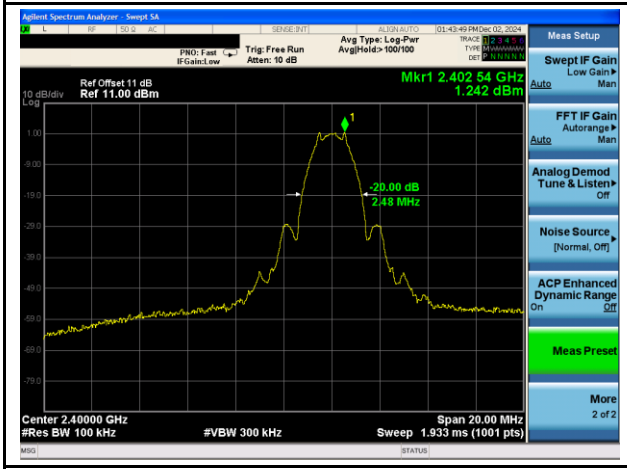
7.6.5 Test Plots



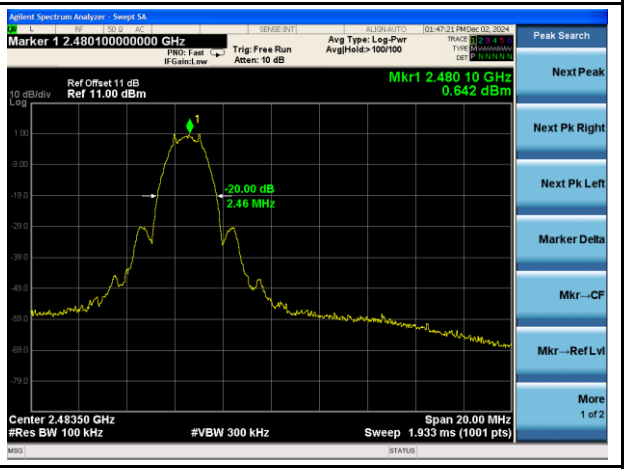
BLE-Band Edge-Low-1Mpbs



BLE-Band Edge-High-1Mpbs



BLE-Band Edge-Low-2Mpbs



BLE-Band Edge-High-2Mpbs

7.7 Radiated Band-Edge & Spurious Emissions into Restricted Frequency Bands

7.7.1 Requirement

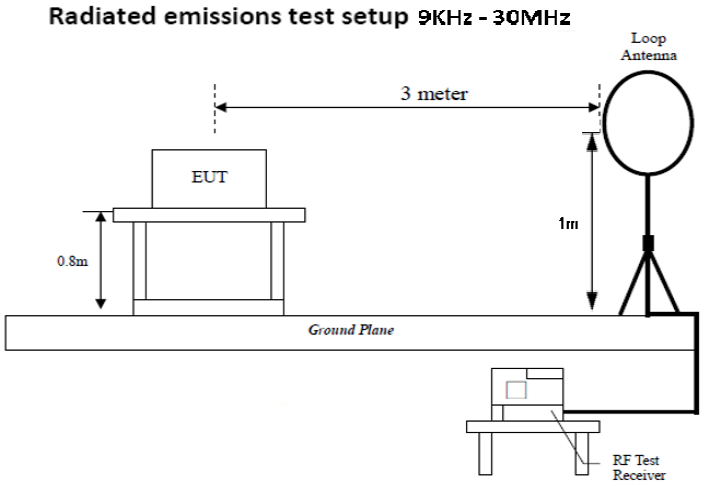
§ 15.247 (d), RSS-247 §5.5

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.

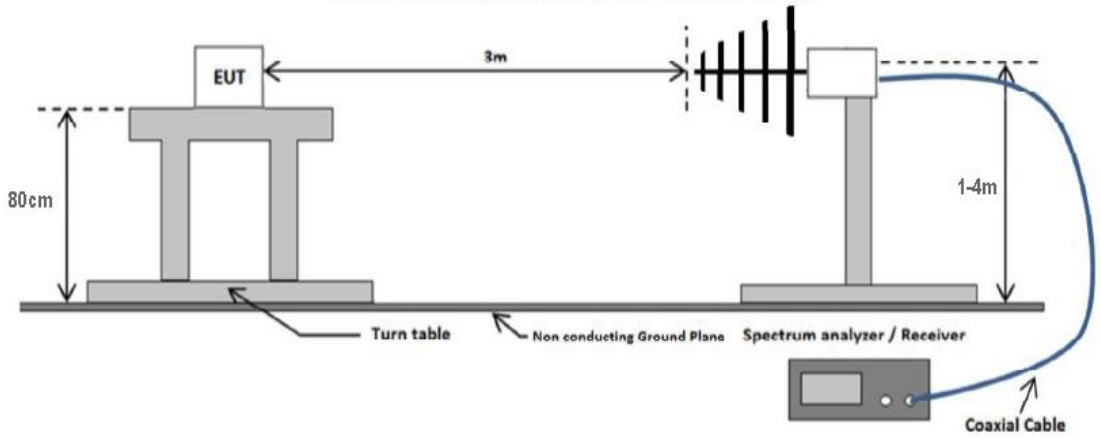
Attenuation below the general limits specified in §15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency Range (MHZ)	Field Strength (μV/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

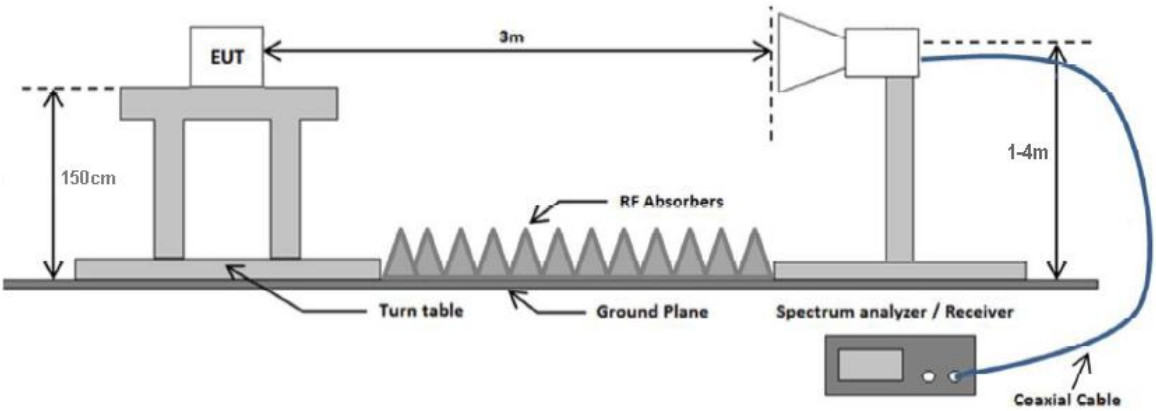
7.7.2 Test Setup



Radiated emissions test setup 30 MHz - 1 GHz



Radiated emissions test setup above 1 GHz



7.7.3 Test Procedure

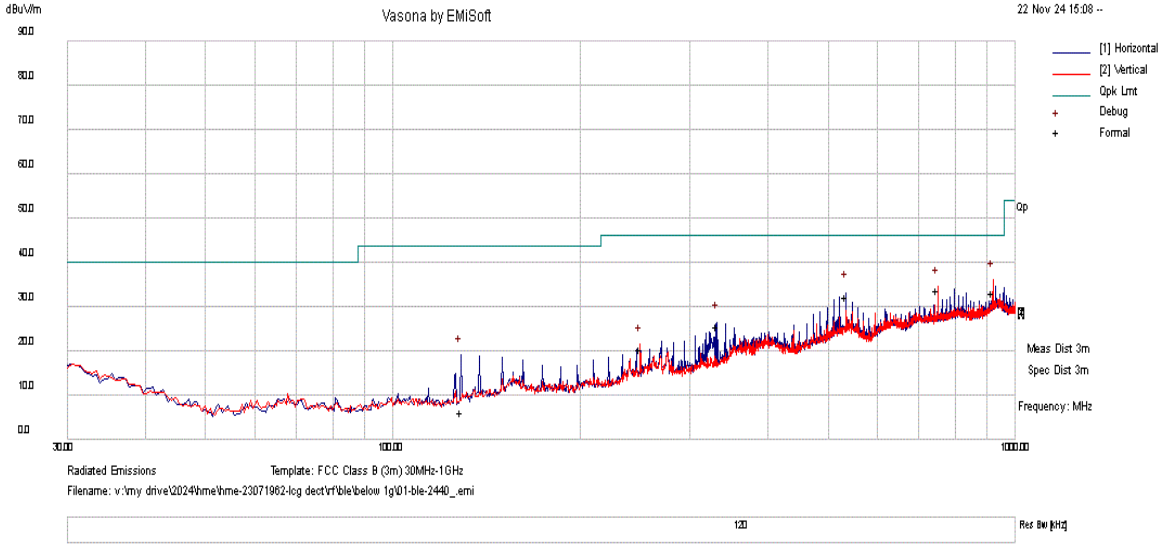
According to section 8.6 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.12.2.7 Radiated spurious emission measurements in ANSI C62.10-2013 as well as the procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 was followed. Boresight antenna mast was 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.

7.7.4 Test Result

RADIATED EMISSIONS BELOW 1 GHZ

Test Standard:	15.209, 15.247, RSS-247	Mode:	TX mode
Frequency Range:	30 MHz - 1 GHz	Test Date:	11/22/2024
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Lining
Remark:	Mid ch	Test Result:	Pass



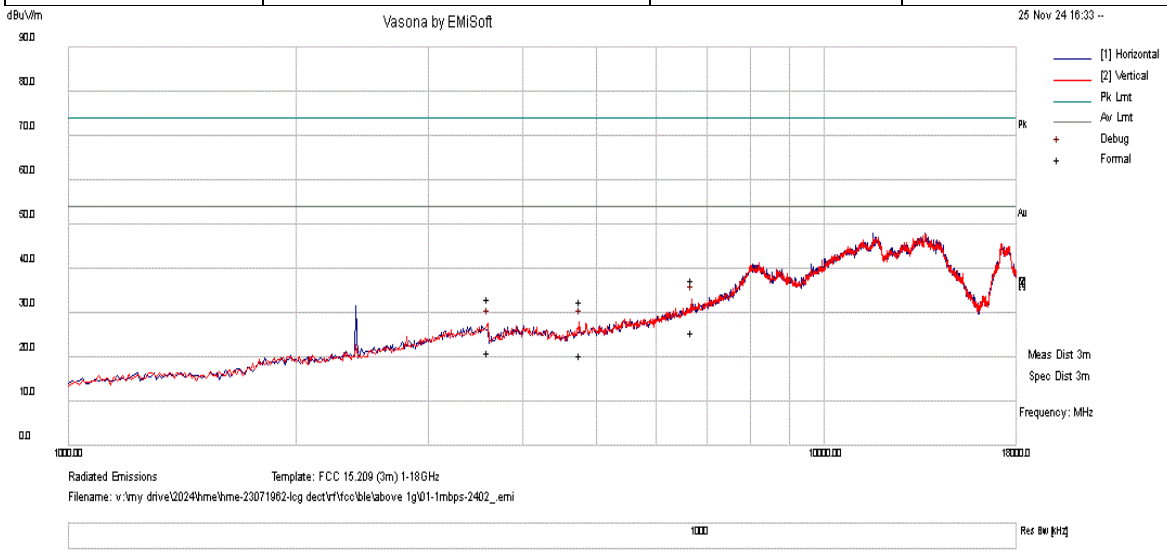
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	920.0	19.97	4.57	8.58	33.12	Quasi Max	V	100	130	46.00	-12.88	Pass
2	750.07	23.85	4.14	5.79	33.78	Quasi Max	V	346	0	46.00	-12.22	Pass
3	534.02	26.09	3.43	2.86	32.38	Quasi Max	H	194	234	46.00	-13.62	Pass
4	331.79	28.96	2.66	-6.03	25.59	Quasi Max	H	100	229	46.00	-20.41	Pass
5	128.58	17.91	1.65	-13.48	6.08	Quasi Max	H	385	179	43.50	-37.42	Pass
6	250.02	25.79	2.28	-7.80	20.27	Quasi Max	V	313	3	46.00	-25.73	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB) = Antenna Factor (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	15.209, 15.247, RSS-247	Mode:	Cont-TX
Frequency Range:	1 GHz – 18GHz	Test Date:	11/25/2024
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Lining
Remark:	BLE Ch0	Test Result:	Pass

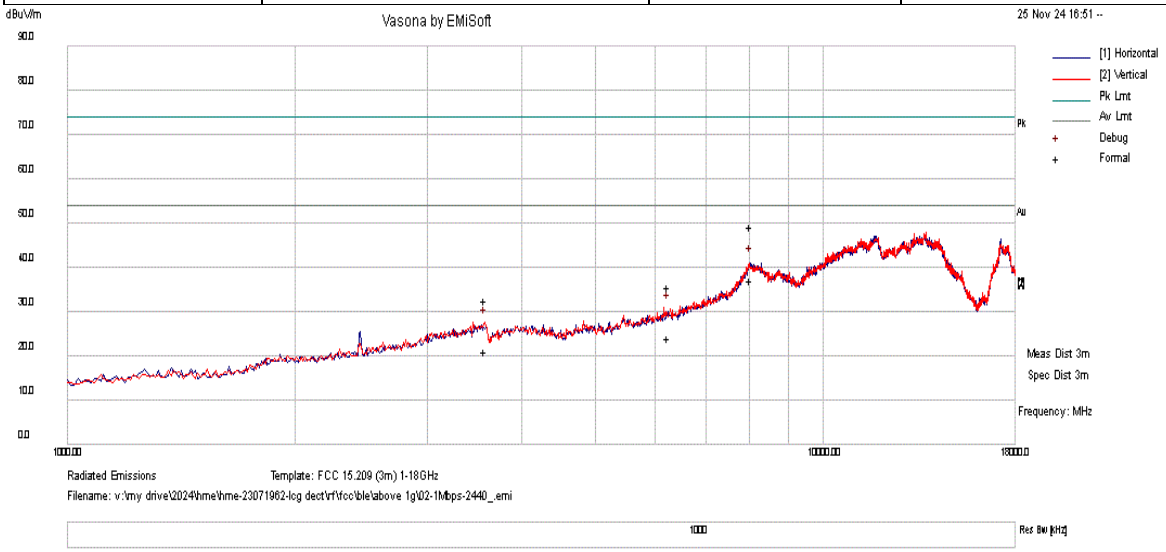


No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	6706.86	17.33	12.04	8.11	37.48	Peak Max	V	147	81	74.00	-36.52	Pass
2	4764.18	17.40	9.05	5.95	32.40	Peak Max	V	119	116	74.00	-41.60	Pass
3	3594.3	20.09	8.44	4.49	33.02	Peak Max	H	200	118	74.00	-40.98	Pass
4	6706.86	5.50	12.04	8.11	25.65	Average Max	V	147	81	54.00	-28.35	Pass
5	4764.18	5.54	9.05	5.95	20.54	Average Max	V	119	116	54.00	-33.46	Pass
6	3594.3	8.21	8.44	4.49	21.14	Average Max	H	200	118	54.00	-32.86	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB) = Antenna Factor (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

Test Standard:	15.209, 15.247, RSS-247	Mode:	Cont-TX
Frequency Range:	1 GHz – 18GHz	Test Date:	11/25/2024
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Lining
Remark:	BLE Ch19	Test Result:	Pass

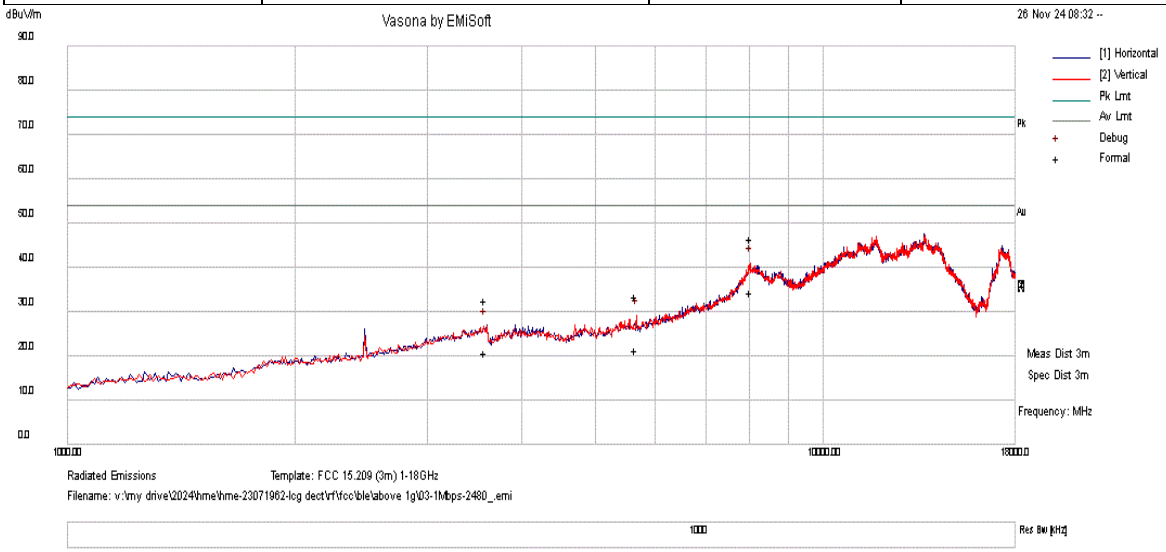


No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8024.06	19.04	14.26	15.84	49.14	Peak Max	H	167	146	74.00	-24.86	Pass
2	6239.1	16.83	11.83	6.84	35.50	Peak Max	H	132	163	74.00	-38.50	Pass
3	3573.2	19.82	8.39	4.45	32.66	Peak Max	H	147	173	74.00	-41.34	Pass
4	8024.06	7.06	14.26	15.84	37.16	Average Max	H	167	146	54.00	-16.84	Pass
5	6239.1	5.41	11.83	6.84	24.08	Average Max	H	132	163	54.00	-29.92	Pass
6	3573.2	8.22	8.39	4.45	21.06	Average Max	H	147	173	54.00	-32.94	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB) = Antenna Factor (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

Test Standard:	15.209, 15.247, RSS-247	Mode:	Cont-TX
Frequency Range:	1 GHz – 18GHz	Test Date:	11/26/2024
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Lining
Remark:	BLE Ch39	Test Result:	Pass



No.	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
1	8024.06	16.23	14.26	15.84	46.33	Peak Max	H	137	6	74.00	-27.67	Pass
2	5667.3	16.49	11.22	5.82	33.53	Peak Max	V	184	147	74.00	-40.47	Pass
3	3572.48	19.84	8.39	4.45	32.68	Peak Max	H	171	0	74.00	-41.32	Pass
4	8024.06	4.32	14.26	15.84	34.42	Average Max	H	137	6	54.00	-19.58	Pass
5	5667.3	4.24	11.22	5.82	21.28	Average Max	V	184	147	54.00	-32.72	Pass
6	3572.48	8.00	8.39	4.45	20.84	Average Max	H	171	0	54.00	-33.16	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB) = Antenna Factor (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

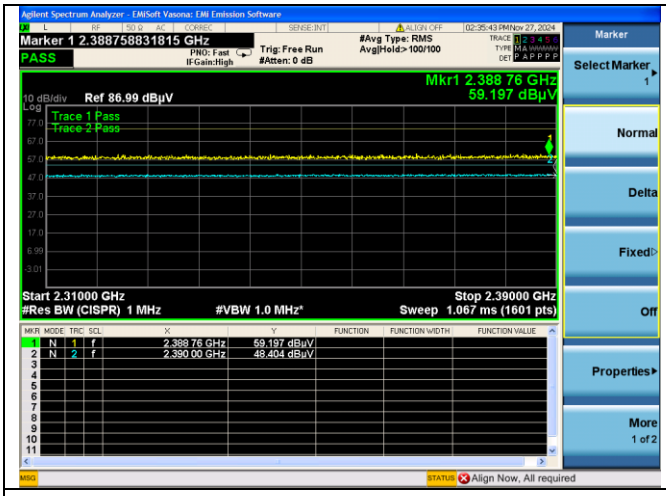
Radiated Emission between 9KHz – 30MHz test result

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

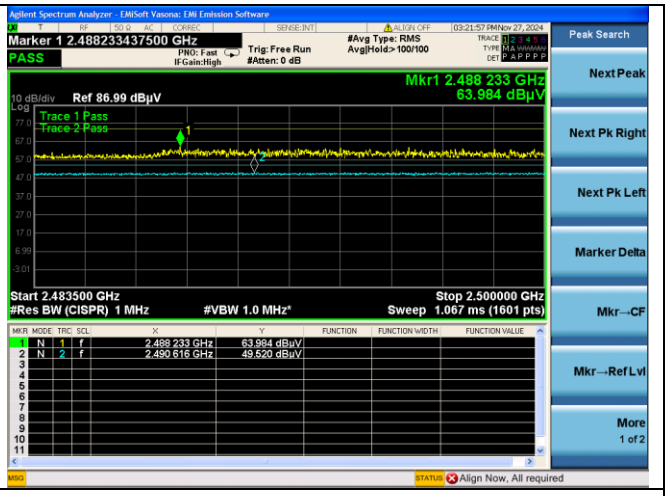
Radiated Emission between 18GHz – 40GHz test result

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

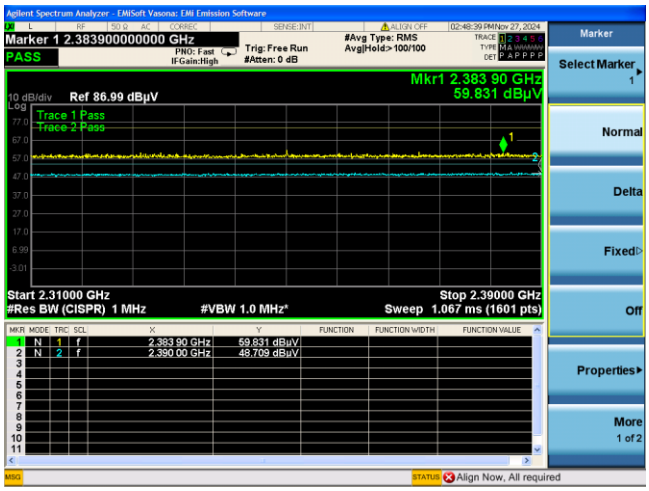
Restricted Band Measurement Result



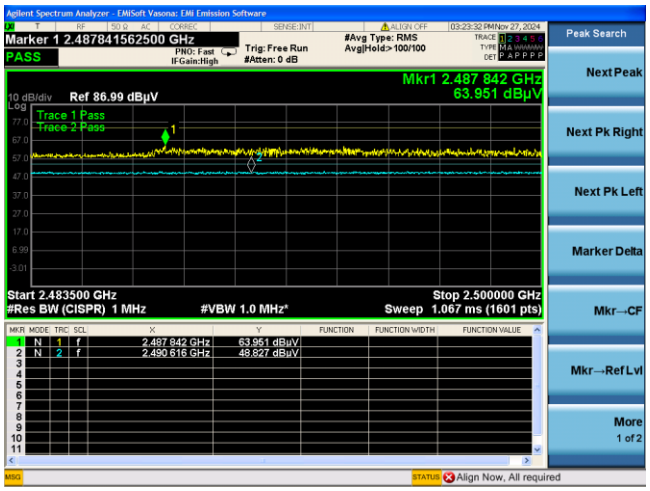
BLE – Low CH-1Mpbs



BLE – High CH-1Mpbs



BLE – Low CH-2Mpbs



BLE – High CH-2Mpbs

7.8 Conducted Emissions

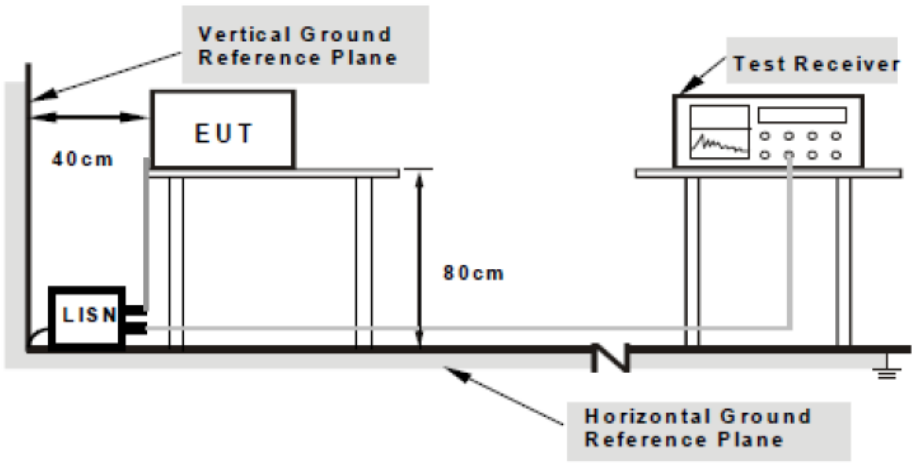
7.8.1 Requirement

Per § 15.207 (a), an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Limits for Conducted Emissions at the Mains Ports

Section	Frequency ranges (MHz)	Limit (dBuV)	
		QP	Average
Class B devices	0.15 – 0.5	66 – 56	56 – 46
	0.5 – 5	56	46
	5 - 30	60	50
NOTE 1 The lower limit shall apply at the transition frequencies.			

7.8.2 Test setup



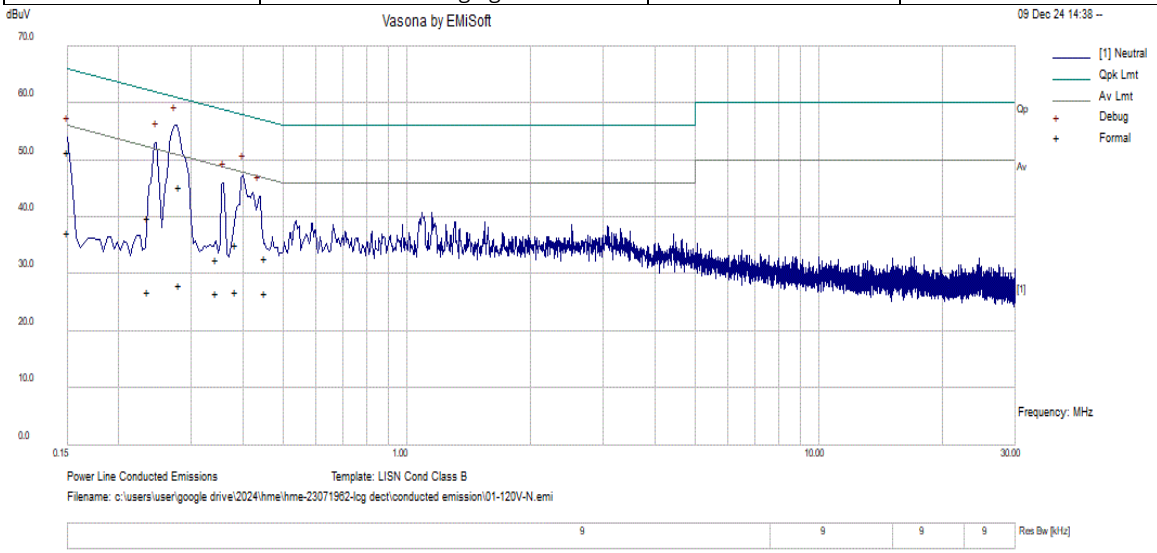
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

7.8.3 Test Procedure

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50Ω/50µH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment was powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, were then selected.
8. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made
9. All possible modes of operation were investigated. Only the worst case emissions were measured and reported. All other emissions were relatively insignificant.

7.8.4 Test Result

Test Standard:	LISN B Cond Class B	Mode:	Conducted Emission
Frequency Range:	0.15 - 30MHz	Test Date:	12/09/2024
Line:	Neutral	Test Personnel:	Lining
Remark:	EUT in Charging mode	Test Result:	Pass

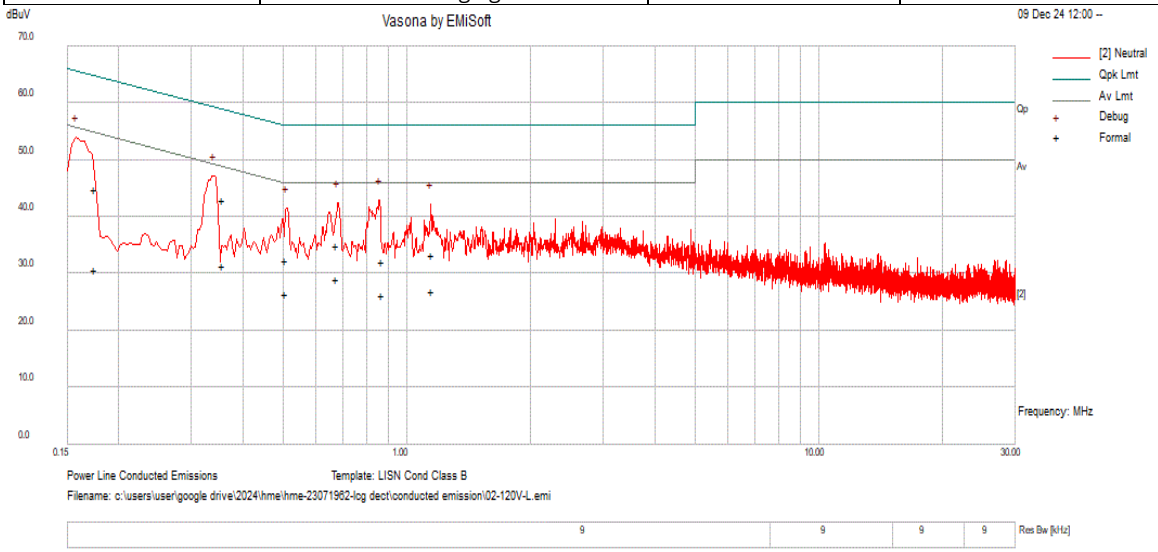


No.	Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass/Fail
1	0.28	35.23	10.04	0.14	45.41	Quasi Peak	Neutral	60.80	-15.39	Pass
2	0.24	29.78	10.04	0.16	39.98	Quasi Peak	Neutral	62.24	-22.26	Pass
3	0.38	24.96	10.04	0.12	35.12	Quasi Peak	Neutral	58.20	-23.08	Pass
4	0.15	41.07	10.03	0.24	51.34	Quasi Peak	Neutral	65.98	-14.64	Pass
5	0.35	22.39	10.04	0.12	32.55	Quasi Peak	Neutral	59.07	-26.52	Pass
6	0.45	22.67	10.04	0.11	32.82	Quasi Peak	Neutral	56.81	-23.99	Pass
7	0.28	17.94	10.04	0.14	28.12	Average	Neutral	50.80	-22.68	Pass
8	0.24	16.78	10.04	0.16	26.98	Average	Neutral	52.24	-25.26	Pass
9	0.38	16.75	10.04	0.12	26.91	Average	Neutral	48.20	-21.29	Pass
10	0.15	27.11	10.03	0.24	37.38	Average	Neutral	55.98	-18.60	Pass
11	0.35	16.58	10.04	0.12	26.74	Average	Neutral	49.07	-22.33	Pass
12	0.45	16.67	10.04	0.11	26.82	Average	Neutral	46.81	-19.99	Pass

Remarks:

1. The emission levels of other frequencies were very low against the limit.
2. Factor = Inert loss of LISN
3. Margin value = Emission level - Limit value
4. Emission Level = Raw Value + Cable loss + Factors Value.
5. EUT is battery operated only; it's charging mode has a indirect connection to AC power line.

Test Standard:	LISN B Cond Class B	Mode:	Conducted Emission
Frequency Range:	0.15 - 30MHz	Test Date:	12/09/2024
Line:	Live	Test Personnel:	Lining
Remark:	EUT in Charging mode	Test Result:	Pass



No.	Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass/Fail
1	0.18	34.67	10.04	0.21	44.92	Quasi Peak	Live	64.71	-19.79	Pass
2	0.36	32.86	10.04	0.12	43.02	Quasi Peak	Live	58.78	-15.76	Pass
3	0.87	21.97	10.05	0.10	32.12	Quasi Peak	Live	56.00	-23.88	Pass
4	0.67	24.77	10.05	0.11	34.93	Quasi Peak	Live	56.00	-21.07	Pass
5	1.15	23.27	10.05	0.10	33.42	Quasi Peak	Live	56.00	-22.58	Pass
6	0.51	22.20	10.04	0.10	32.34	Quasi Peak	Live	56.00	-23.66	Pass
7	0.18	20.37	10.04	0.21	30.62	Average	Live	54.71	-24.09	Pass
8	0.36	21.31	10.04	0.12	31.47	Average	Live	48.78	-17.31	Pass
9	0.87	16.13	10.05	0.10	26.28	Average	Live	46.00	-19.72	Pass
10	0.67	18.92	10.05	0.11	29.08	Average	Live	46.00	-16.92	Pass
11	1.15	16.82	10.05	0.10	26.97	Average	Live	46.00	-19.03	Pass
12	0.51	16.32	10.04	0.10	26.46	Average	Live	46.00	-19.54	Pass

Remarks:

1. The emission levels of other frequencies were very low against the limit.
2. Factor = Inert loss of LISN
3. Margin value = Emission level - Limit value
4. Emission Level = Raw Value + Cable loss + Factors Value.
5. EUT is battery operated only; it's charging mode has a indirect connection to AC power line.

8 EUT and Test Setup Photos

See FCC exhibits

9 Test Instrument List

Equipment	Manufacturer	Model	Instrument Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	05/24/2024	05/24/2027
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A1)	N/A1)
Spectrum Analyzer	Keysight	N9020A	MY50110074	05/15/2024	05/15/2026
EMC Test Receiver	R&S	ESL6	100230	05/14/2024	05/14/2025
LISN (9KHz – 30MHz)	EMCO	3816/2	9705-1066	05/28/2024	05/28/2025
Bi-Log Antenna	ETS-Lindgren	3142E	217921	07/25/2024	07/25/2025
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	07/22/2024	07/22/2025
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	07/22/2024	07/22/2025
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	05/17/2024	05/17/2025
RF Attenuator	Pasternack	PE7005-3	VL061	07/29/2024	07/29/2025
EM Center Control	ETS-Lindgren	7006-001	160136	N/A1)	N/A1)
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A1)	N/A1)
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A1)	N/A1)
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	06/13/2024	06/13/2026
RE test cable (below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	07/29/2024	07/29/2025
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	07/29/2024	07/29/2025
RE test cable (>18GHz)	Sucoflex	104	344903/4	07/29/2024	07/29/2025
Pulse limiter	Com-Power	LIT-930A	531727	07/29/2024	07/29/2025
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	07/29/2024	07/29/2025
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	07/29/2024	07/29/2025
USB RF Power Sensor	ETS-Lindgren	7002-006	SN 00151268	05/14/2024	05/14/2026
Agilent Signal Generator	MXG N5182A	N5182A	US47080548	05/15/2024	05/15/2025
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL052	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL053	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL054	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL055	N/A1)	N/A1)
2.4GHz Notch Filter	Micro-Tronics	BRM50702	VL063	N/A1)	N/A1)
5GHz Notch Filter	Micro-Tronics	BRM50716	VL064	N/A1)	N/A1)
Horn Antenna (1-18GHz)	FT-RF	HA-07M18G-NF	180010HA	N/A1)	N/A1)
DECT Communication Tester	R&S	CMD60	845660/013	05/15/2024	05/15/2026
Wideband Communication	R&S	CMW500	147508	05/15/2023	05/15/2025
Temperature/Humidity Chamber	Bemco	FBW1.5-100/350	3621-9	05/16/2024	05/16/2027
Synthesized Signal Generator	Anritsu	68367C A/NV	11625	05/14/2024	05/14/2025
Spectrum Analyser (9kHz-43GHz)	Anritsu	MS2830A	6201145210	05/16/2024	05/16/2025

Note:

1) This equipment is not for measurement purposes and only requires functional verification. Calibration is not required.

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