ELECTRONICS TEST CENTRE
MPB TECHNOLOGIES INC.

ACCREDITED
TESTING CERT#2750.01

Test Report Prepared By:

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ETC Report #: t29e22a153-DTS Release1 Report date: March 29, 2022

Test Date: February 28, 2022
March 01 and 08, 2022

EMC testing of the Tektelic Communication Inc. Breeze-V in accordance with FCC Part 15.247and ANSI C63.10: 2013 as referenced by FCC OET KDB 558074 D01 15.247 Meas Guidance v05r02.

FCC ID: 2ALEPT0007805

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REVISION RECORD

ISSUE	DATE	AUTHOR	REVISIONS
DRAFT 1	2022-03-08	I. Akram	Initial draft submitted for review.
Release1	2022-03-29	I. Akram	Sign Off

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1.0 INTRODUCTION

1.1 Scope

The purpose of this report is to present the results of compliance testing performed in accordance with FCC Part 15.247 and ANSI C63.10-2013 to gain FCC Certification Authorization for Low-Power License-Exempt transmitters. All test procedures, limits, criteria, and results described in this report apply only to the Tektelic Communication Inc. Breeze-V test sample, referred to herein as the EUT (Equipment Under Test).

This report does not imply product endorsement by the Electronics Test Centre, A2LA, nor any Canadian Government agency.

1.2 Applicant

This test report has been prepared for Tektelic Communication Inc., located in Calgary, Alberta, Canada.

1.3 Test Sample Description

As provided to ETC (Airdrie) by Tektelic Communication Inc.:

Product Name:			Breeze-V
Lora Radio	**Frequency Range**		903 – 914.2 MHz
	Type of Modulation		LoRa 500KHz DTS
BLE	**Frequency Range**		2400 – 2483.5 MHz
	Type of Modulation		2402 – 2480 MHz
Associated Antennas		**LoRa**	Ignion (Fractus Antennas S.L), RUN mXTENDTM (NN02-224) Peak Gain = 2.1 dBi, Chip Antenna
		BLE	Pulse Engineering, W3008, Gain=1.1 dBi, Chip Antenna
Model# / Serial#			T0007806 / 2210K0004
Variant Name / Model#			Breeze / T0007838, Vivid+ / T0007848
Power supply:			Battery Powered

This Breeze-V model contains all of the equipment options in this family of products. This model represents model number Breeze (T0007838) and Vivid+ (T0007848). This model was chosen as a worst-case condition for emission testing. Both T0007806/2210K0004 and T0007806/2210K0003 (Crystal/TCXO) tested for emission profile and found no difference in emission.

Detail differences between the models are given in Breeze-V family exhibit.

1.4 General Test Conditions

The EUT was set up and exercised using the configurations, modes of operation and arrangements defined in this report only. All inputs and outputs to and from other equipment associated with the EUT were adequately simulated.

Where relevant, the EUT was only tested using the monitoring methods and test criteria defined in this report.

The environmental conditions are recorded during each test, and are reported in the relevant sections of this document.

1.5 Reference Standards

Standards	Description
FCC, title 47 CFR § 15.247	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
FCC, title 47 CFR § 15.207	General Requirements for Compliance of Radio Apparatus
FCC, title 47 CFR § 15.209	Intentional radiator, conducted emission limits
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ANSI C63.10-2014	American National Standard for Methods of Measurement of Radio – Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 KHz to 40 GHz
558074 D01 15.247 Meas Guidance v05r02	Guidance For Compliance Measurements On Digital Transmission System, Frequency Hopping Spread Spectrum System, And Hybrid System Devices Operating Under Section 15.247 Of The FCC Rules

1.6 Test Methodology

Test methods are specified in the Basic Standard as referenced and/or modified by the Product Standard in the part of Section 2 of this report associated with each particular test case. Separate test report is provided to customer for RX mode under SDOC.

1.6.1 Variations in Test Methodology

Any variance in methodology or deviation from the reference Standard is documented in the part of Section 2 of this report associated with each particular Test Case.

1.6.2 Test Sample Verification, Configuration & Modifications

EUT setup, configuration, protocols for operation and monitoring of EUT functions, and any modifications performed in order to meet the requirements, are detailed in each Test Case of Section 2 of this report.

1.6.3 Uncertainty of Measurement:

The factors contributing to measurement uncertainty are identified and calculated in accordance with CISPR 16-4-2: 2011.
This uncertainty estimate represents an expended uncertainty expressed at approximately 95% confidence using a coverage factor of k = 2.

Test Method	Uncertainty
Radiated Emissions Level (9 KHz – 1 GHz)	±5.8 dB
Radiated Emissions Level (1 GHz – 18 GHz)	±4.9 dB
Radiated Emissions Level (18 GHz – 26.5 GHz)	±5.0 dB
Conducted Emissions Level (150 KHz – 30 MHz)	±3.0 dB
Uncertainty Conducted Power level	±0.5 dB
Uncertainty Conducted Spurious emission level	±0.6 dB
Uncertainty for Bandwidth test	±1.5 %

2.0 TEST CONCLUSION

STATEMENT OF COMPLIANCE

The customer equipment referred to in this report was found to comply with the requirements, as summarized below.

The EUT was subjected to the following tests. Compliance status is reported as **Compliant** or **Non-compliant**. **N/A** indicates the test was Not Applicable to the EUT.

The measurement uncertainty is not accounted for determination of the statement of compliance. The statement of compliance is based only on the measurement value recorded.

> **Note:** Maintenance of compliance is the responsibility of the Manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the EUT with respect to the standards detailed in this test report.

The following table summarizes the tests performed in terms of the specification, class or performance criterion applied, and the EUT modification state.

Test Case	Test Type	Specification	Test Sample	Modifications	Config.	Result
2.1	AC Conducted Emissions (Tx)	15.207	Breeze-V	none	see § 2.1	**Compliant**
2.2	6dB Bandwidth	15.247(a)	Breeze-V	none	see § 2.2	**Compliant**
2.3	Max Output Power	15.247(d)	Breeze-V	none	see § 2.3	**Compliant**
2.4	Power Spectral Density	15.247(e)	Breeze-V	none	see § 2.4	**Compliant**
2.5	Band Edge	15.247(d)	Breeze-V	none	see § 2.5	**Compliant**
2.6	Conducted Spurious Emission (Non-Restricted Band)	15.247(d)	Breeze-V	none	see § 2.6	**Compliant**
2.7	EUT Position	ANSI C63.4	Breeze-V	none	see § 2.7	**assed**
2.8	Radiated Spurious Emission (Restricted Band)	15.205, 15.209 15.247(d)	Breeze-V	none	see § 2.8	**Compliant**
2.9	RF Exposure	15.247(i)	Breeze-V	none	see § 2.9	**Compliant**

Refer to the test data for applicable test conditions.

2.1 AC Power Line Conducted Emissions: Transmit Mode N/A

Test Lab: Electronics Test Centre, Airdrie	**EUT: Breeze-V** **Standard: FCC Part 15.207** **Basic Standard: ANSI C63.10: 2013**
EUT status: N/A	
Comments: EUT is internal Battery Powered. No Direct or indirect Connection to AC main.	

2.2 6dB Bandwidth

Test Lab: Electronics Test Centre, Airdrie	**EUT: Breeze-V**
Test Personnel: Imran Akram	**Standard: FCC PART 15.247**
Date: 2022-03-08 (20.7°C,14.2% RH)	**Basic Standard: ANSI C63.10-2013 FCC OET KDB 558074**

EUT status: Compliant

Specification: FCC Part 15.247 (a, 2), FCC 15.215 (c)

Criteria: Systems using digital modulation techniques may operate in the 902-928 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.2.1 Test Guidance: ANSI C63.10-2013, Clause 11.8 / FCC OET KDB 558074

This measurement is performed at low, mid and high frequencies, with modulation.

The RF output of EUT with an antenna connector is fed to the input of the spectrum analyzer through appropriate attenuation. The loss from the cable and the attenuator were added on the analyzer as gain offset setting there by allowing direct measurements, without the need for any further corrections.

For DTS the spectrum analyzer is set for a frequency span ≥ (2 * OBW), ≤ (5 * OBW), selected to clearly display the channel. The RBW is set to 100 kHz. The VBW is set to ≥ (3 * RBW). The Peak detector is used, with the trace set to Max Hold.

The automated 99% BW function of the spectrum analyzer is engaged, and the 6 dB OBW and/or 20 dB OBW is measured with the x dB function.

2.2.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

2.2.3 Test Equipment

Testing was performed with the following equipment:

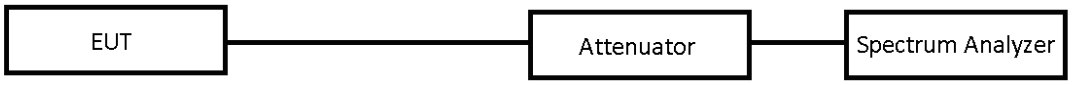
Equipment	Manufacturer	Model #	Asset #	Cal. Date	Cal. Due
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2021-06-18	2022-06-18
Temp/Humidity	Extech	42270	5892	2021-04-05	2022-04-15
Attenuator	Mini-Circuits®	BWS102W263	6932	Cal. before each use	
Coaxial Cables (RF)	Huber+Suhner	Enviroflex 400	-	Cal. before each use	

2.2.4 Test Sample Verification, Configuration & Modifications

The EUT was set to transmit continuously on a selected channel with test-specific software. The output was modulated as in normal operation. The EUT met the requirements without modification.

Test setup diagrams for Occupied Bandwidth testing:

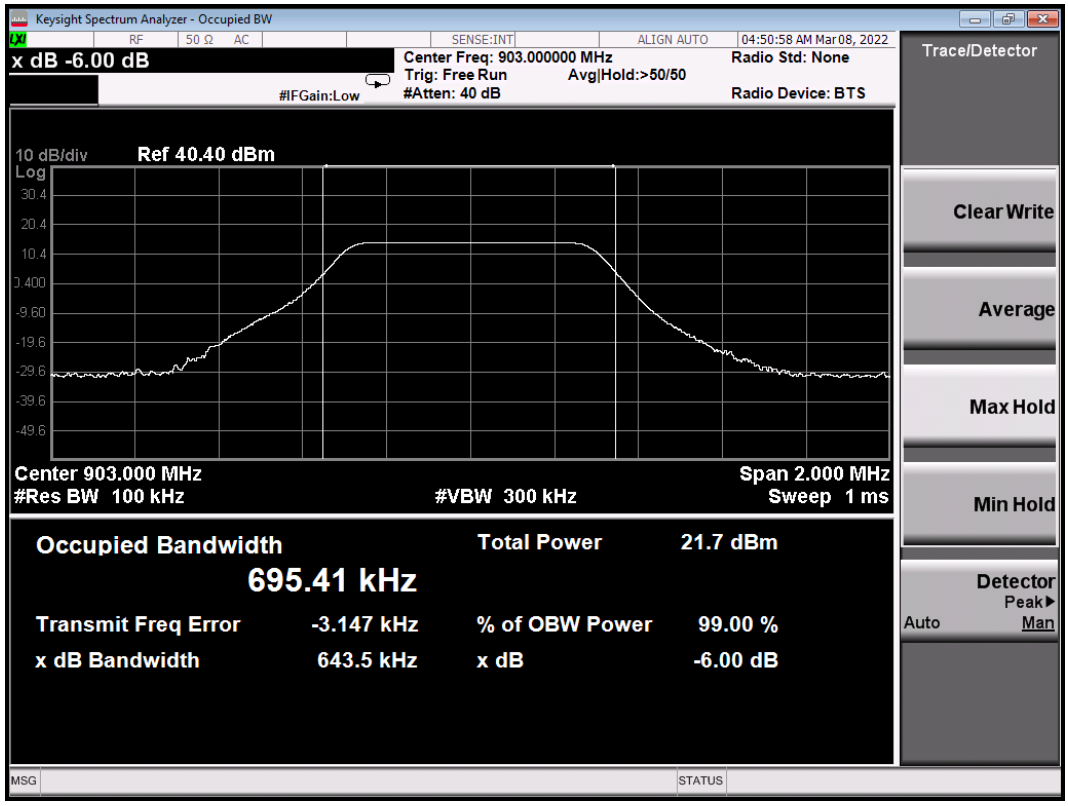
Conducted:



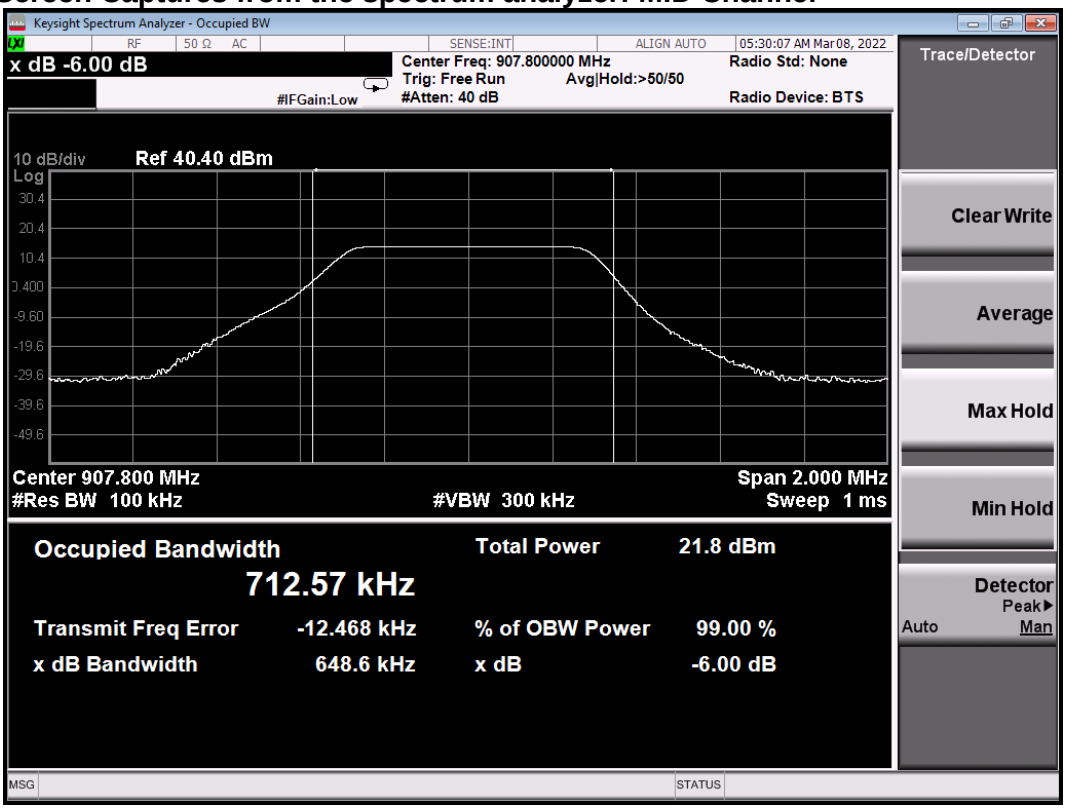
2.2.5 Channel Occupied Bandwidth Data: LoRa DTS

Mode of operation	Channel	Freq. [MHz]	6 dB BW [kHz]	Limit BW [KHz]
LoRa 500 KHz	Low	903	643.5	≥ 500
	Mid	907.8	648.6	
	High	914.2	648.2	

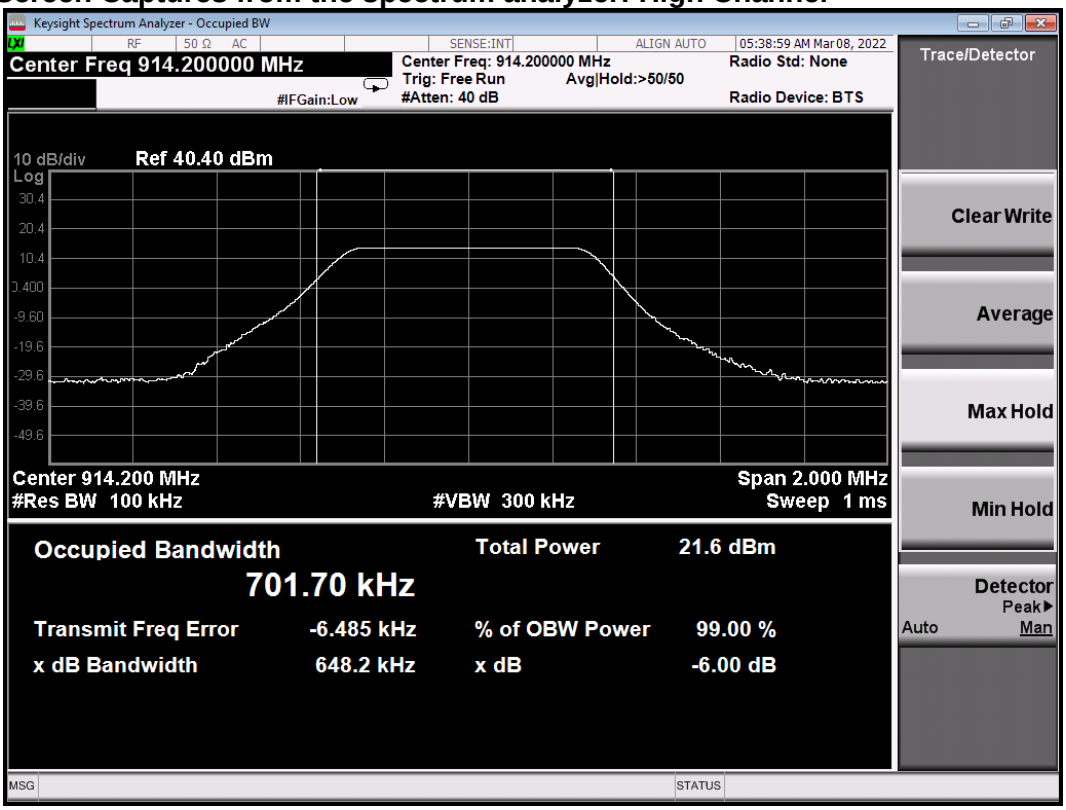
Screen Captures from the spectrum analyzer: Low Channel



Screen Captures from the spectrum analyzer: MID Channel



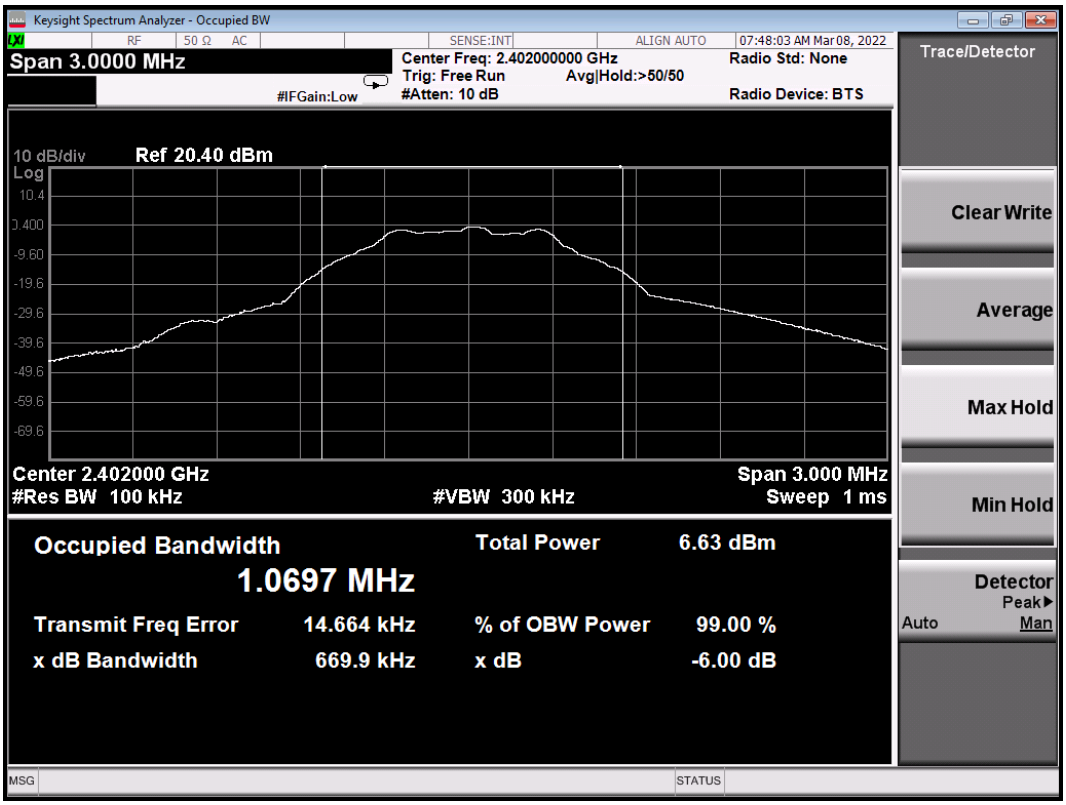
Screen Captures from the spectrum analyzer: High Channel



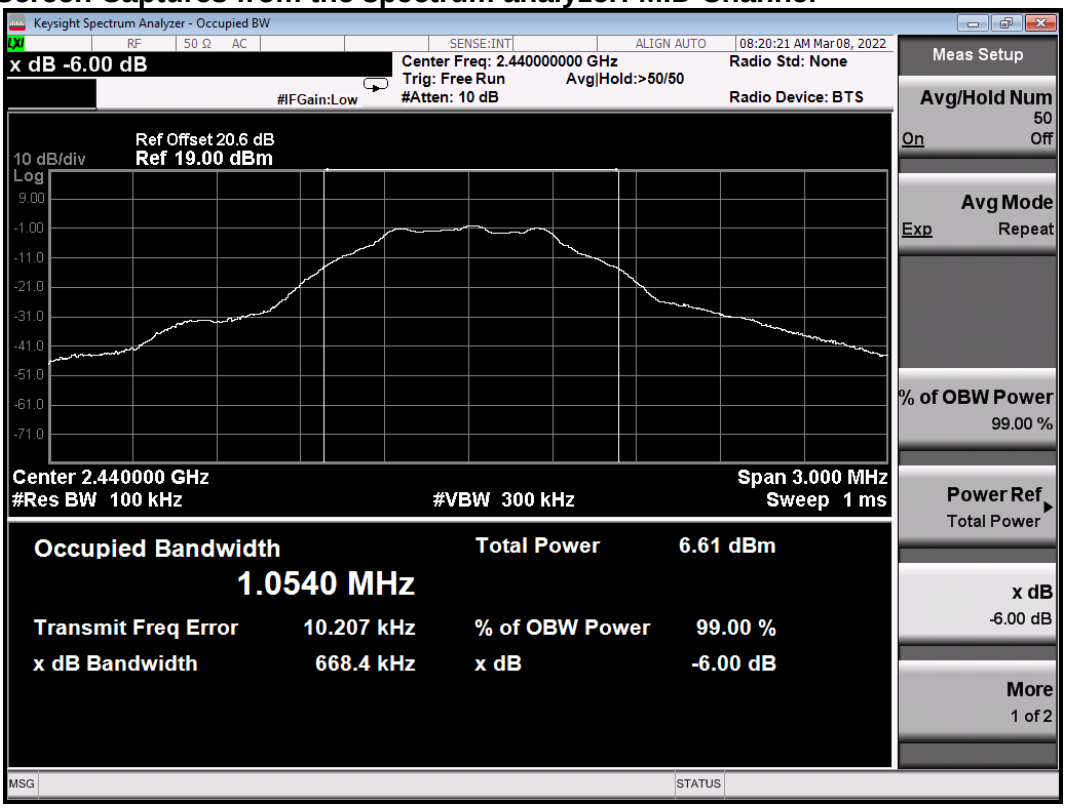
2.2.6 Channel Occupied Bandwidth Data: BLE

Mode of operation	Channel	Freq. [MHz]	6 dB BW [kHz]	Limit BW [KHz]
BLE	Low	2402	669.9	≥ 500
	Mid	2440	668.4	
	High	2480	669.4	

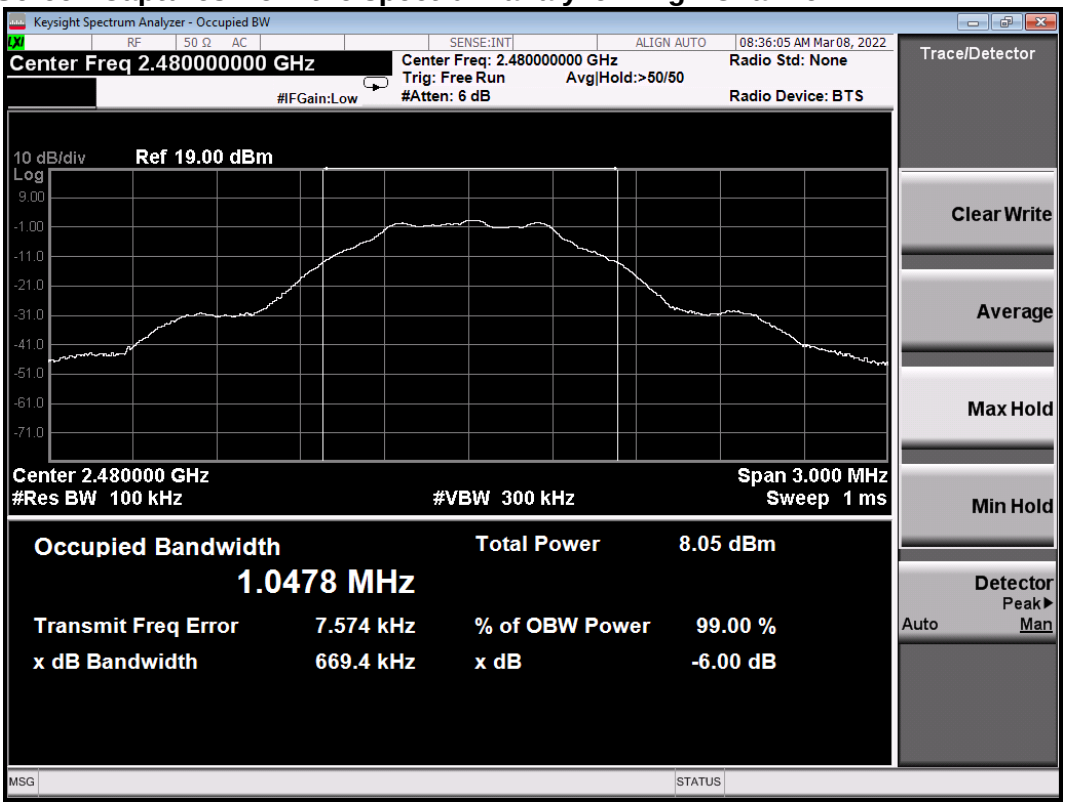
Screen Captures from the spectrum analyzer: Low Channel



Screen Captures from the spectrum analyzer: MID Channel



Screen Captures from the spectrum analyzer: High Channel



2.3 Max Average Output Power

Test Lab: Electronics Test Centre, Airdrie	**EUT: Breeze-V**
Test Personnel: : Imran Akram	**Standard: FCC PART 15.247**
Date: 2022-03-08 (20.7°C,14.2% RH)	**Basic Standard: ANSI C63.10: 2013** **FCC OET KDB 558074**

EUT status: Compliant

Specification: FCC Part 15.247(b, 3)

Criteria	(3) For systems using digital modulation in the 902-928 MHz bands: 1 Watt.

2.3.1 Test Guidance: ANSI C63.10-2013, Clause 11.9.2.2.2/ FCC OET KDB 558074

This measurement is performed at low, mid and high frequencies, with modulation.

The RF output of EUT with an antenna connector is fed to the input of the spectrum analyzer through appropriate attenuation. The loss from the cable and the attenuator were added on the analyzer as gain offset setting there by allowing direct measurements, without the need for any further corrections.

Output Power Method AVGSA-1 For LoRa DTS	
Span	≥ 1.5 times the OBW
RBW	1 – 5 % of the OBW, ≤ 1 MHz
VBW	≥ 3 x RBW
Number of Points in sweep	≥ 2 x Span / RBW
Sweep time	Auto
Detector	RMS (Power Averaging)
Sweep trigger	Free Run (Duty Cycle ≥98%)
Trace Average	100 traces in power Averaging (RMS)
Power measured	Integrated the spectrum across the OBW of the signal using the S/A band power measurement function, with band limit set equal to the OBW band edge.

2.3.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

2.3.3 Test Equipment

Testing was performed with the following equipment:

Equipment	Manufacturer	Model #	Asset #	Cal. Date	Cal. Due
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2021-06-18	2022-06-18
Temp/Humidity	Extech	42270	5892	2021-04-05	2022-04-15
Attenuator	Mini-Circuits	BWS102W263	6932	Cal. before each use	
Coaxial Cables (RF)	Huber+Suhner	Enviroflex 400	-	Cal. before each use	

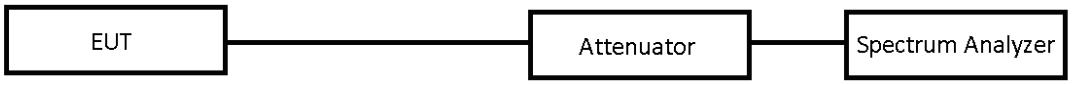
2.3.4 Test Sample Verification, Configuration & Modifications

The EUT was set to a selected channel with test-specific software. The output was modulated as in normal operation.

The EUT met the requirements without modification.

Test setup diagrams for Peak Power testing:

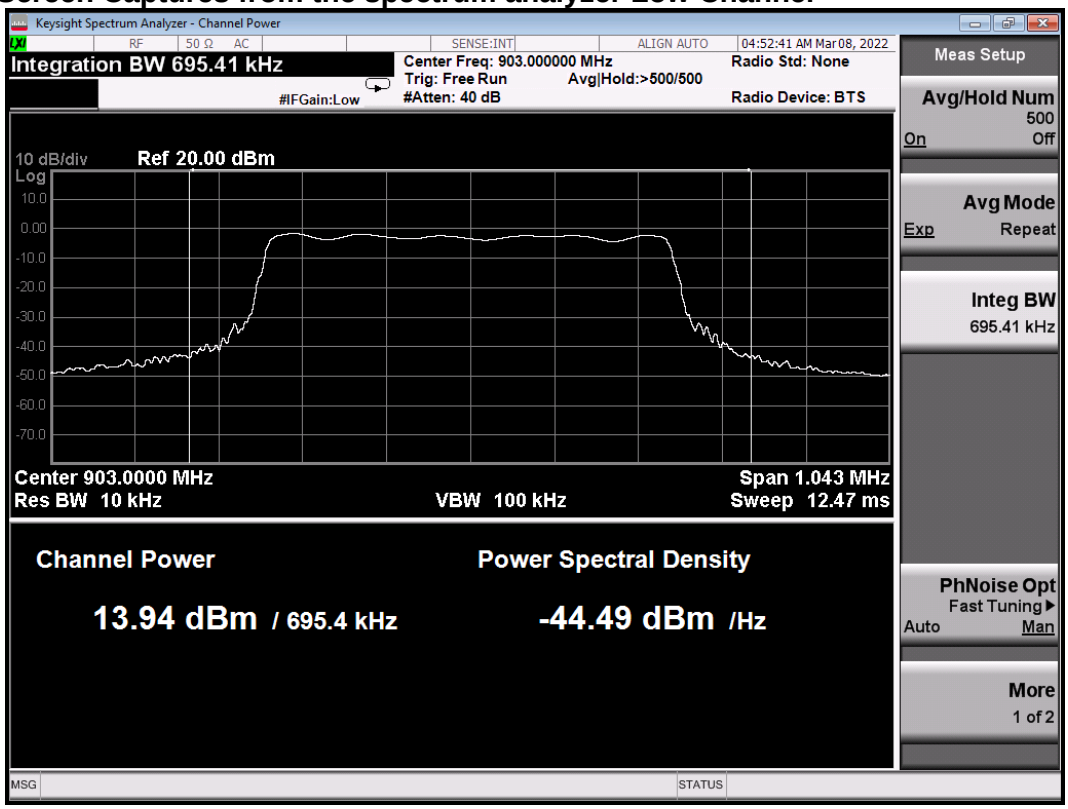
Conducted:



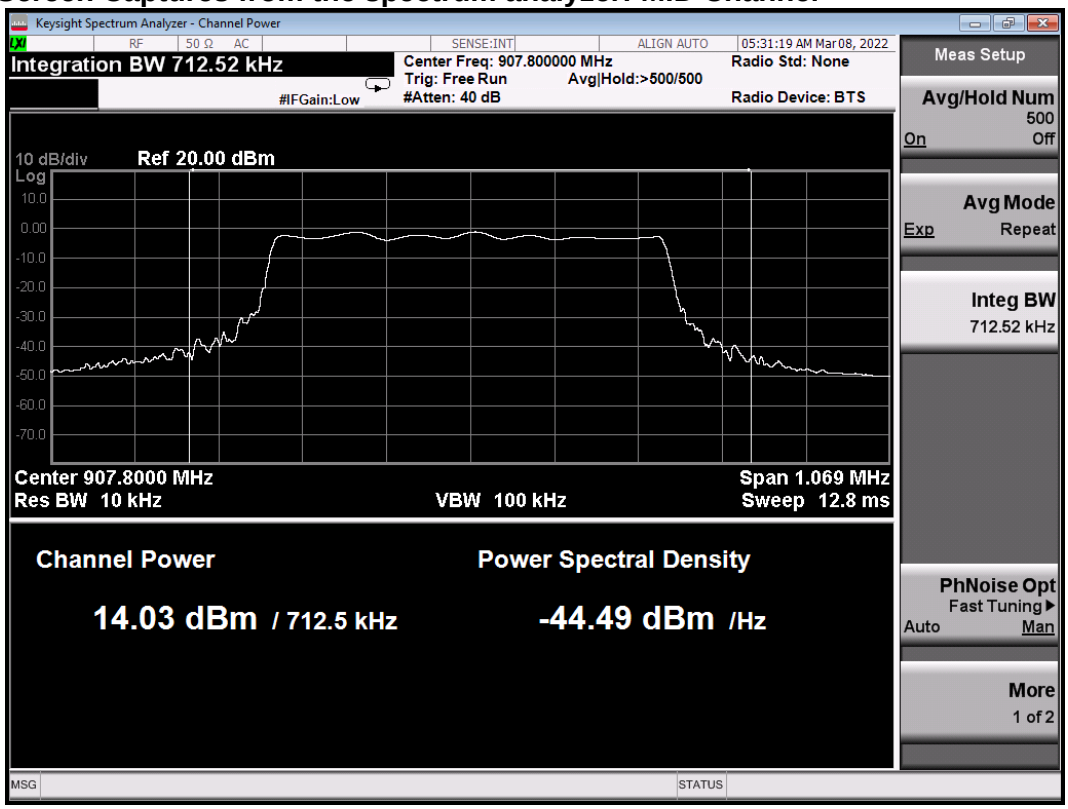
2.3.5 Max Average Output Power Data: LoRa DTS

Mode of Operation	Channel	Freq. [MHz]	Out Put Power (dBm)	Out Put Power Limit (dBm
LoRa 500 KHz	Low	903	13.94	30
	Mid	907.8	14.03	30
	High	914.2	14.11	30

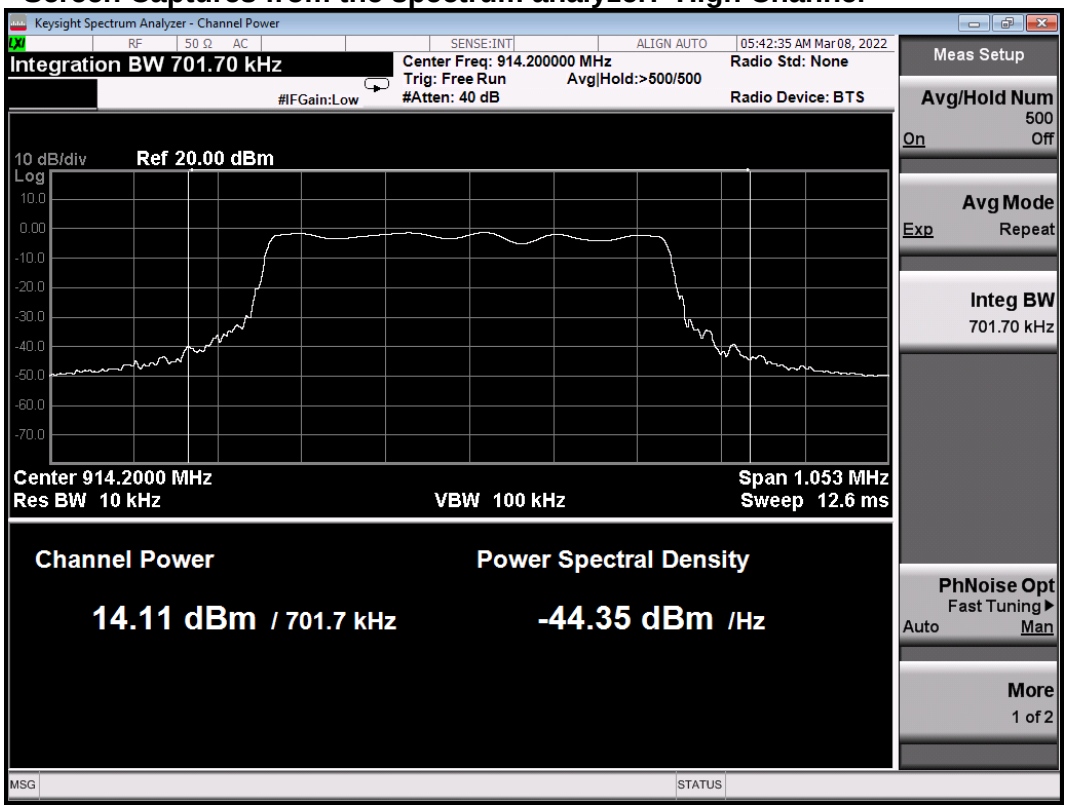
Screen Captures from the spectrum analyzer Low Channel



Screen Captures from the spectrum analyzer: MID Channel



Screen Captures from the spectrum analyzer: High Channel



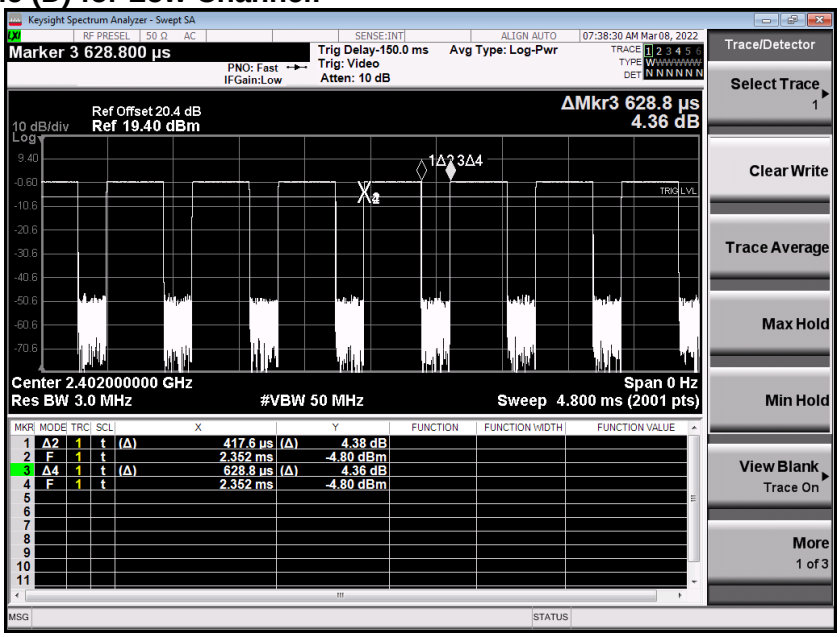
2.3.6 Max Average Output Power Data: BLE

Mode of Operation	Channel	Freq. [MHz]	AV Output Power (dBm)	Duty Cycle Factor (dB)	Corrected AV output Power (dBm)	Out Put Power Limit (dBm
BLE	Low	2402	-1.89	1.78	-0.11	30
	Mid	2440	-2.09	1.79	-0.29	30
	High	2480	-2.03	1.79	-0.24	30

BLE transmitting duty cycle < 98%. Method AVGSA-2 uses trace averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction is used. The procedure for this method is as follows:

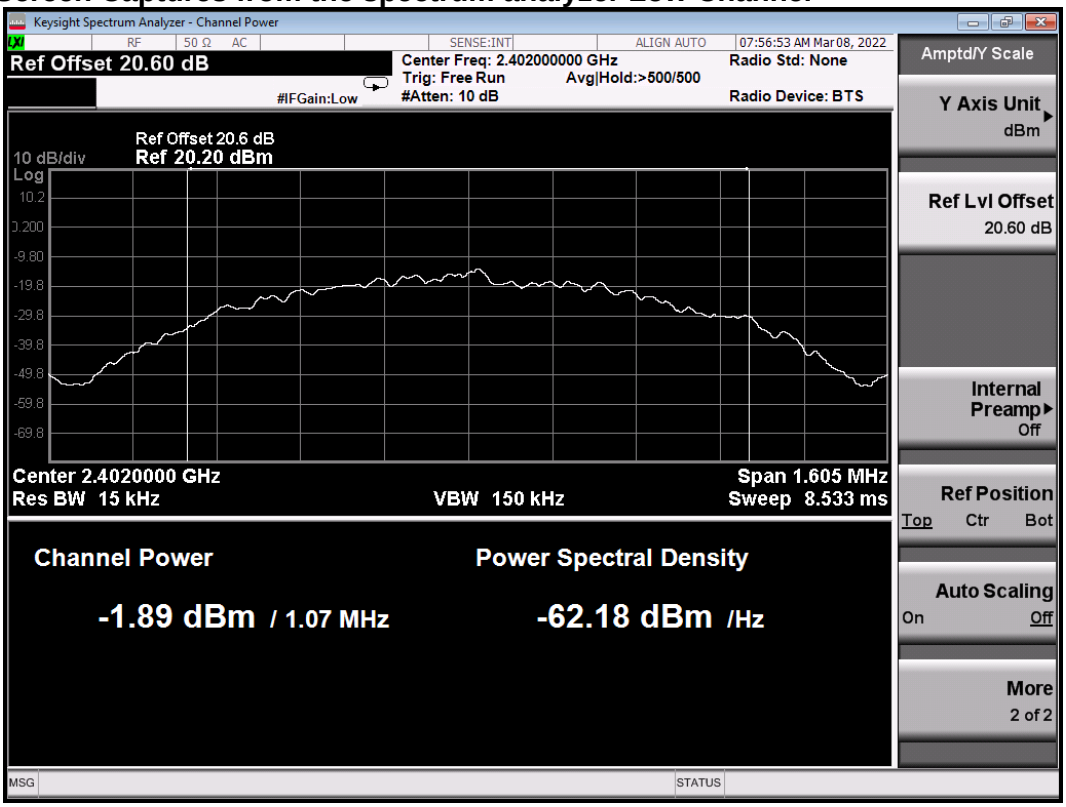
Output Power Method AVGSA-2 For BLE	
Measure the duty cycle D of the transmitter output signal	
Span	≥ 1.5 times the OBW
RBW	1 – 5 % of the OBW, ≤ 1 MHz
VBW	≥ 3 x RBW
Number of Points in sweep	≥ [2 x Span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
Sweep time	Auto
Detector	RMS (Power Averaging)
Sweep trigger	Free Run
Trace Average	≥ 100 traces in power Averaging (RMS)
Power measured	Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
Duty Cycle Correction Factor	Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.

Duty Cycle (D) for Low Channel:

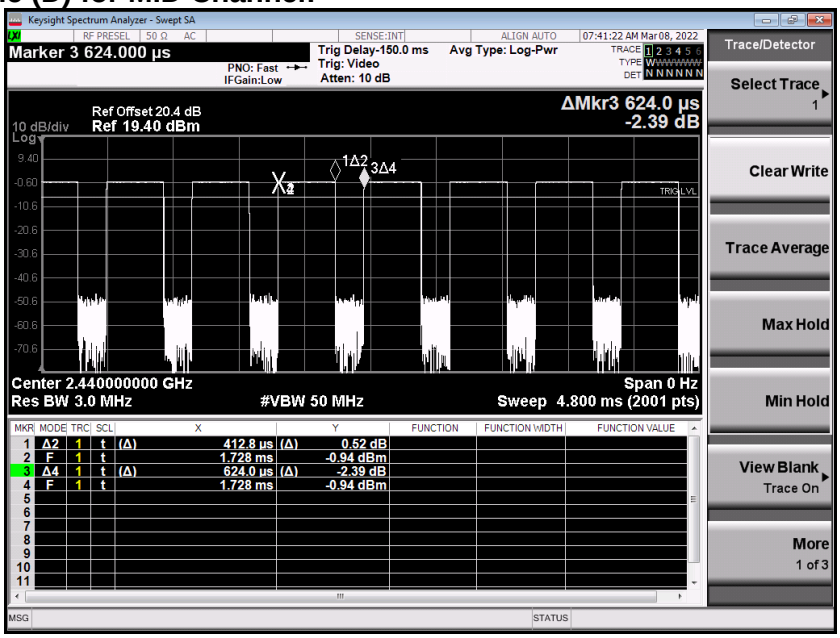


On Time = 417.6 µs
Time Period = 628.8 µs
Duty Cycle (D) = ON Time / Time Period = [(417.6 µs / 628.8 µs)] x100= 66.41%
Duty Cycle Correction Factor = 10 log (1 / D) = 10log (1/0.6641) = 1.78 dB

Screen Captures from the spectrum analyzer Low Channel

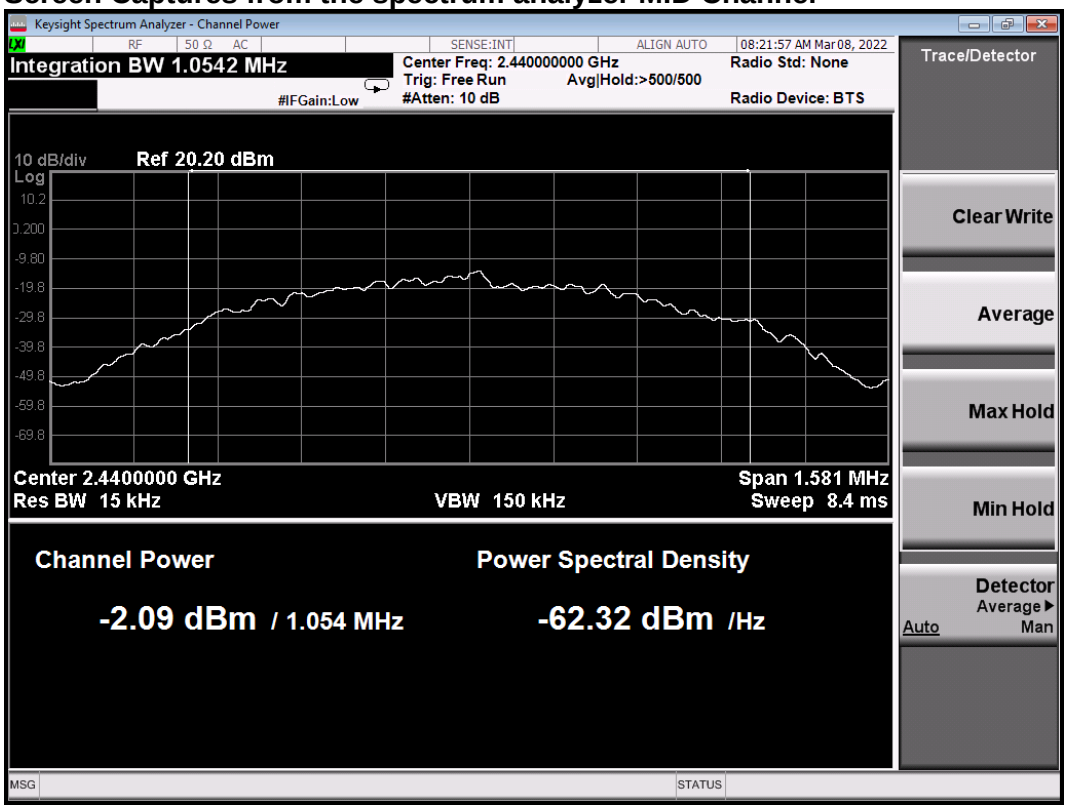


Duty Cycle (D) for MID Channel:

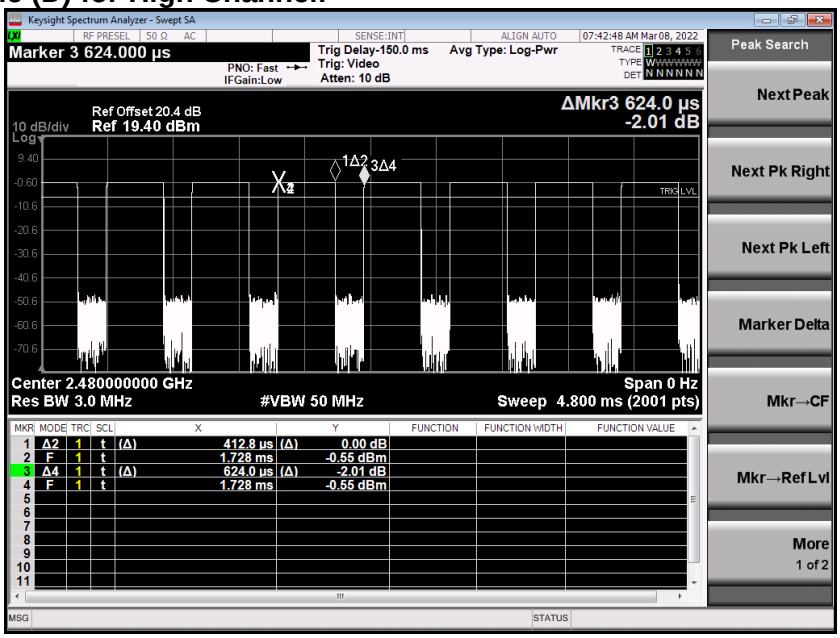


On Time = 412.8 µs
Time Period = 624.0 µs
Duty Cycle (D) = ON Time / Time Period = [(412.8 µs / 624.0 µs)] x100= 66.15%
Duty Cycle Correction Factor = 10 log (1 / D) = 10log (1/0.6615) = 1.79 dB

Screen Captures from the spectrum analyzer MID Channel

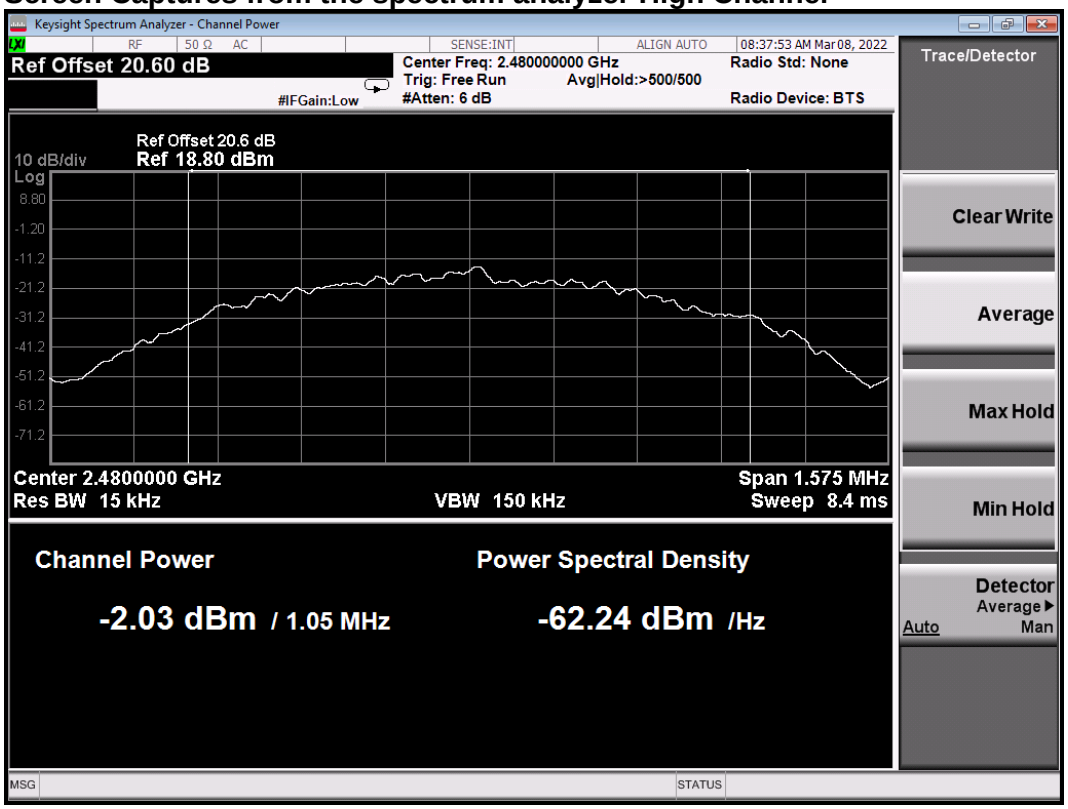


Duty Cycle (D) for High Channel:



On Time = 412.8 µs
Time Period = 624.0 µs
Duty Cycle (D) = ON Time / Time Period = [(412.8 µs / 624.0 µs)] x100= 66.15%
Duty Cycle Correction Factor = 10 log (1 / D) = 10log (1/0.6615) = 1.79 dB

Screen Captures from the spectrum analyzer High Channel



2.4 Power Spectral Density

Test Lab: Electronics Test Centre, Airdrie	**EUT: Breeze-V**
Test Personnel: : Imran Akram	**Standard: FCC PART 15.247**
	Basic Standard: ANSI C63.10: 2013
Date: 2022-03-08 (20.7°C,14.2% RH)	

EUT status: Compliant

Specification: FCC Part 15.247(e)

Criteria 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.

2.4.1 Test Guidance: ANSI C63.10-2013, Clause 11.10.3 / FCC OET KDB 558074

This measurement is performed at low, mid and high frequencies, in continuous transmission, with modulation.

The RF output of EUT with an antenna connector is fed to the input of the spectrum analyzer through appropriate attenuation. The loss from the cable and the attenuator were added on the analyzer as gain offset setting there by allowing direct measurements, without the need for any further corrections.

Method AVGPSD-1 For DTS	
Span	≥ 1.5 times the OBW
RBW	3 kHz ≤ RBW ≥ 100 kHz.
VBW	≥ 3 x RBW
Number of Points in sweep	≥ 2 x Span / RBW
Sweep time	auto couple
Detector	RMS (Power Averaging)
Sweep trigger	Free Run (Duty Cycle ≥98%)
Trace Average	Minimum 100 traces in power Averaging (RMS)
PSD measured	Use the peak marker function to determine the maximum amplitude level.
If the measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).	

2.4.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

2.4.3 Test Equipment

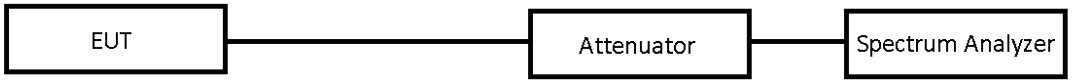
Testing was performed with this equipment:

Equipment	Manufacturer	Model #	Asset #	Cal. Date	Cal. Due
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2021-06-18	2022-06-18
Temp/Humidity	Extech	42270	5892	2021-04-05	2022-04-15
Attenuator	Mini-Circuits	BWS102W263	6932	Cal. before each use	
Coaxial Cables (RF)	Huber+Suhner	Enviroflex 400	-	Cal. before each use	

2.4.4 Test Sample Verification, Configuration & Modifications

The EUT was set to transmit continuously on a selected channel with test-specific software. The output was modulated as in normal operation. The EUT met the requirements without modification.

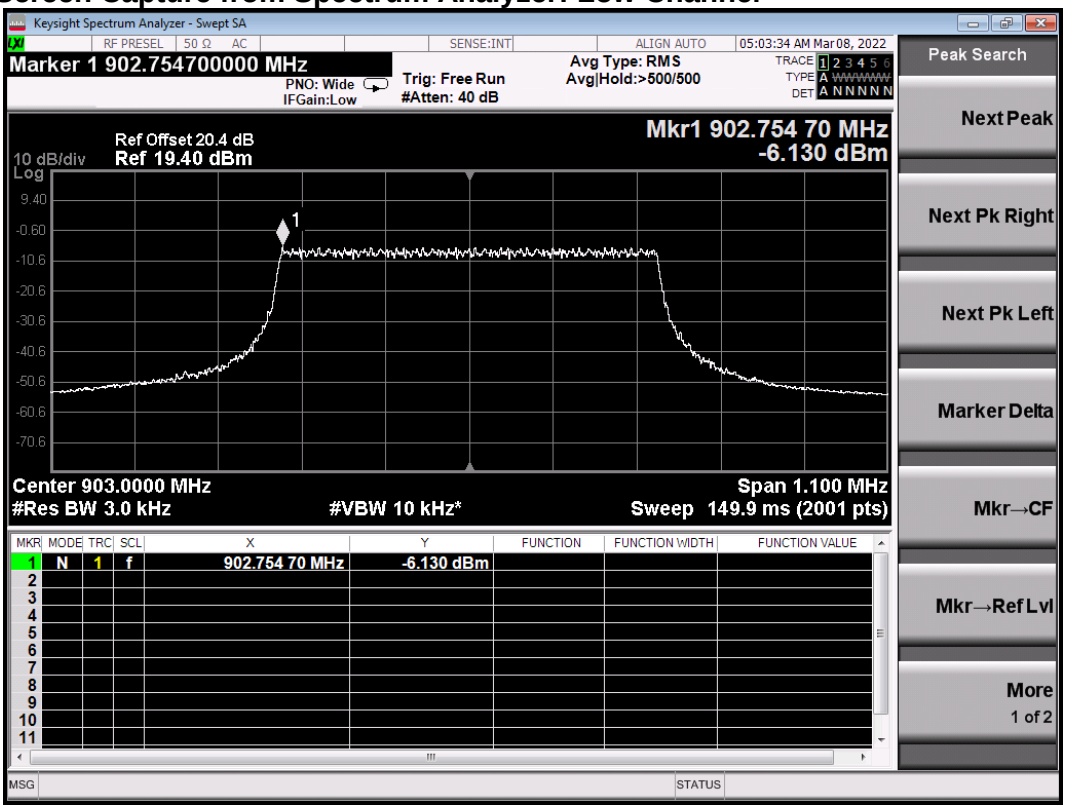
Test setup diagrams for Peak Power Spectral Density testing:
Conducted:



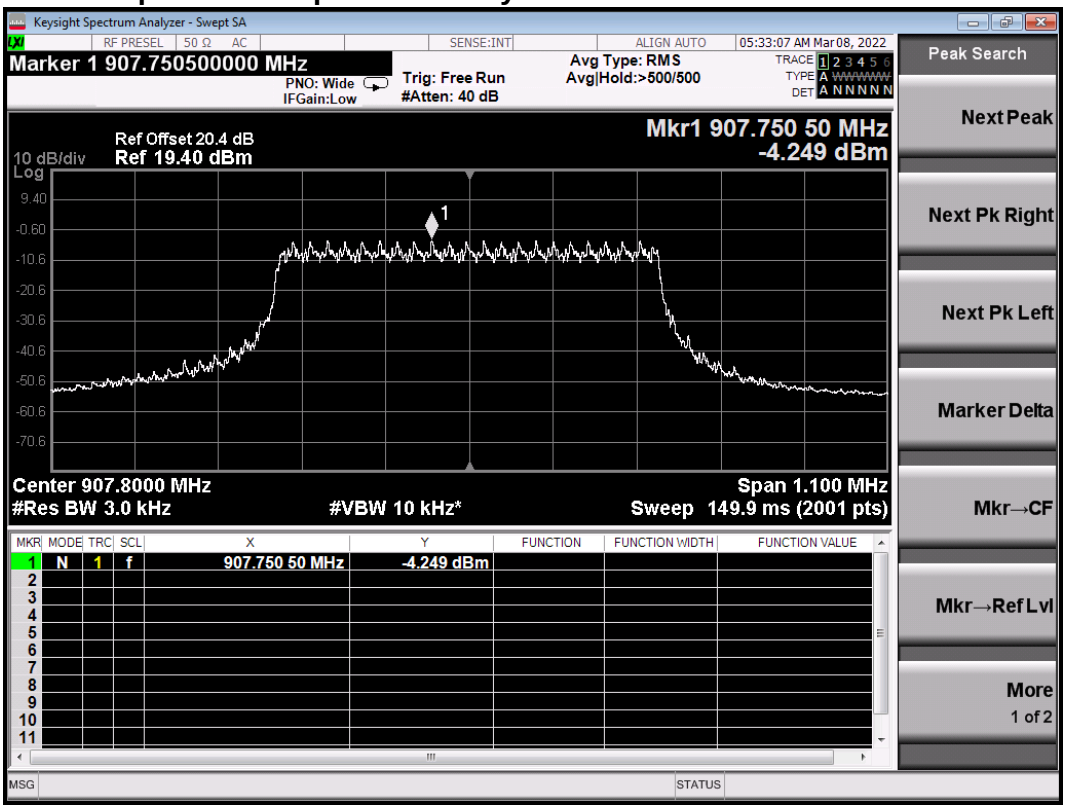
2.4.5 Average PSD Data LoRa DTS

Mode of operation	Channel	Freq. [MHz]	PSD (dBm)	PSD Limit (dBm
LoRa 500 KHz	Low	903	-6.130	8
	Mid	907.8	-4.249	8
	High	914.2	-5.942	8

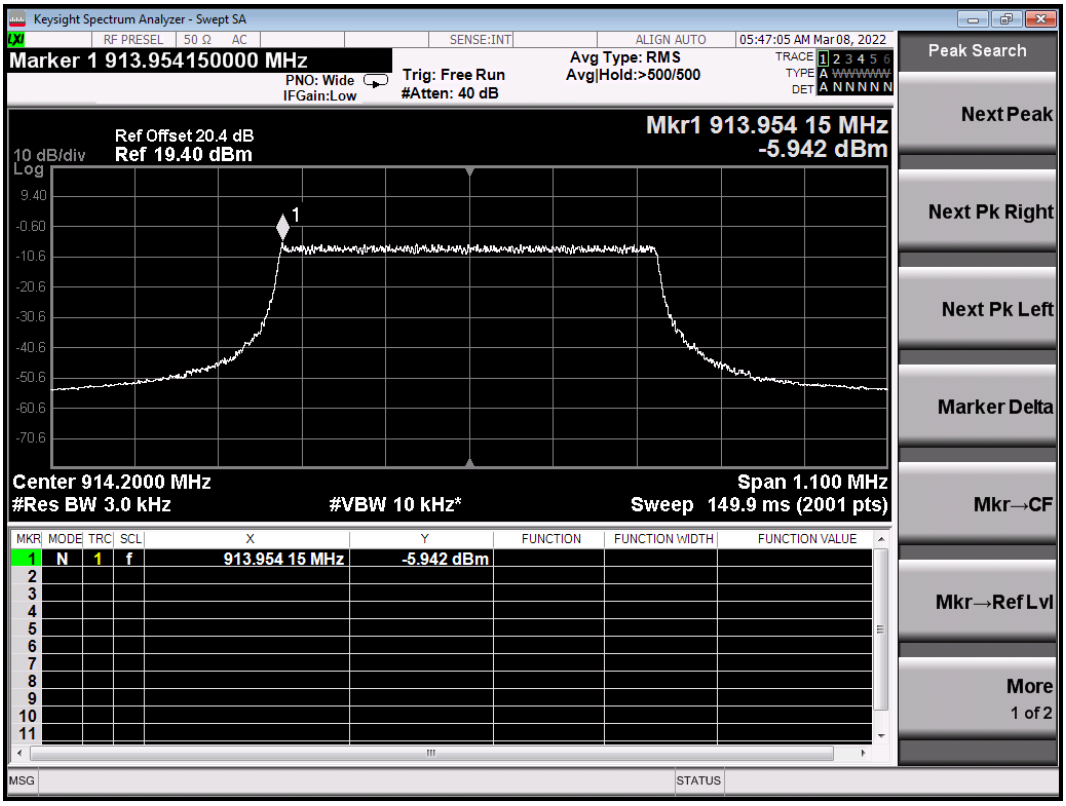
Screen Capture from Spectrum Analyzer: Low Channel



Screen Capture from Spectrum Analyzer: MID Channel



Screen Capture from Spectrum Analyzer: High Channel



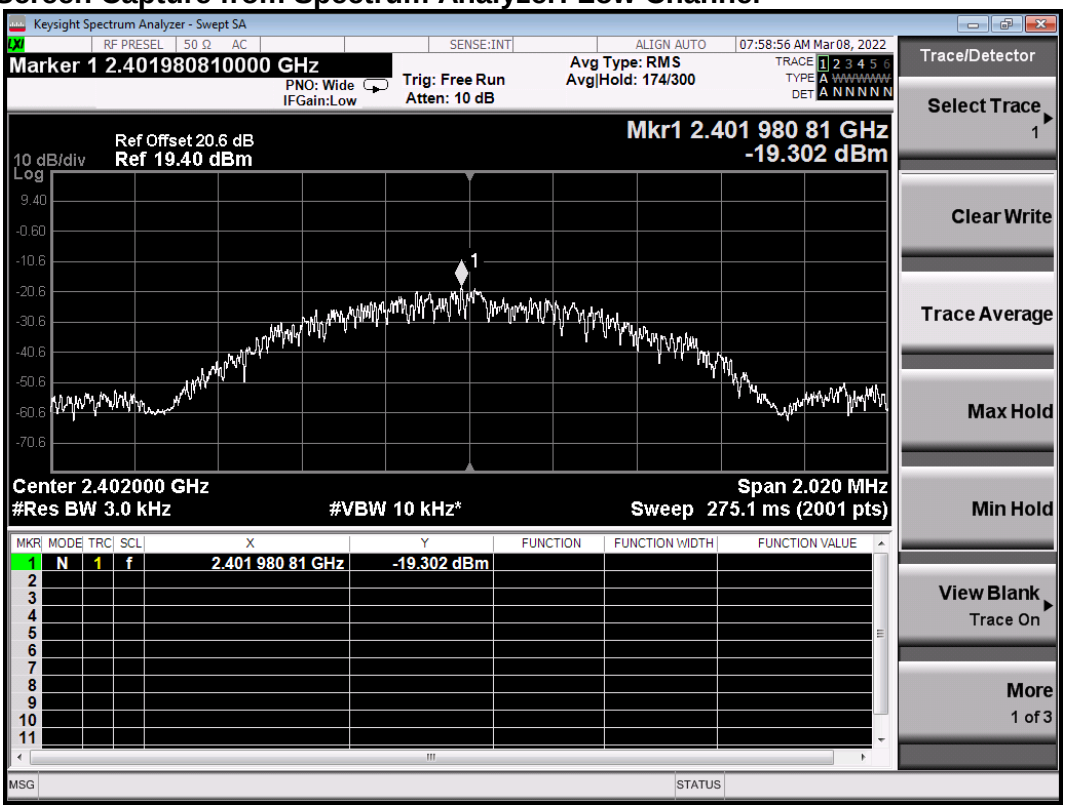
2.4.6 Average PSD Data BLE

BLE duty cycle is ≤ 98%. The following procedure is applicable when the EUT cannot be configured to transmit continuously (i.e.,D < 98%), when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than ±2%):

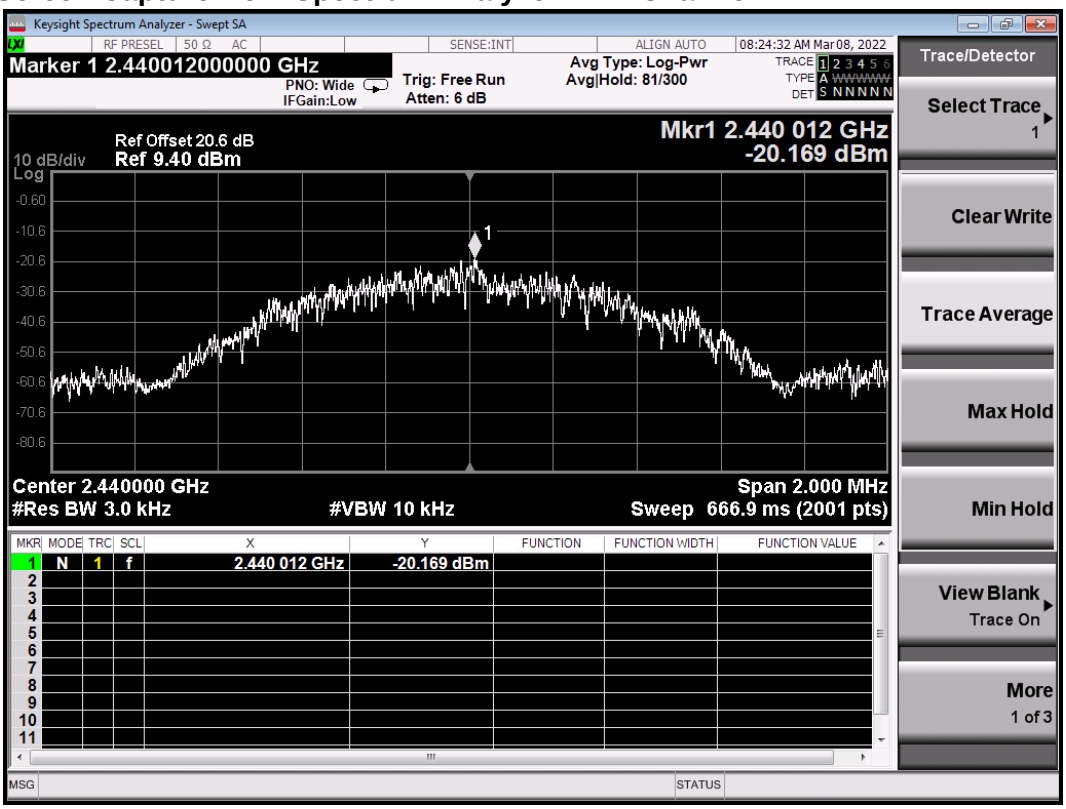
Output Power Method AVGPSD-2 For BLE	
Measure the duty cycle (D) of the transmitter output signal.	
Set instrument center frequency to DTS channel center frequency.	
Span	≥ 1.5 times the OBW
RBW	3 kHz ≤ RBW ≥ 100 kHz.
VBW	≥ 3 x RBW
Number of Points in sweep	≥ 2 x Span / RBW
Sweep time	auto couple
Detector	RMS (Power Averaging)
Sweep trigger	Free Run
Trace Average	Minimum 100 traces in power Averaging (RMS)
PSD measured	Use the peak marker function to determine the maximum amplitude level.
Duty Cycle Factor	Add [10 log (1 / D)], where D is the duty cycle measured in step a), to the measured PSD to compute the average PSD during the actual transmission time.
If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).	

Mode of operation	Channel	Freq. [MHz]	PSD (dBm)	Duty Cycle Factor (dB)	Corrected PSD (dBm)	PSD Limit (dBm
BLE	Low	2402	-19.302	1.78	-17.522	8
	Mid	2440	-20.169	1.79	-18.379	8
	High	2480	-19.754	1.79	-17.964	8

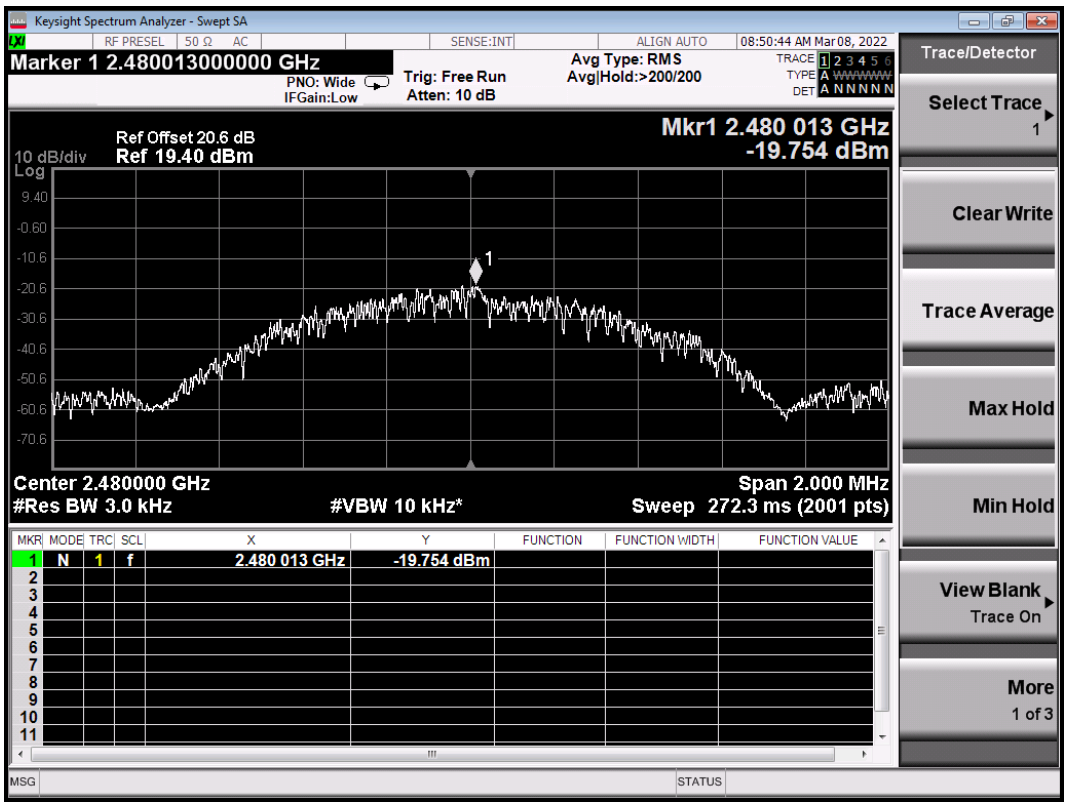
Screen Capture from Spectrum Analyzer: Low Channel



Screen Capture from Spectrum Analyzer: MID Channel



Screen Capture from Spectrum Analyzer: High Channel



2.5 Band Edge Attenuation

Test Lab: Electronics Test Centre, Airdrie	**EUT: Breeze-V**
Test Personnel: Imran Akram	**Standard: FCC PART 15.247**
	Basic Standard: ANSI C63.10: 2013
Date: 2022-03-08 (20.7°C,14.2% RH)	

EUT status: Compliant

Specification: FCC Part 15.247(d)

Criteria: 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, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) 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)).

2.5.1 Test Guidance: ANSI C63.10-2013 Clause 11.13.2 & 6.10.4, 6.10.6 / FCC OET KDB 558074

This measurement is performed at the low and high frequencies, with modulation.

The RF output of EUT with an antenna connector is fed to the input of the spectrum analyzer through appropriate attenuation. The loss from the cable and the attenuator were added on the analyzer as gain offset setting there by allowing direct measurements, without the need for any further corrections.

The spectrum analyzer is set for a frequency span to show the band edge and the nearest channel. The RBW is set to ≥ 100 kHz. The VBW is set to ≥ (RBW * 3). The Peak detector is used, with the trace set to Max Hold.

The attenuation is measured with the Marker Delta function.

2.5.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

2.5.3 Test Equipment

Testing was performed with the following equipment:

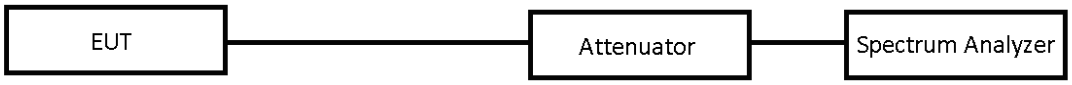
Equipment	Manufacturer	Model #	Asset #	Cal. Date	Cal. Due
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2021-06-18	2022-06-18
Temp/Humidity	Extech	42270	5892	2021-04-05	2022-04-15
Attenuator	Mini-Circuits	BWS102W263	6932	Cal. before each use	
Coaxial Cables (RF)	Huber+Suhner	Enviroflex 400	-	Cal. before each use	

2.5.4 Test Sample Verification, Configuration & Modifications

The EUT was set to transmit continuously on a selected channel with test-specific software. The output was modulated as in normal operation. The EUT met the requirements without modification.

Test setup diagrams for Band Edge Attenuation testing:

Conducted:

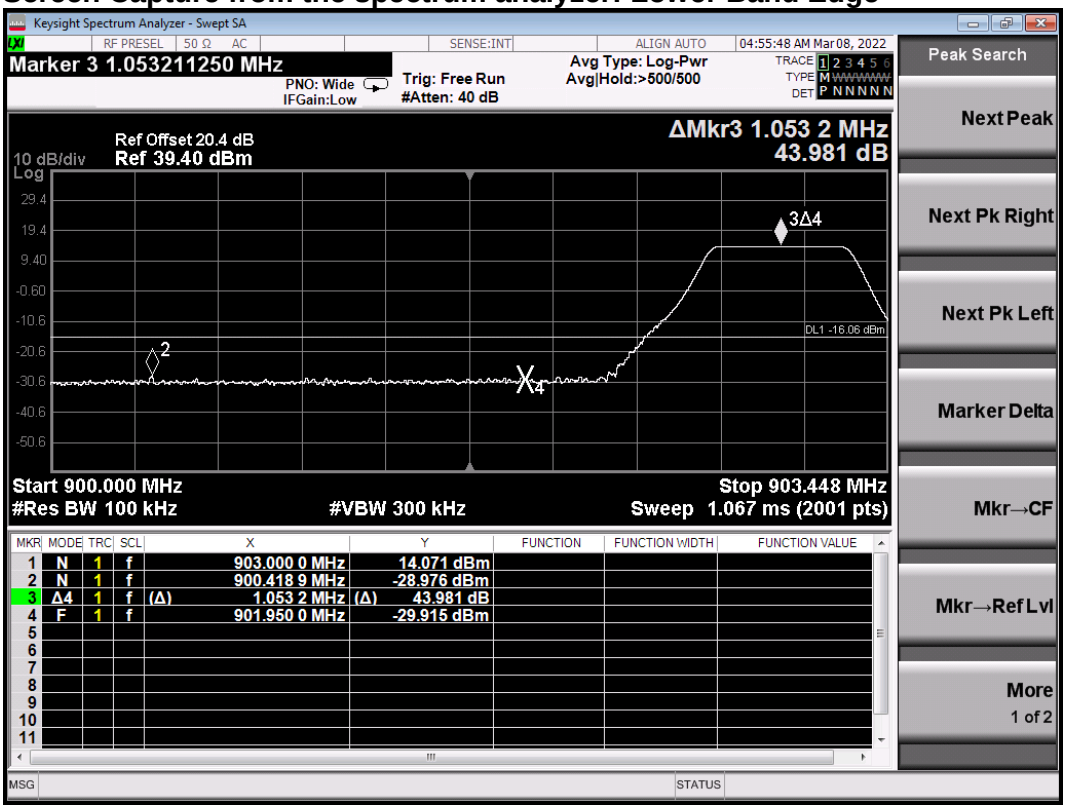


2.5.5 Band Edge Data LoRa DTS

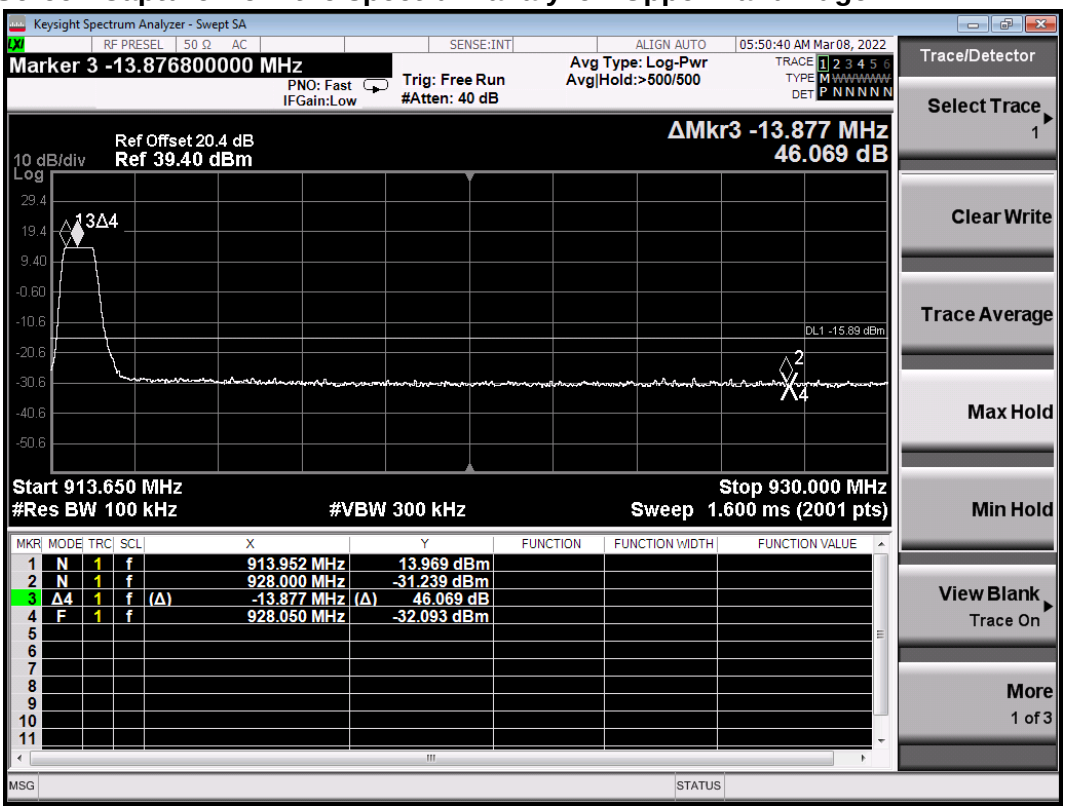
Worse Case Data

Mode of operation	Channel	Attenuation at Band Edge	Attenuation Limit at Band Edge
Lora 500KHz	903	43.981dBc	30 dBc
	914.2	46.069dBc	30 dBc

Screen Capture from the spectrum analyzer: Lower Band Edge



Screen Capture from the spectrum analyzer: Upper Band Edge

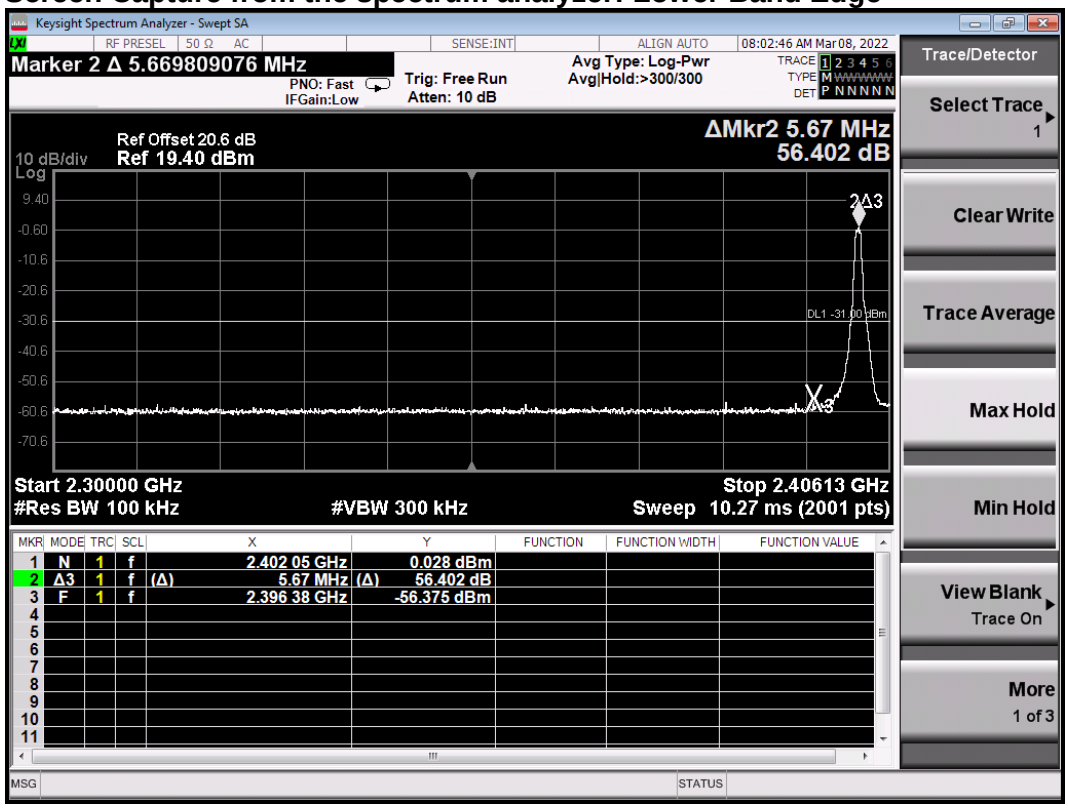


2.5.6 Band Edge Data BLE

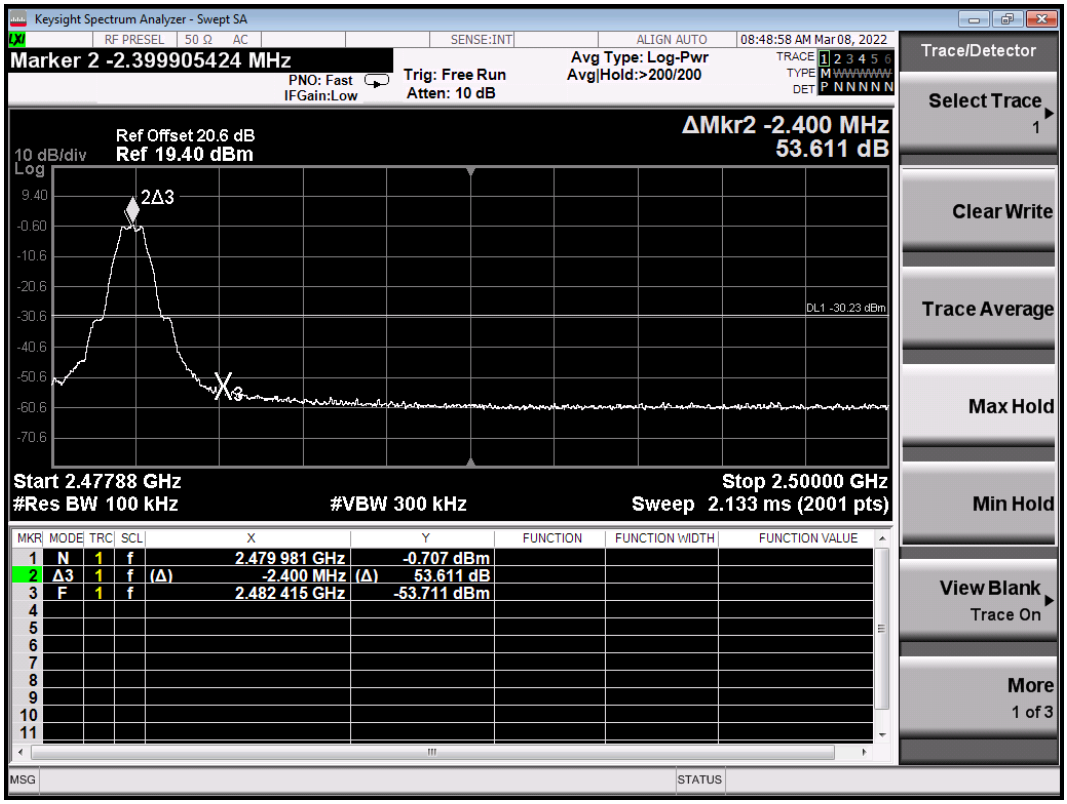
Worse Case Data

Mode of operation	Channel	Attenuation at Band Edge	Attenuation Limit at Band Edge
BLE	2402	56.024dBc	30 dBc
	2480	53.611dBc	30 dBc

Screen Capture from the spectrum analyzer: Lower Band Edge



Screen Capture from the spectrum analyzer: Upper Band Edge



2.6 Conducted Spurious Emissions (Non-Restricted Band)

Test Lab: Electronics Test Centre, Airdrie	**EUT: Breeze-V**
Test Personnel: Imran Akram	**Standard: FCC PART 15.247**
	Basic Standard: ANSI C63.4-2014
Date: 2022-03-08 (20.7°C,14.2% RH)	**FCC OET KDB 558470 v04 DTS**

EUT status: Compliant

Specification: FCC Part 15.247(d)

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, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

2.6.1 Test Guidance: ANSI C63.10-2013, Clause 6.7

This measurement is performed at the low, mid and high frequencies, with modulation.
The RF output of EUT with an antenna connector is fed to the input of the spectrum analyzer through appropriate attenuation. The loss from the cable and the attenuator were added on the analyzer as gain offset setting there by allowing direct measurements, without the need for any further corrections.
The spectrum analyzer is stepped through the spectrum in frequency spans selected to ensure acceptable frequency resolution. The RBW is set to 100 kHz. The VBW is set to ≥ 300 kHz. The Peak detector is used, with the trace set to Max Hold.

2.6.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

2.6.3 Test Equipment

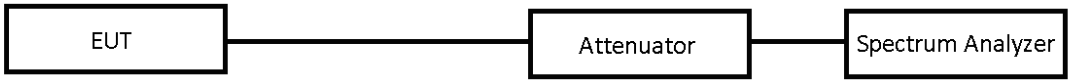
Testing was performed with the following equipment:

Equipment	Manufacturer	Model #	Asset #	Cal. Date	Cal. Due
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2021-06-18	2022-06-18
Temp/Humidity	Extech	42270	5892	2021-04-05	2022-04-15
Attenuator	Mini-Circuits	BWS102W263	6932	Cal. before each use	
Coaxial Cables (RF)	Huber+Suhner	Enviroflex 400	-	Cal. before each use	

2.6.4 Test Sample Verification, Configuration & Modifications

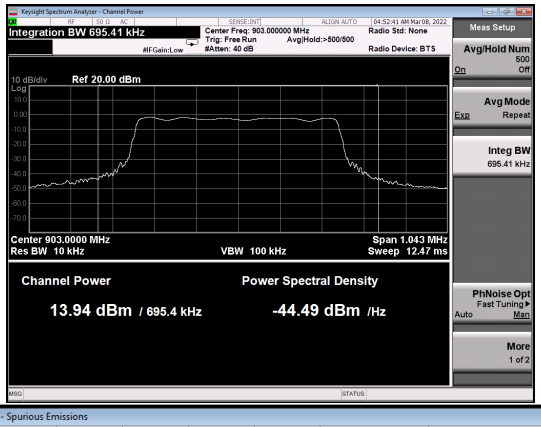
The EUT was set to a selected channel with test-specific software. The output was modulated as in normal operation. The EUT met the requirements without modification.

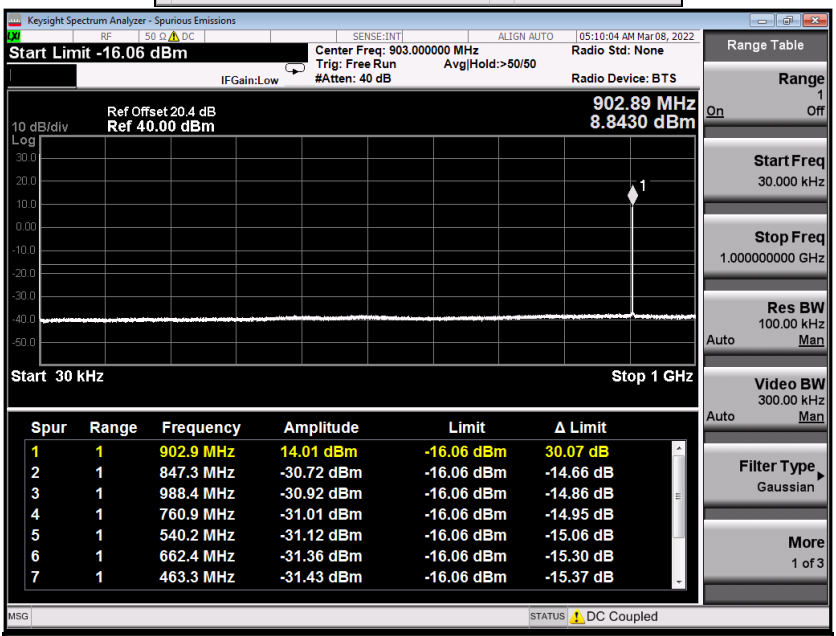
Test setup diagram for Conducted Spurious Emissions testing:

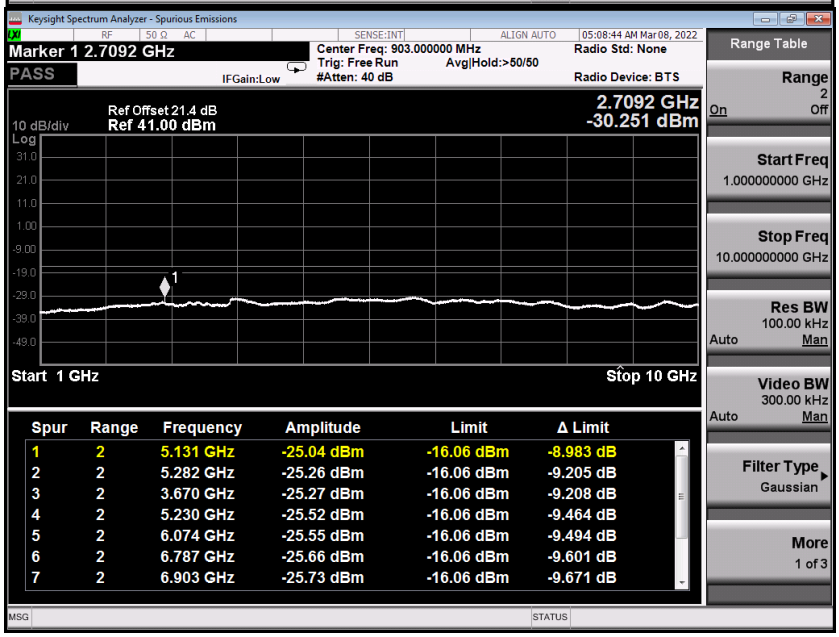


2.6.5 Conducted Emissions Data: LoRa DTS

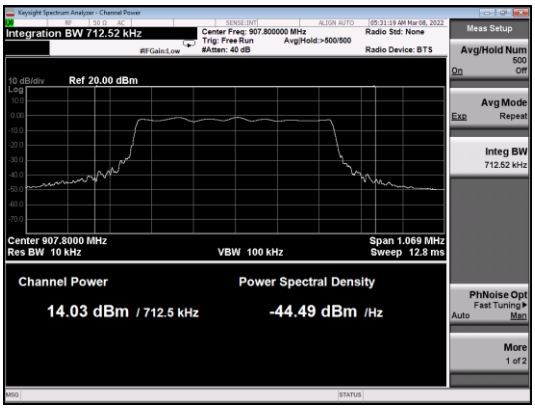
Low Channel

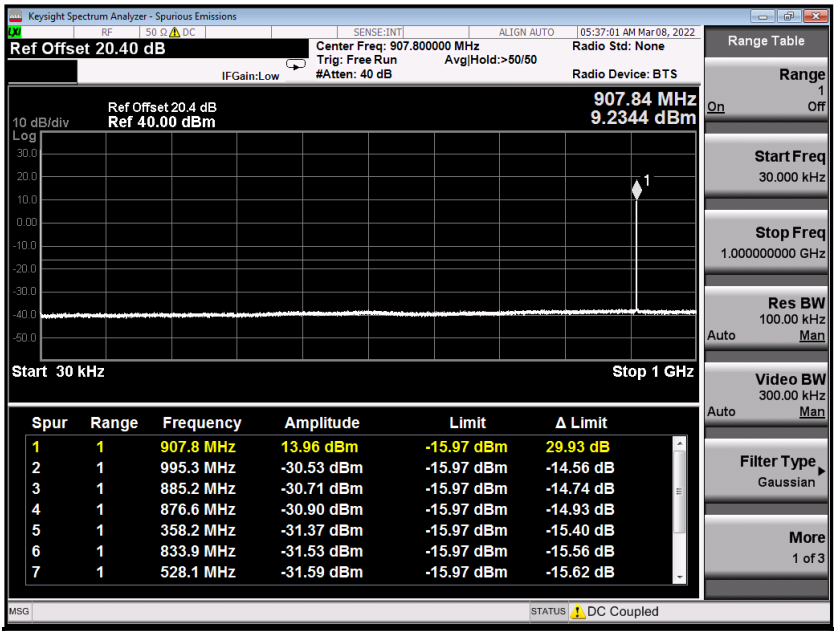


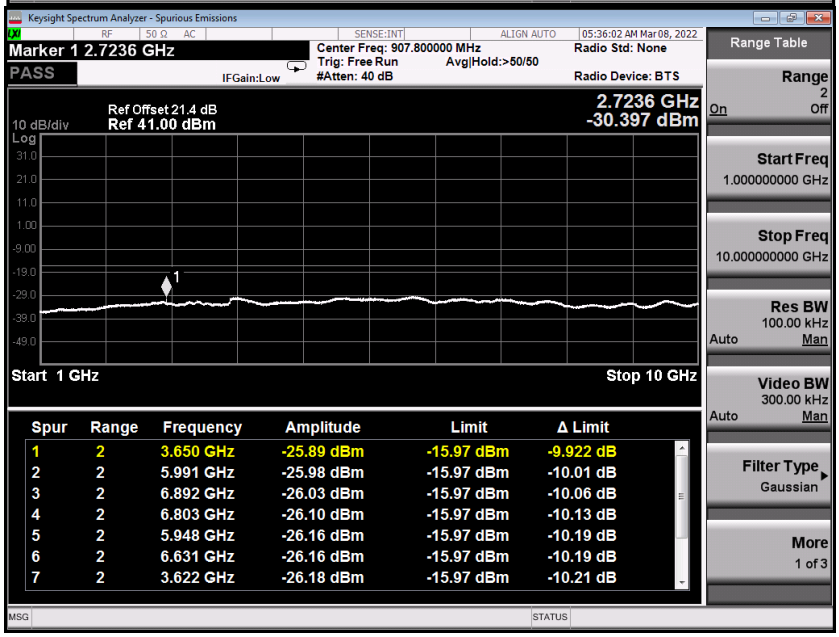




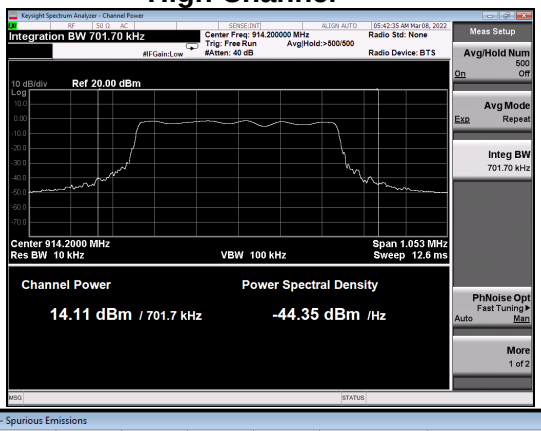
MID Channel

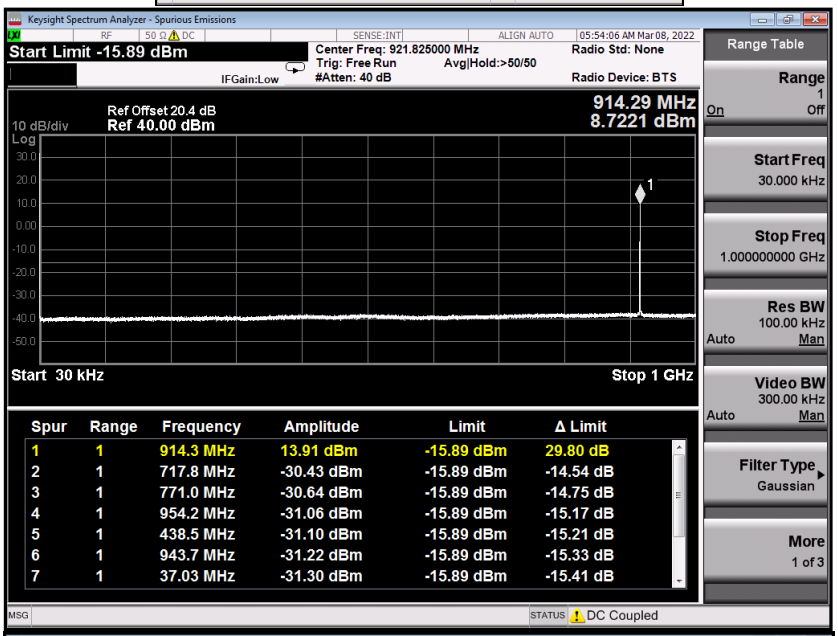

Integration BW 712.52 kHz
Center Freq: 907.800000 MHz
Trig: Free Run
#Atten: 40 dB
Avg|Hold:>500/500
Radio Std: None
Radio Device: BTS
Ref 20.00 dBm
Center 907.8000 MHz
Res BW 10 kHz
VBW 100 kHz
Span 1.069 MHz
Sweep 12.8 ms
Channel Power
14.03 dBm / 712.5 kHz
Power Spectral Density
-44.49 dBm /Hz

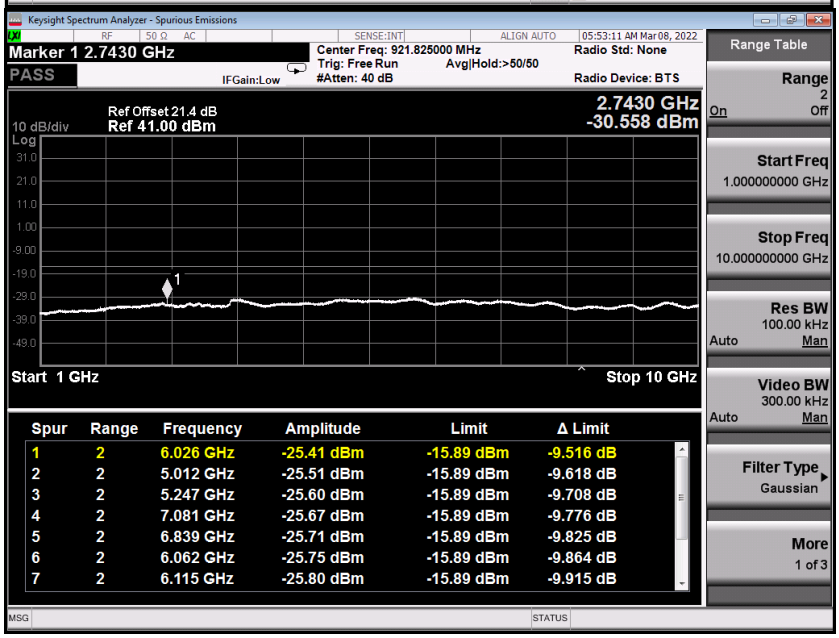

Keysight Spectrum Analyzer - Spurious Emissions
Ref Offset 20.40 dB
Center Freq: 907.800000 MHz
Trig: Free Run
Avg|Hold:>50/50
#Atten: 40 dB
Radio Std: None
Radio Device: BTS
Ref Offset 20.4 dB
10 dB/div
Ref 40.00 dBm
907.84 MHz
9.2344 dBm
Start 30 kHz
Stop 1 GHz
Spur Range Frequency Amplitude Limit Δ Limit
1 1 907.8 MHz 13.96 dBm -15.97 dBm 29.93 dB
2 1 995.3 MHz -30.53 dBm -15.97 dBm -14.56 dB
3 1 885.2 MHz -30.71 dBm -15.97 dBm -14.74 dB
4 1 876.6 MHz -30.90 dBm -15.97 dBm -14.93 dB
5 1 358.2 MHz -31.37 dBm -15.97 dBm -15.40 dB
6 1 833.9 MHz -31.53 dBm -15.97 dBm -15.56 dB
7 1 528.1 MHz -31.59 dBm -15.97 dBm -15.62 dB
Range Table
Range 1
Start Freq 30.000 kHz
Stop Freq 1.000000000 GHz
Res BW 100.00 kHz
Video BW 300.00 kHz
Filter Type Gaussian
More 1 of 3
DC Coupled


Keysight Spectrum Analyzer - Spurious Emissions
Marker 1 2.7236 GHz
PASS
Center Freq: 907.800000 MHz
Trig: Free Run
Avg|Hold:>50/50
#Atten: 40 dB
Radio Std: None
Radio Device: BTS
Ref Offset 21.4 dB
10 dB/div
Ref 41.00 dBm
2.7236 GHz
-30.397 dBm
Start 1 GHz
Stop 10 GHz
Spur Range Frequency Amplitude Limit Δ Limit
1 2 3.650 GHz -25.89 dBm -15.97 dBm -9.922 dB
2 2 5.991 GHz -25.98 dBm -15.97 dBm -10.01 dB
3 2 6.892 GHz -26.03 dBm -15.97 dBm -10.06 dB
4 2 6.803 GHz -26.10 dBm -15.97 dBm -10.13 dB
5 2 5.948 GHz -26.16 dBm -15.97 dBm -10.19 dB
6 2 6.631 GHz -26.16 dBm -15.97 dBm -10.19 dB
7 2 3.622 GHz -26.18 dBm -15.97 dBm -10.21 dB
Range Table
Range 2
Start Freq 1.000000000 GHz
Stop Freq 10.000000000 GHz
Res BW 100.00 kHz
Video BW 300.00 kHz
Filter Type Gaussian
More 1 of 3

High Channel

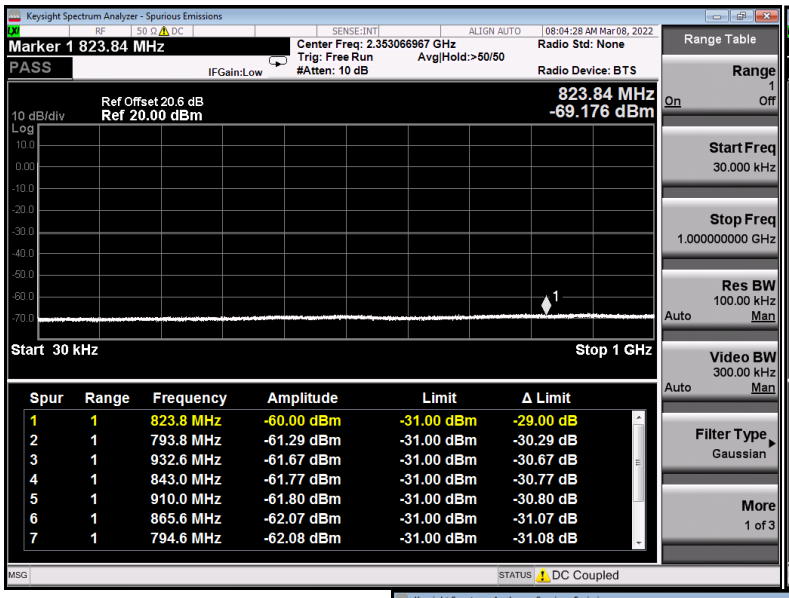


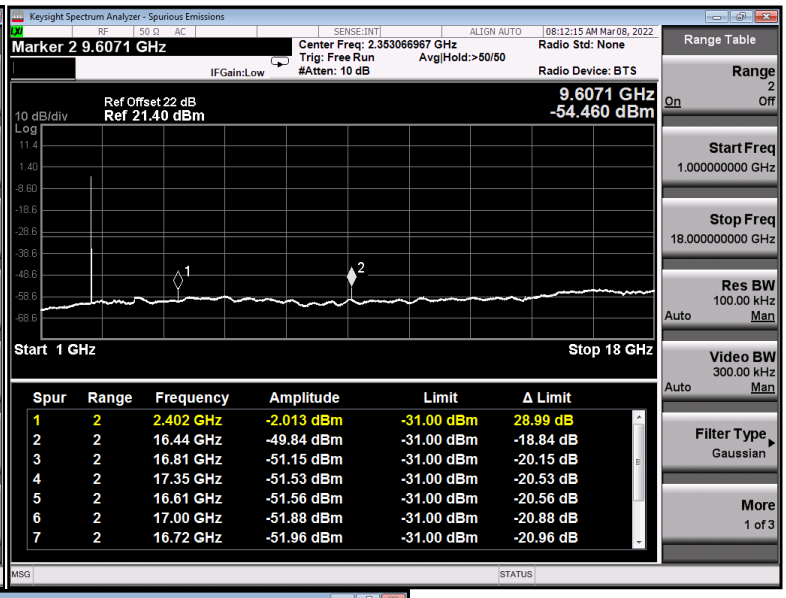


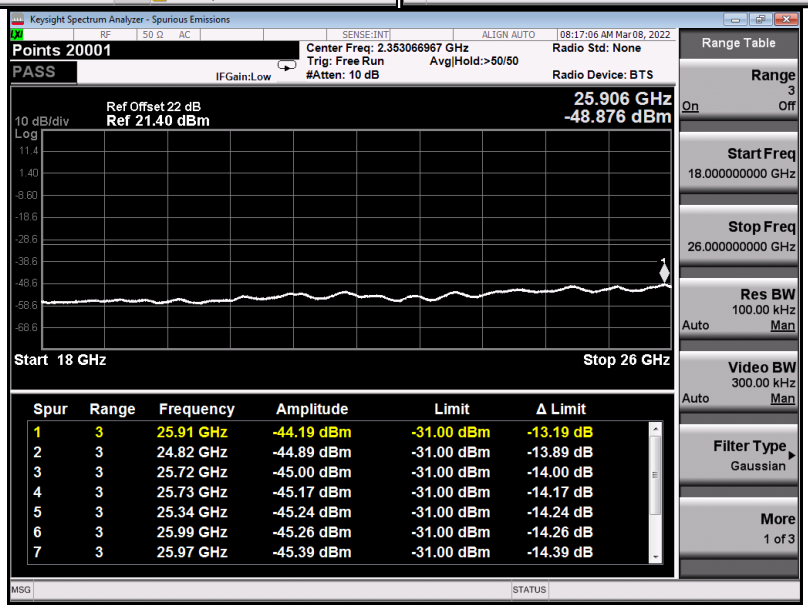


2.6.6 Conducted Emissions Data: BLE

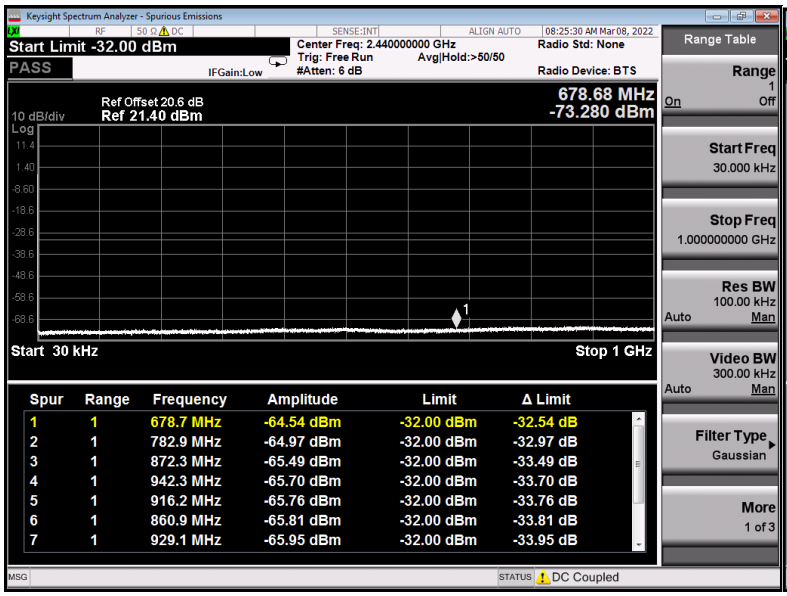
Low Channel

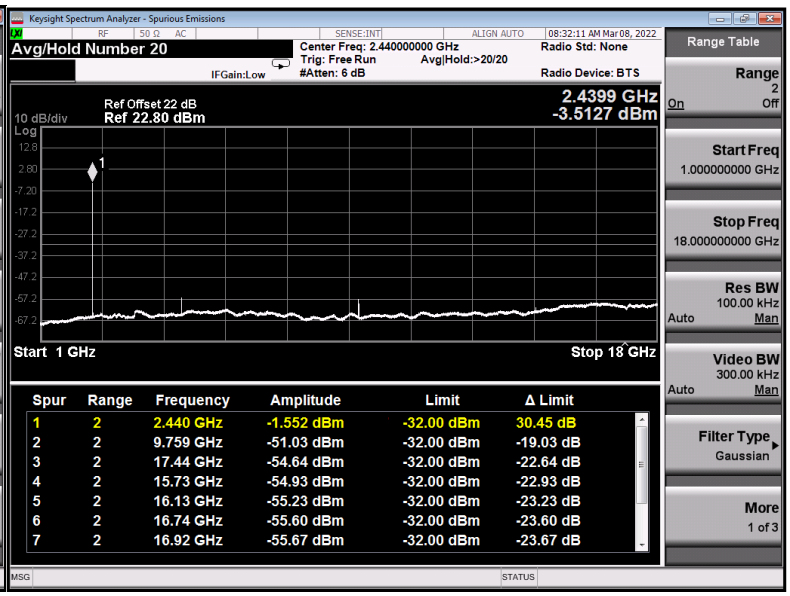


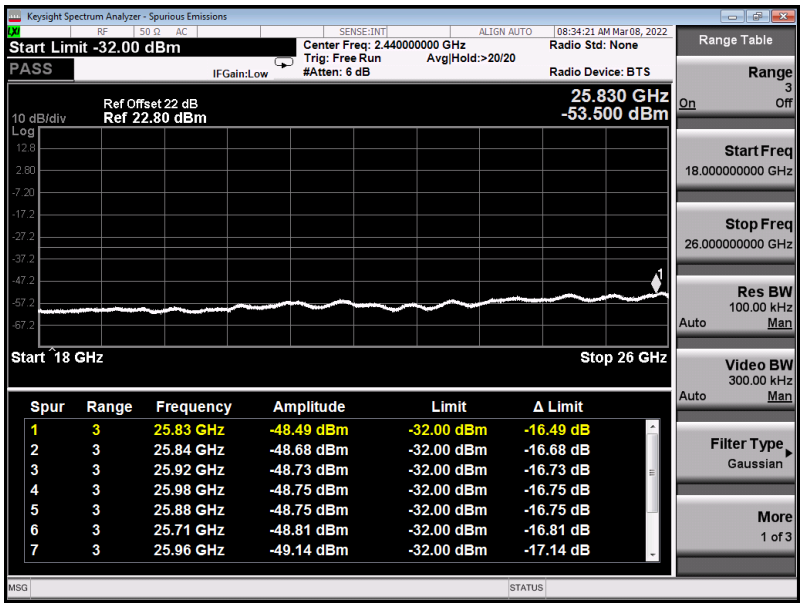




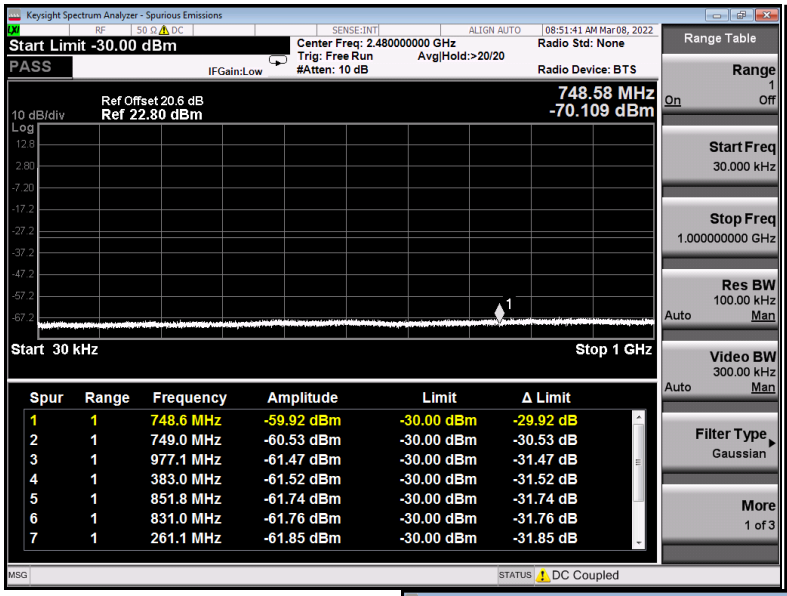
MID Channel

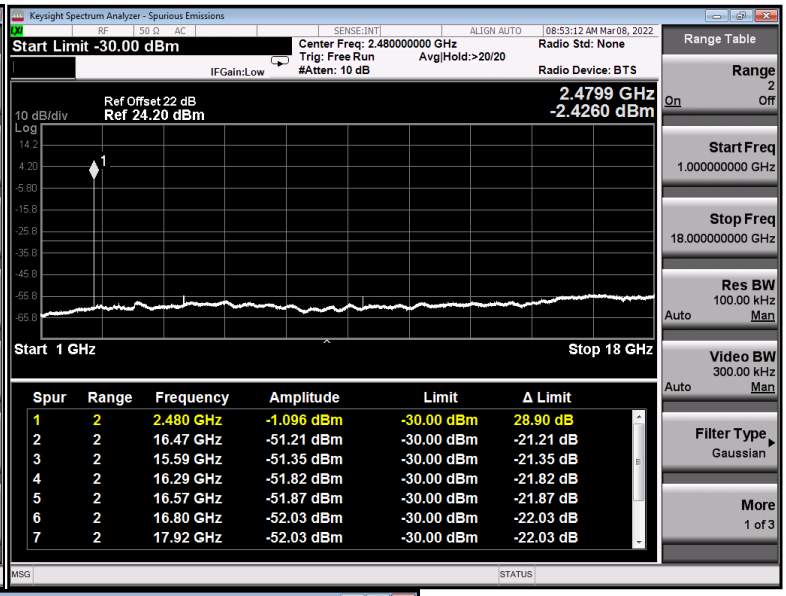


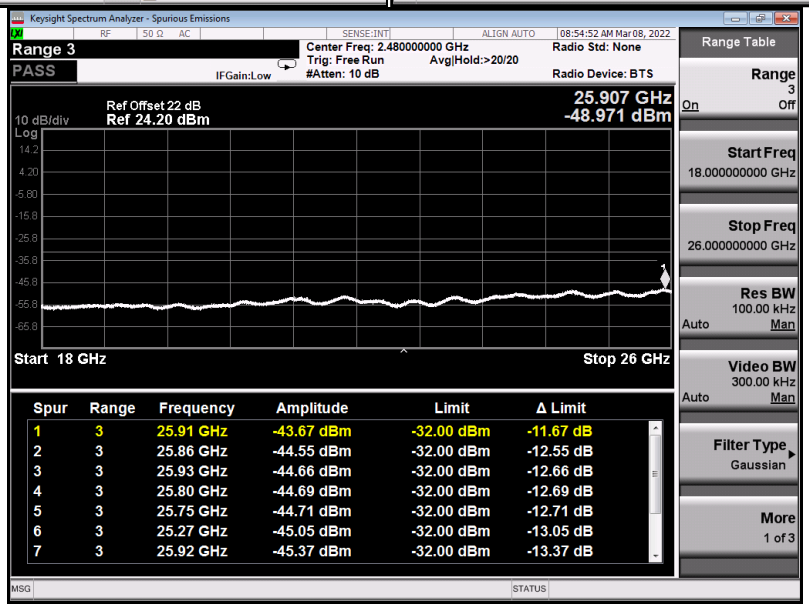




High Channel





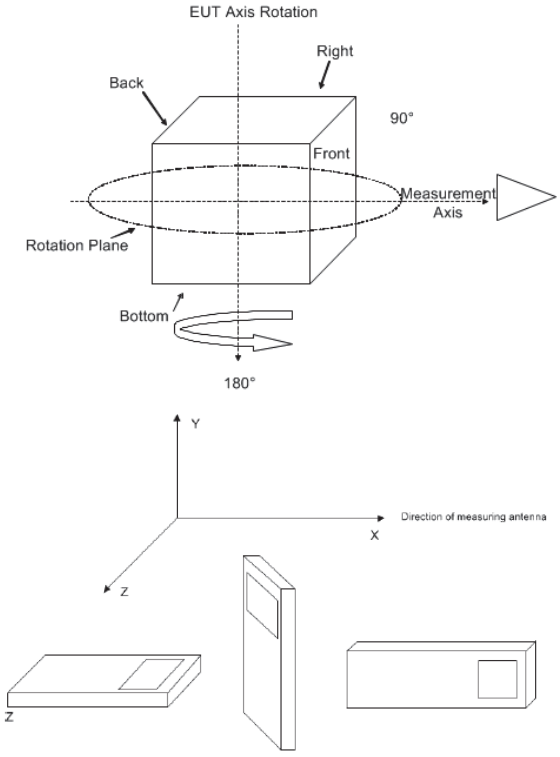


2.7 EUT Positioning Assessment

Test Lab: Electronics Test Centre, Airdrie	**EUT: Breeze-V**
Test Personnel: Imran Akram	**Standard: FCC PART 15.247**
Date: 2022-02-28 (19.7° C,14.1 % RH)	**Basic Standard: ANSI C63.4-2014**
Comments: Z-Axis position found worse	

Specification: ANSI C63.4-2014, Clause 6.3.2.1

Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a non-conducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m, but it may be larger or smaller to accommodate various sized EUTs (see Figure 6, Figure 7, and Figure 9). For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.



Refer to Test Setup photo exhibit.

2.8 Radiated Spurious Emissions within restricted band

Test Lab: Electronics Test Centre, Airdrie	**EUT: Breeze-V**
Test Personnel: Imran Akram /Janet Mijares Braden Van Hee	**Standard: FCC PART 15.247/15.209**
	Basic Standard: ANSI C63.10-2013
Date: 2022-02-28 (20.7° C,11.13 % RH) 2022-03-01 (19.8° C,16.0 % RH)	

EUT status: Compliant

Specification: FCC PART 15.247(d)

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, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) 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)).

Restricted Bands of Operation:

MHz	MHz	MHz	MHz	MHz	GHz	GHz
0.0900000 – 0.1100000	8.2910000 - 8.2940000	16.804250 - 16.804750	162.01250 - 167.17000 *	1660.0000 – 1710.0000	3.6000000 – 4.4000000	14.470000 – 14.500000
0.4950000 - 0.5050000 *	8.3620000 - 8.3660000	25.500000 - 25.670000	167.72000 - 173.20000 *	1718.8000 – 1722.2000	4.5000000 – 5.1500000	15.350000 – 16.200000
2.1735000 - 2.1905000	8.3762500 - 8.3867500	37.500000 - 38.250000	240.00000 – 285.00000	2200.0000 – 2300.0000	5.3500000 – 5.4600000	17.700000 – 21.400000
4.1250000 - 4.1280000	8.4142500 - 8.4147500	73.000000 - 74.600000	322.00000 - 335.40000	2310.0000 – 2390.0000	7.2500000 – 7.7500000	22.010000 – 23.120000
4.1772500 - 4.1777500	12.290000 - 12.293000	74.800000 - 75.200000	399.90000 – 410.00000	2483.5000 – 2500.0000 *	8.0250000 – 8.5000000	23.600000 – 24.000000
4.2072500 - 4.2077500	12.519750 - 12.520250	108.00000 - 121.94000 **	608.00000 – 614.00000	2655.0000 – 2900.0000	9.0000000 – 9.2000000	31.200000 – 31.800000
5.6770000 - 5.6830000	12.576750 - 12.577250	123.00000 - 138.00000 **	960.00000 – 1240.0000 ***	3260..0000 – 3267.0000	9.3000000 – 9.5000000	36.430000 – 36.500000
6.2150000 - 6.2180000	13.360000 - 13.410000	149.90000 - 150.05000 *	1300.0000 – 1427.0000 ***	3332.0000 – 3339.0000	10.600000 – 12.700000	Above 38.600000
6.2677500 - 6.2682500	16.420000 - 16.423000	156.52475- 156.52525	1435.0000 – 1626.5000	3345.8000 – 3358.0000	13.250000 – 13.400000	
6.3117500 - 6.3122500	16.694750 - 16.695250	156.70000 - 156.90000	1645.5000 – 1646.5000	3500.0000 – 3600.0000 ****		

* US only ** Canada 108 – 138 MHz *** Canada 960 – 1427 MHz **** Canada only

2.8.1 Test Guidance: ANSI C63.10-2013, Clause 13.4.2

From 9 kHz to 150 kHz (resolution bandwidth of 200 Hz) and from 150 kHz to 30 MHz (resolution bandwidth 9 kHz) measurements are performed with a loop antenna (as per KDB 460108).

From 30 MHz to 1000 MHz, measurements are performed with a broadband biconilog antenna and a resolution bandwidth of 120 kHz.

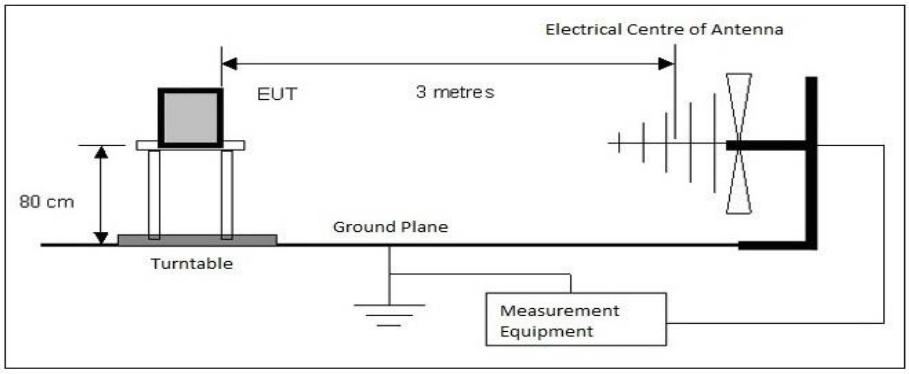
Above 1000 MHz, measurements are performed with a DRG Horn antenna or a Standard Gain horn, and a resolution bandwidth of 1 MHz. The EUT is raised to 150 cm above the ground plane, and the area between the EUT and the antenna mast is covered with RF absorbent material.

The scan is performed at discreet increments of turntable azimuth and antenna height, which are selected in accordance with the applicable standard in order to assure capture of frequencies of interest. Optimization is performed based on the scan data.

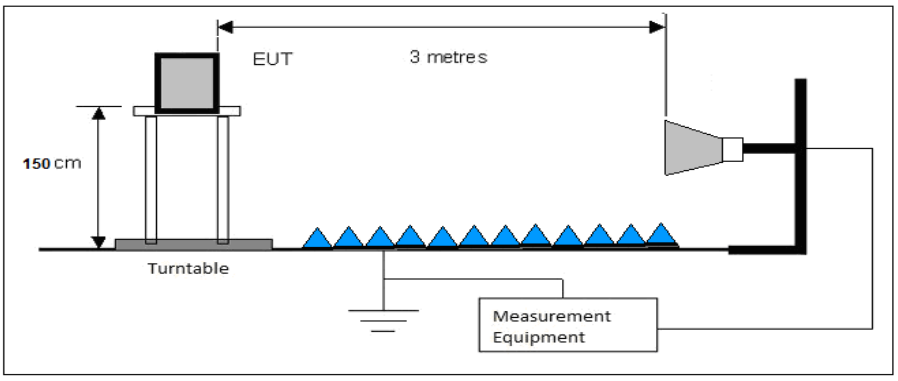
Frequencies having peak emissions within 10dB of the limits are optimized. The EUT is rotated in azimuth over 360 degrees and the direction of maximum emission is noted.

Antenna height is varied from 1 – 4 meters at this azimuth to obtain the maximum emission. Then the maximum level is measured with the appropriate detector and recorded. Up to 1 GHz, measurements are performed with a Quasi-Peak detector. Above 1 GHz, measurements are recorded with Peak and/or Average detectors, as applicable.

Test setup diagram for Radiated Spurious Emissions testing (below 1GHz):



Test setup diagram for Radiated Spurious Emissions testing (above 1GHz):



2.8.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

2.8.3 Test Equipment

Testing was performed with the following equipment:

Equipment	Manufacturer	Model #	Asset #	Cal. Date (yyyy-mm-dd)	Cal. Due (yyyy-mm-dd)
EMC Software	UL	Ver. 9.5	ETC-SW-EMC 2.1	N/A	
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2021-06-18	2022-06-18
Loop Antenna (9KHz – 30MHz)	EMCO	6502	10868	2021-05-11	2023-05-11
Biconilog Antenna (30 – 1000 MHz)	AR	JB1	6905	2021-10-29	2023-10-29
DRG Horn (1000 – 18000 MHz)	EMCO	3115	19357	2020-09-29	2022-09-29
STD Horn (18 – 26 GHz)	QuinStar Technology, Inc.	QWH-KPRS00	6163	2020-09-30	2022-09-30
Humidity/Temp Logger	Extech Ins. Corp.	42270	5892	2021-04-06	2022-04-06
Pre-Amplifier (30 – 1400 MHz)	HP	8447D	9291	2021-05-11	2022-05-11
Low Noise Amplifier (1 – 18 GHz)	MITEQ	JS43-01001800-21-5P	4354	2021-05-11	2022-05-11
Low Noise Amplifier (18 – 26 GHz)	MITEQ	JS44-01002650-33-3P	6163	2021-05-11	2022-05-11
RE Cable below 1GHz	Insulated Wire Inc.	KPS-1501A-3600-KPA-01102006	4419	2021-05-11	2022-05-11
Re Cable Above 1 GHz	A.H. System Inc.	SAC-26G-8.23	6187	2021-05-11	2022-05-11
0.9GHz Notch Filter	Microtronics	BRM20784	6947	2021-05-11	2022-05-11
2.4GHz Notch Filter	Microtronics	BRM50702	6953	2021-05-11	2022-05-11

2.8.4 Test Sample Verification, Configuration & Modifications

The EUT was set to a selected channel with test-specific software. The output was modulated as in normal operation. LoRa radio transmitting at low Channel 903.0 MHz

The EUT met the requirements without modification.

2.8.5 Radiated Emissions Data: LoRa DTS

The emissions data are presented in tabular form, showing turntable azimuth, antenna height and polarization, the uncorrected spectrum analyzer reading, the correction factors applied, the net result, the value of the limit at the frequency investigated, and the Delta between the result and the limit.

Meter Reading in dBμV + Antenna Factor in dB/m + Gain/Loss Factor in dB = Corrected Field Strength in dbμV/m.

Delta = Field Strength – Limit

Notes:

- When a preamp is used, the resulting gain is compensated, producing a negative value for the Cable Loss.
- Measurements reported are the result of adjusting the turntable azimuth and antenna height to obtain the maximum EUT emission. This may produce a different reading than the plot trace. The plot is a Peak Hold function obtained at discreet increments of height and azimuth, while the reported measurement is obtained with the appropriate Quasi Peak or Average detector after the height and azimuth have been adjusted for maximum emission.
- Preliminary scans were performed for all channels in Transmit modes. The low band channel 903 MHz was selected as the worst-case condition for detailed examination.
- In Transmit mode, the EUT was assessed up to 10.0 GHz.

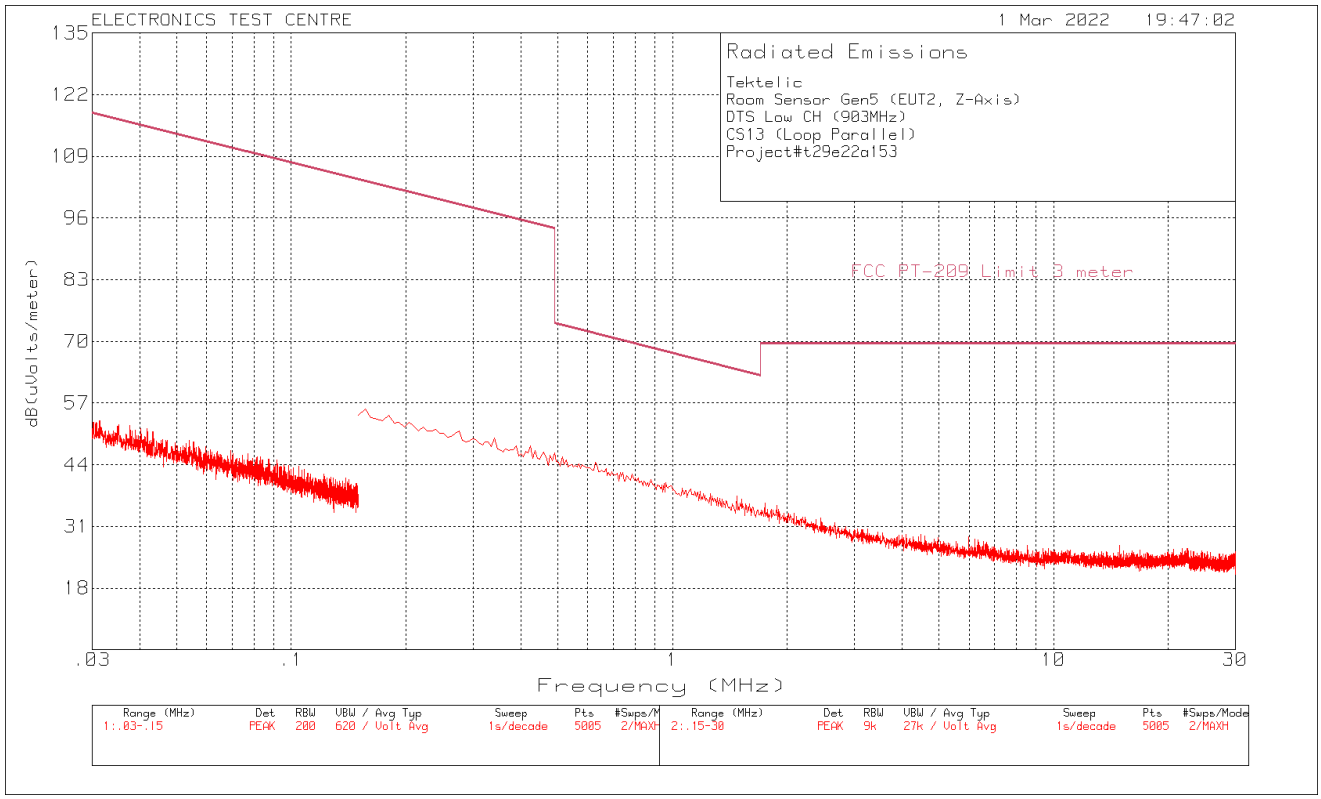
Negative values for Delta indicate compliance.

Spurious Emission

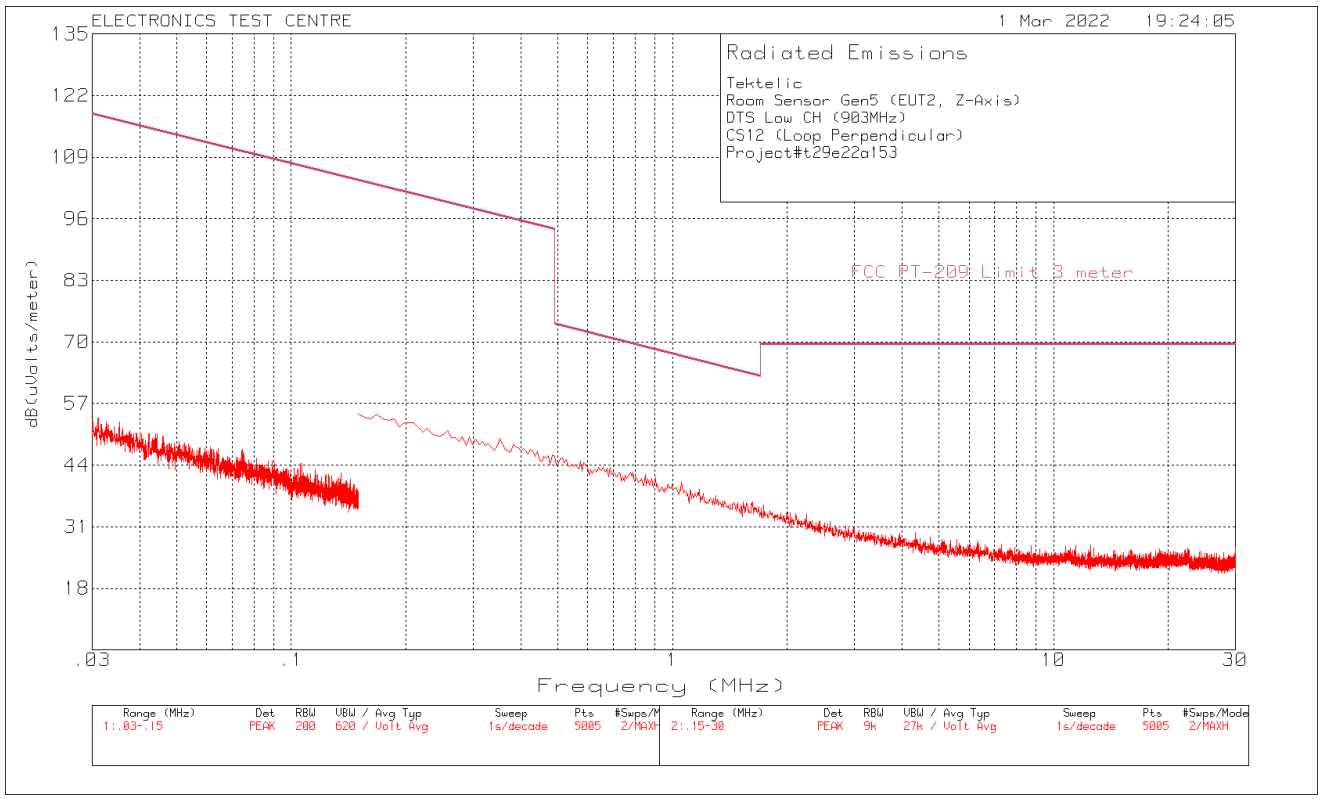
Freq. Marker	Freq. [MHz]	Raw reading [dBμv]	Det	Antenna Factor [dB/m]	Pre amp Gain [dB]	Corrected Reading [dBμv/m]	FCC 15.209 Limit [dBμv/m]	Delta [dB]	Azimuth [Deg]	Height [cm]	Polarization
1	*5417.1	32.04	AV	33.9	-30.9	35.04	54	-18.96	220	391	Horizontal
1	*5417.1	43.82	PK	33.9	-30.9	46.82	74	-27.18	220	391	Horizontal
2	*5418.9	30.8	AV	33.9	-30.9	33.8	54	-20.2	297	382	Vertical
2	*5418.9	43.43	PK	33.9	-30.9	46.43	74	27.57	297	382	Vertical

*** Restricted Band**

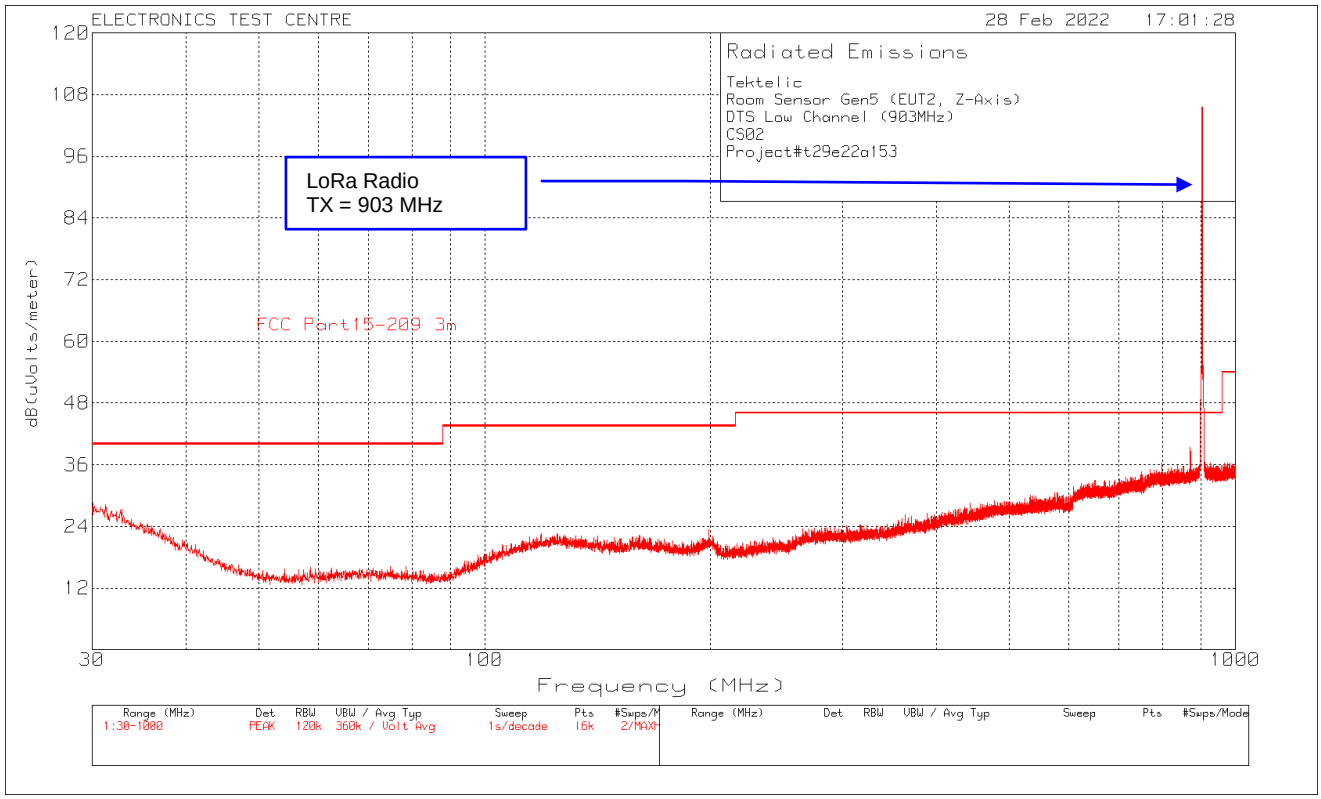
Plot of Radiated Emissions: Measuring Antenna Parallel



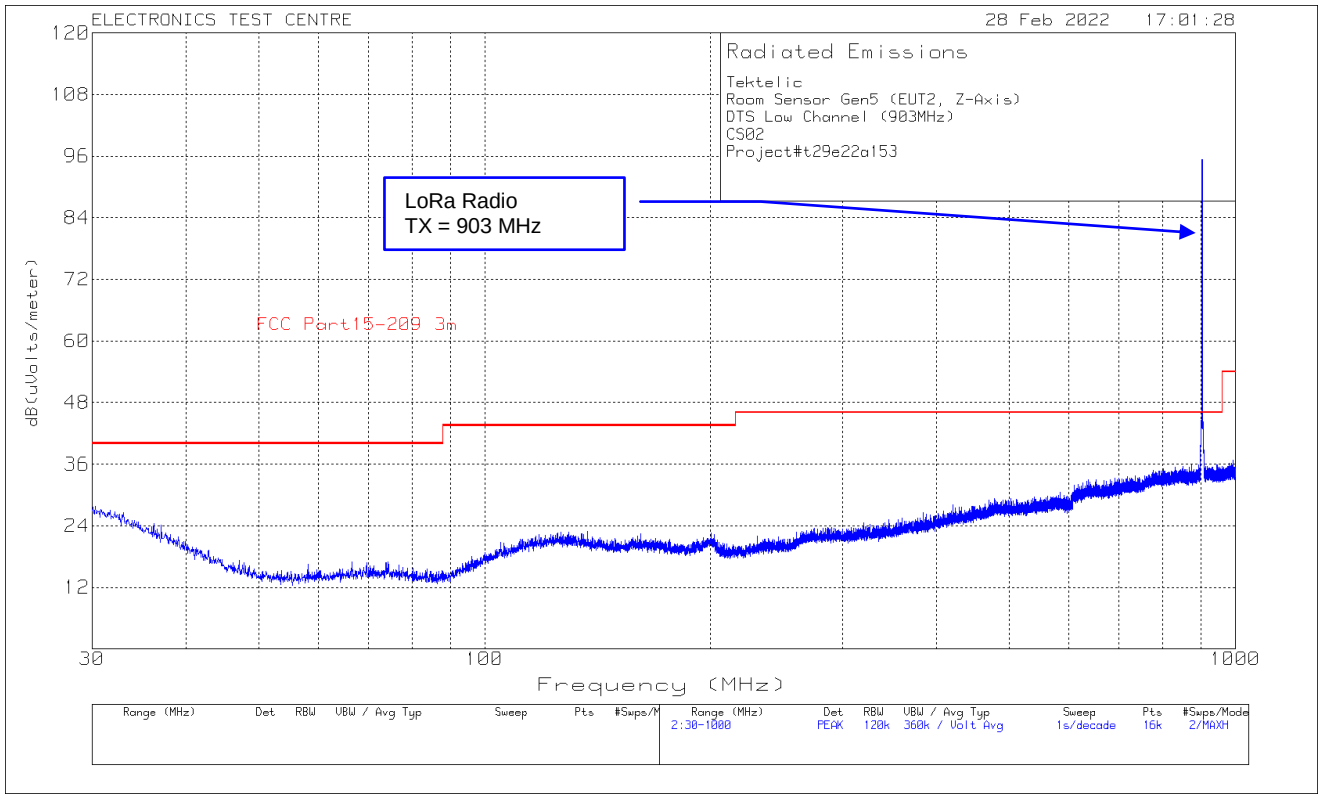
Plot of Radiated Emissions: Measuring Antenna Perpendicular



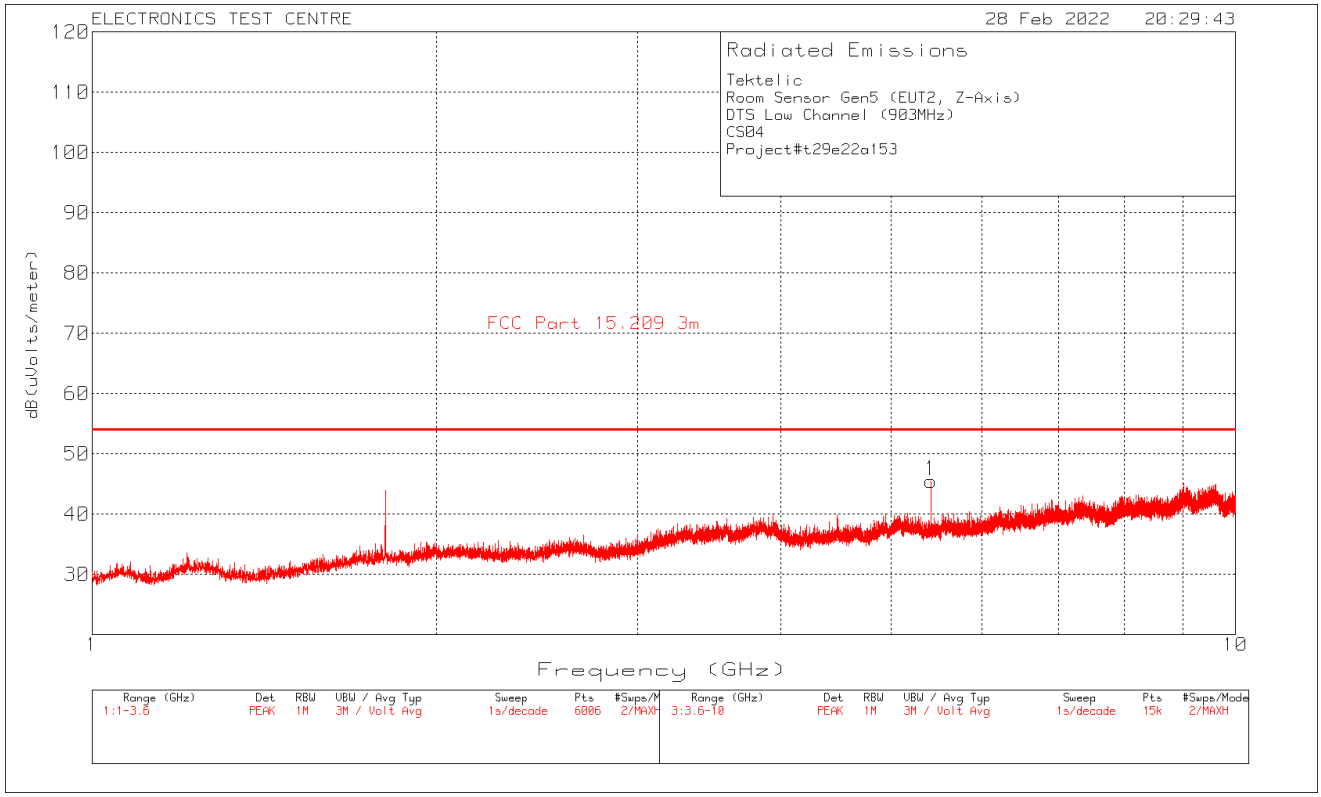
Plot of Radiated Emissions: Horizontal polarization



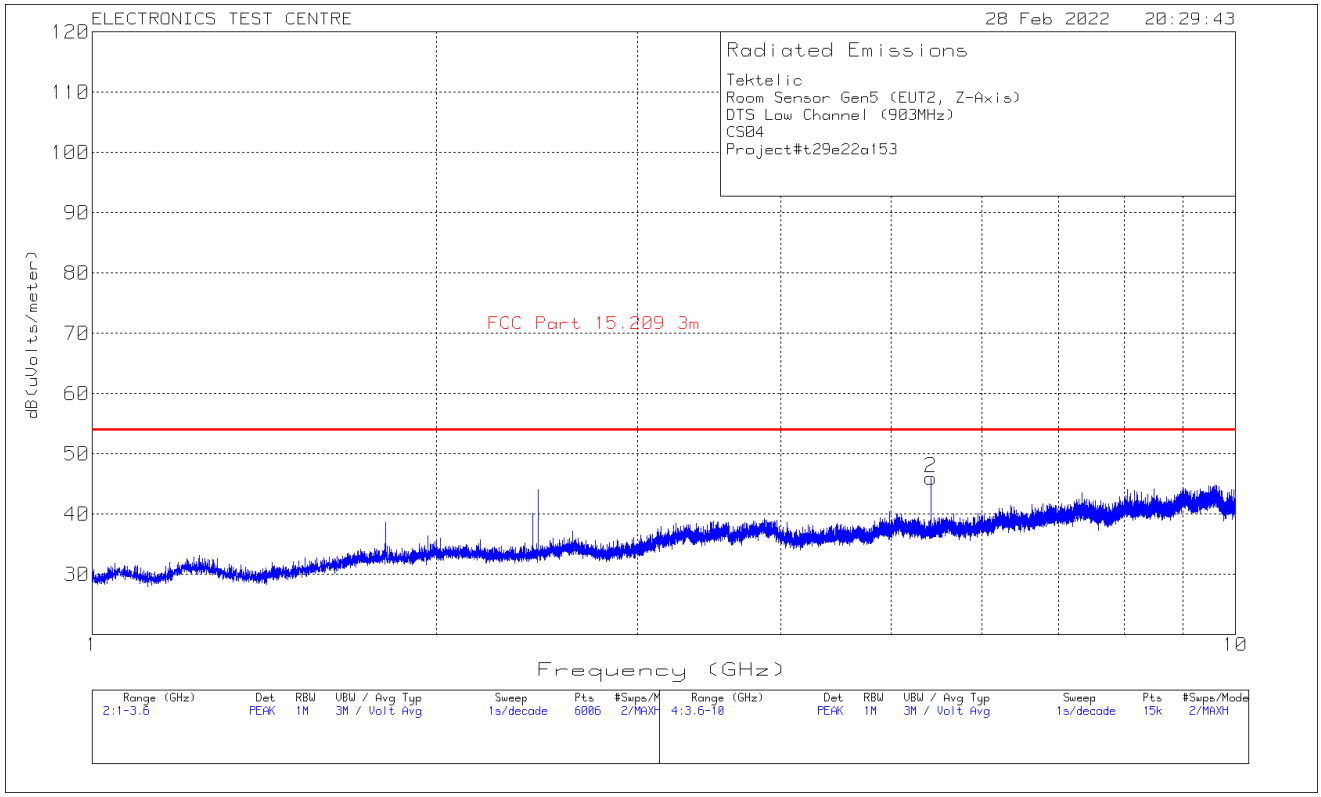
Plot of Radiated Emissions: Vertical polarization



Plot of Radiated Emissions: Horizontal polarization



Plot of Radiated Emissions: Vertical polarization



2.8.6 Radiated Emissions Data: BLE

The emissions data are presented in tabular form, showing turntable azimuth, antenna height and polarization, the uncorrected spectrum analyzer reading, the correction factors applied, the net result, the value of the limit at the frequency investigated, and the Delta between the result and the limit.

Meter Reading in dBµV + Antenna Factor in dB/m + Gain/Loss Factor in dB = Corrected Field Strength in dbµV/m.

Delta = Field Strength – Limit

Notes:

- When a preamp is used, the resulting gain is compensated, producing a negative value for the Cable Loss.
- Measurements reported are the result of adjusting the turntable azimuth and antenna height to obtain the maximum EUT emission. This may produce a different reading than the plot trace. The plot is a Peak Hold function obtained at discreet increments of height and azimuth, while the reported measurement is obtained with the appropriate Quasi Peak or Average detector after the height and azimuth have been adjusted for maximum emission.
- Preliminary scans were performed for all channels in Transmit modes. The low band channel 2402 MHz was selected as the worst-case condition for detailed examination.
- In Transmit mode, the EUT was assessed up to 26 GHz.

Negative values for Delta indicate compliance.

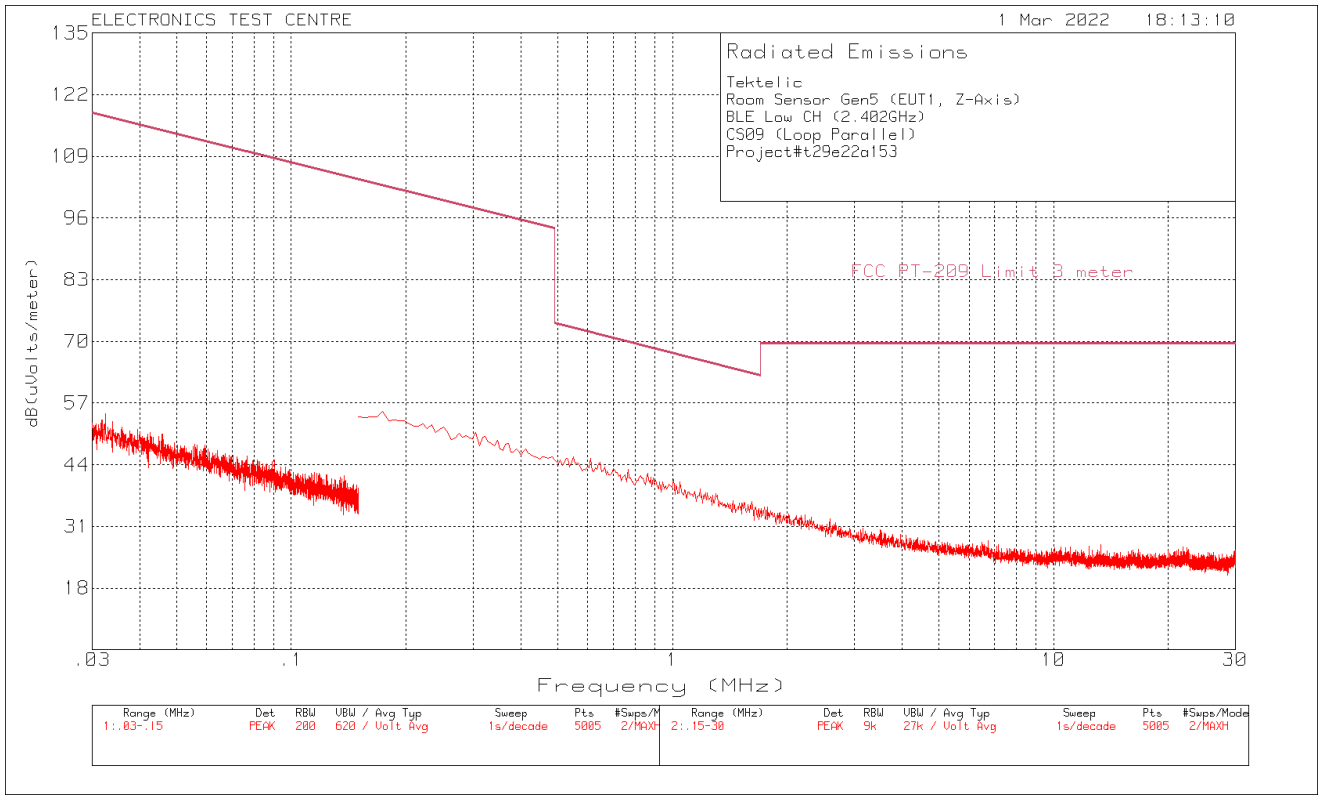
Spurious Emission

Freq. Marker	Freq. [GHz]	Raw reading [dBµv]	Det	Antenna Factor [dB/m]	Pre amp Gain [dB]	DC Correction Factor [dB]	Corrected Reading [dBµv/m]	FCC 15.209 Limit [dBµv/m]	Delta [dB]	Azimuth [Deg]	Height [cm]	Polarization
1	*4.804	41.11	AV	32.8	-32.0	1.79	43.58	54	-10.42	91	122	Horizontal
1	*4.804	50.46	PK	32.8	-32.0	1.79	53.05	74	-20.95	91	122	Horizontal
2	*7.2067	43.64	PK	35.8	-28.0	1.79	53.23	74	-20.77	89	114	Horizontal
2	7.2067	31.68	AV	35.8	-28.0	1.79	41.27	54	-12.73	89	114	Horizontal
3	*12.01	26.9	AV	39.2	-24.2	1.79	43.69	54	-10.31	247	105	Horizontal
3	*12.01	38.6	PK	39.2	-24.2	1.79	55.39	74	-18.61	247	105	Horizontal
4	*4.8034	53.34	PK	32.8	-32.0	1.79	55.93	74	-18.07	256	107	Vertical
4	*4.8034	43.88	AV	32.8	-32.0	1.79	46.47	54	-7.53	256	107	Vertical
5	*7.2052	46.11	PK	35.8	-28.0	1.79	55.7	74	-18.3	134	116	Vertical
5	*7.2052	33.95	AV	35.8	-28.0	1.79	43.54	54	-10.46	134	116	Vertical

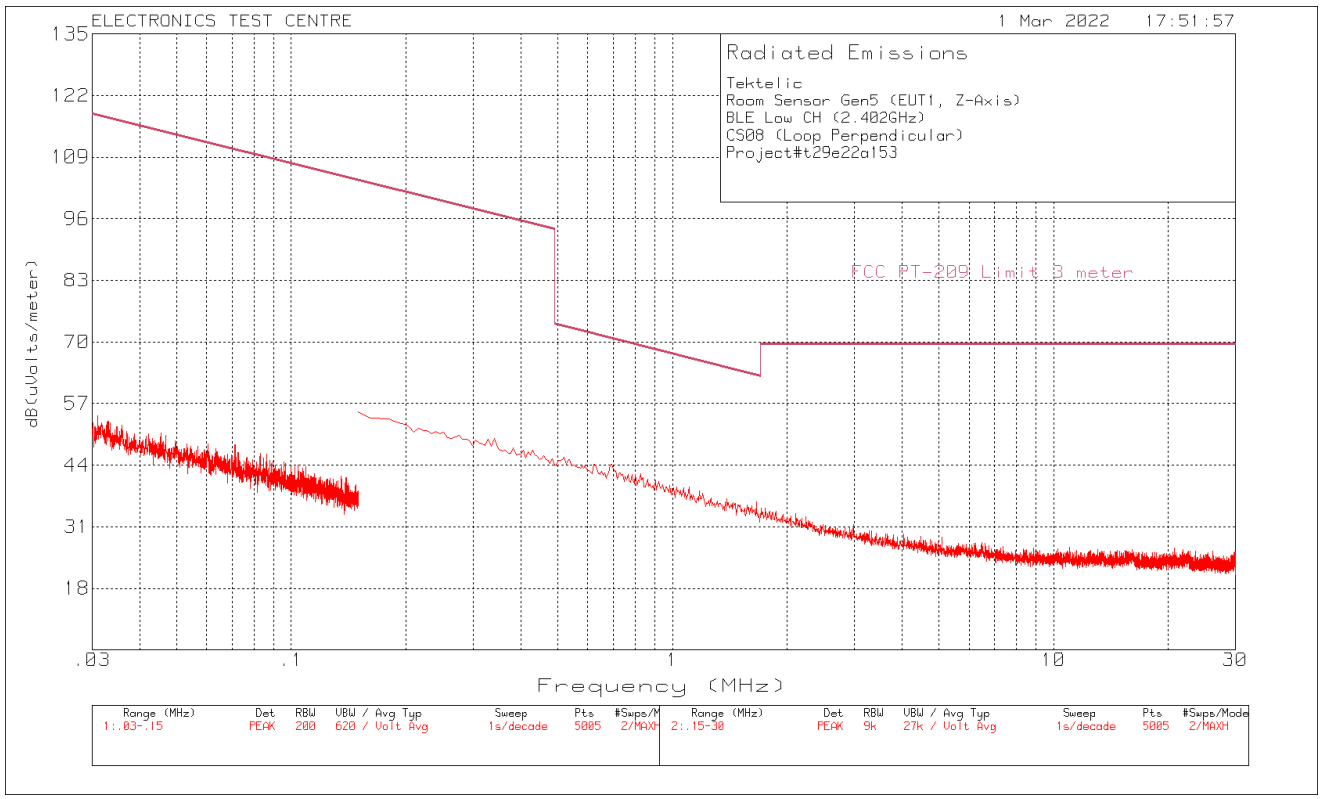
Freq. Marker	Freq. [GHz]	Raw reading [dBµv]	Det	Antenna Factor [dB/m]	Pre amp Gain [dB]	DC Correction Factor [dB]	Corrected Reading [dBµv/m]	FCC 15.209 Limit [dBµv/m]	Delta [dB]	Azimuth [Deg]	Height [cm]	Polarization
6	*12.01	41.87	PK	39.1	-24.2	1.79	58.56	74	-15.44	272	104	Vertical
6	*12.01	29.49	AV	39.1	-24.2	1.79	46.18	54	-7.82	272	104	Vertical
7	*17.89	29.58	PK	46.2	-17.2	1.79	60.37	74	-13.63	197	105	Vertical
7	*17.89	15.66	AV	46.2	-17.2	1.79	46.45	54	-7.55	197	105	Vertical
1	23.89	19.27	Av	35.4	-17.2	1.79	39.26	54	-14.74	170	105	Horizontal
2	24.11	20.22	Av	35.6	-17.5	1.79	40.11	54	-13.89	36	120	Horizontal
3	24.65	21.08	Av	35.7	-17.5	1.79	41.07	54	-12.93	164	151	Horizontal
4	24.77	21.9	Av	35.7	-17.7	1.79	41.69	54	-12.31	350	160	Horizontal
5	25.34	21.08	Av	35.9	-17.7	1.79	41.07	54	-12.93	309	140	Horizontal
6	25.76	20.67	Av	36.1	-18	1.79	40.56	54	-13.44	77	174	Horizontal
7	25.92	21.21	Av	36.2	-17.5	1.79	41.7	54	-12.3	82	110	Horizontal
8	26.33	20.5	Av	36.4	-17.1	1.79	41.59	54	-12.41	13	139	Horizontal
9	24.59	20.23	Av	35.6	-17.4	1.79	40.22	54	-13.78	160	156	Vertical
10	24.79	21.63	Av	35.7	-17.8	1.79	41.32	54	-12.68	73	154	Vertical
11	25.30	21.74	Av	35.9	-17.5	1.79	41.93	54	-12.07	259	146	Vertical
12	25.94	20.84	Av	36.2	-17.6	1.79	41.23	54	-12.77	34	106	Vertical
13	26.46	21.59	Av	36.5	-16.8	1.79	43.08	54	-10.92	284	137	Vertical

*** Restricted Band**

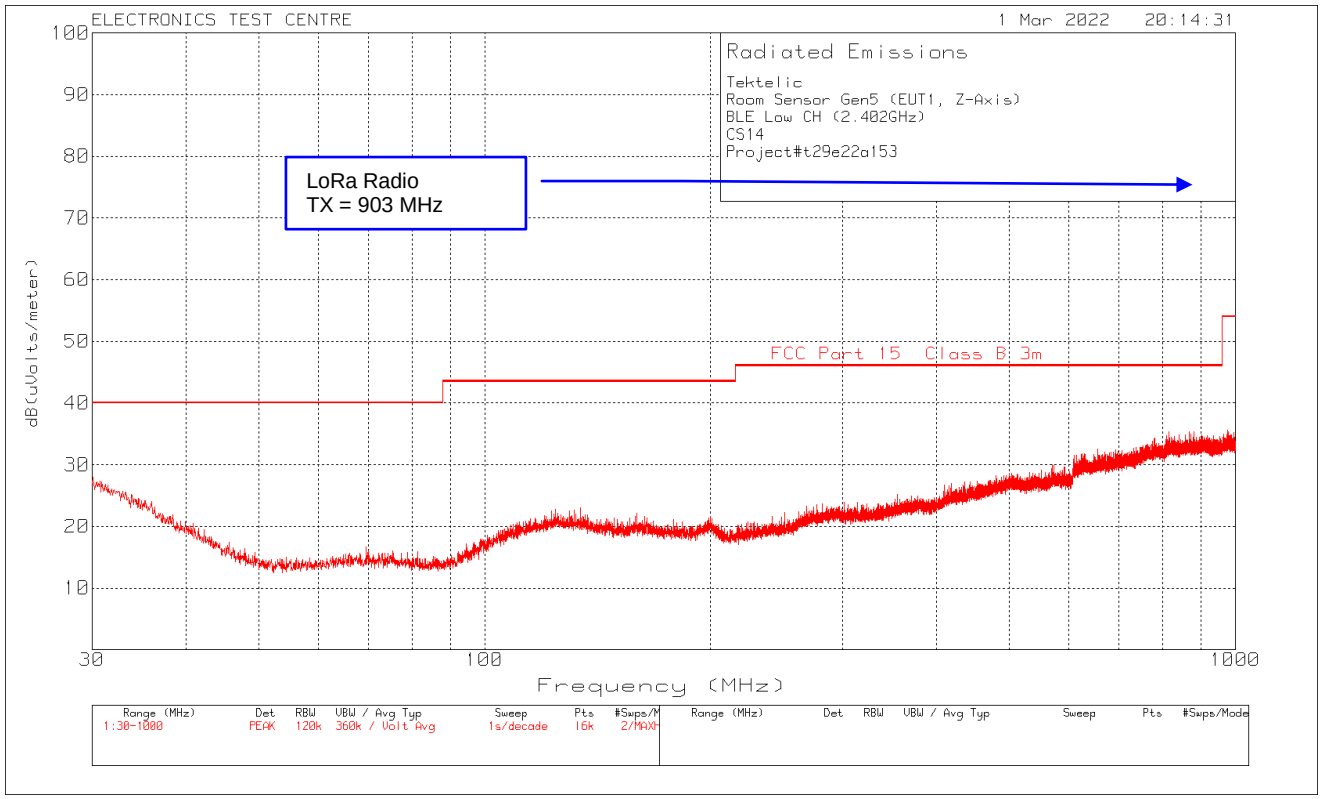
Plot of Radiated Emissions: Measuring Antenna Parallel



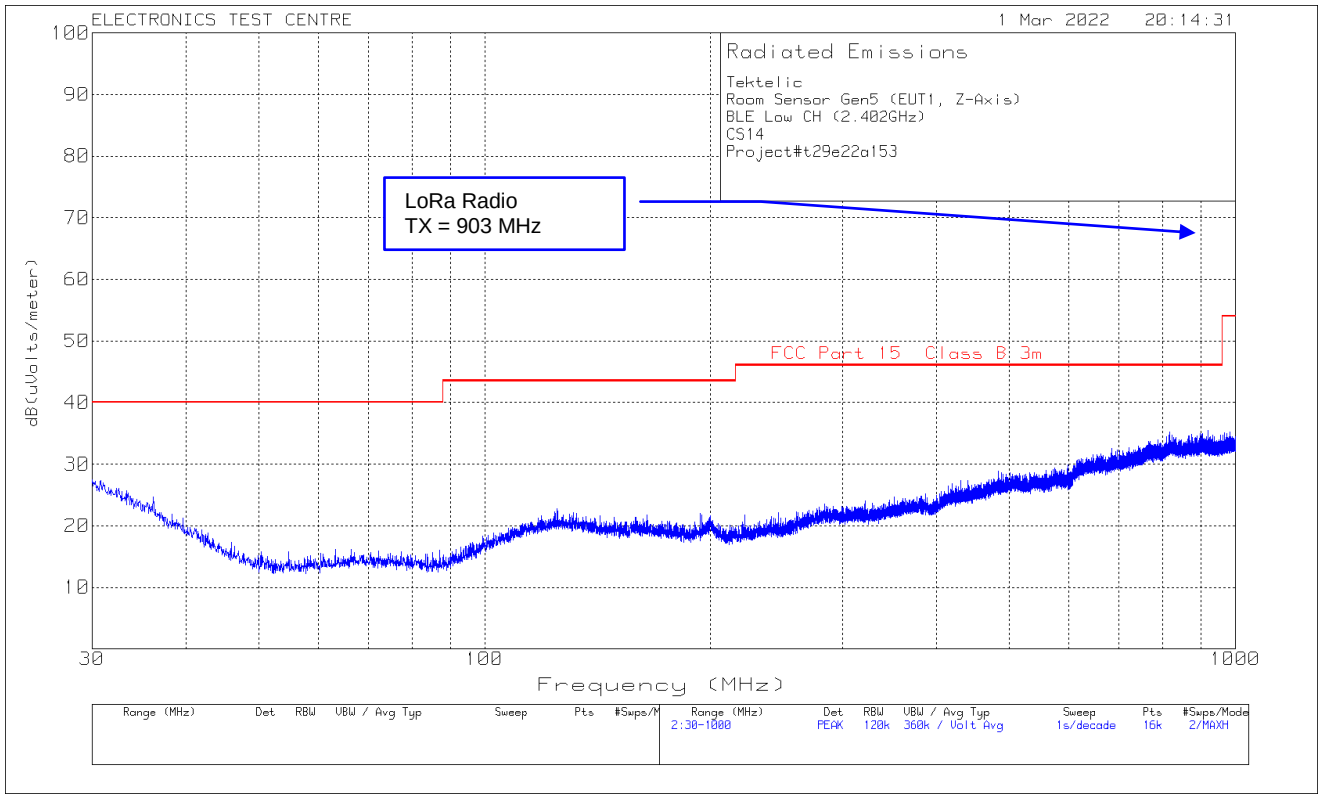
Plot of Radiated Emissions: Measuring Antenna Perpendicular



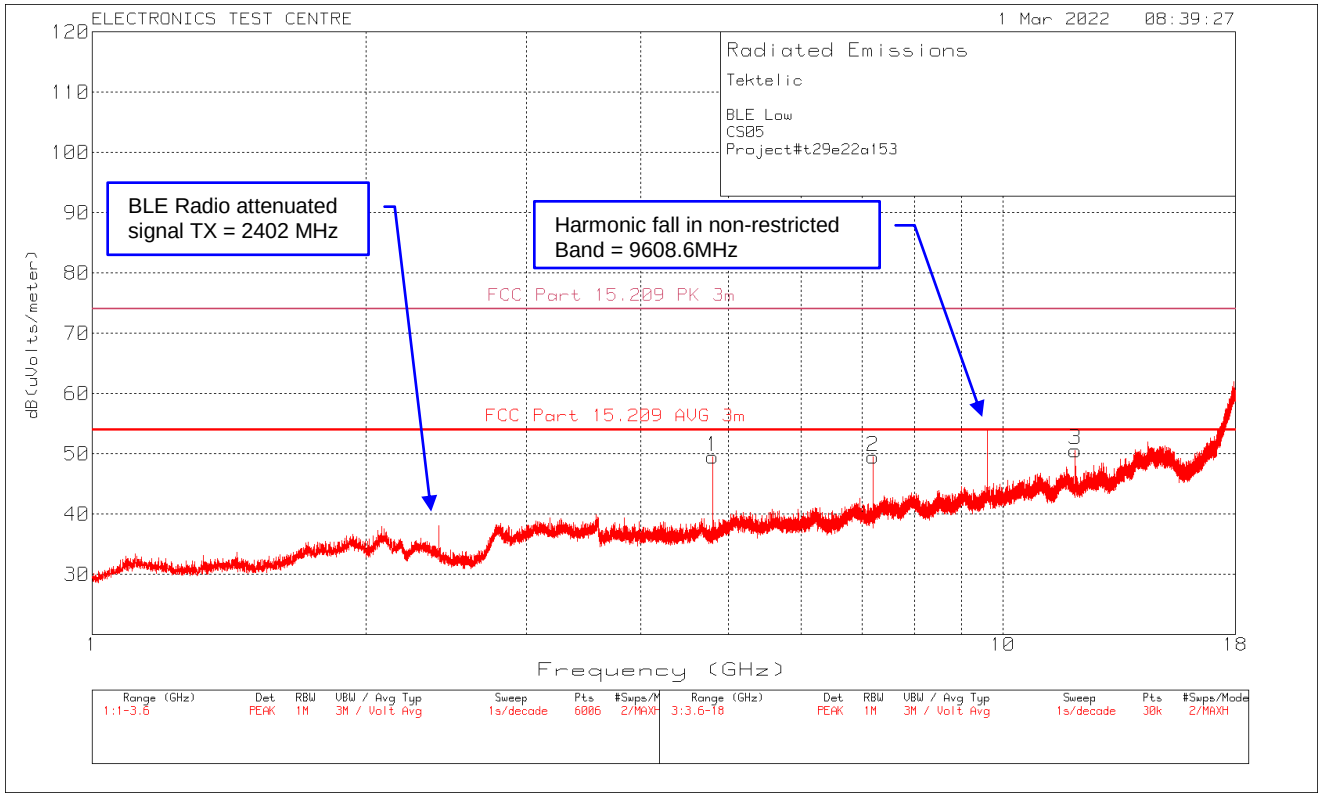
Plot of Radiated Emissions: Horizontal polarization



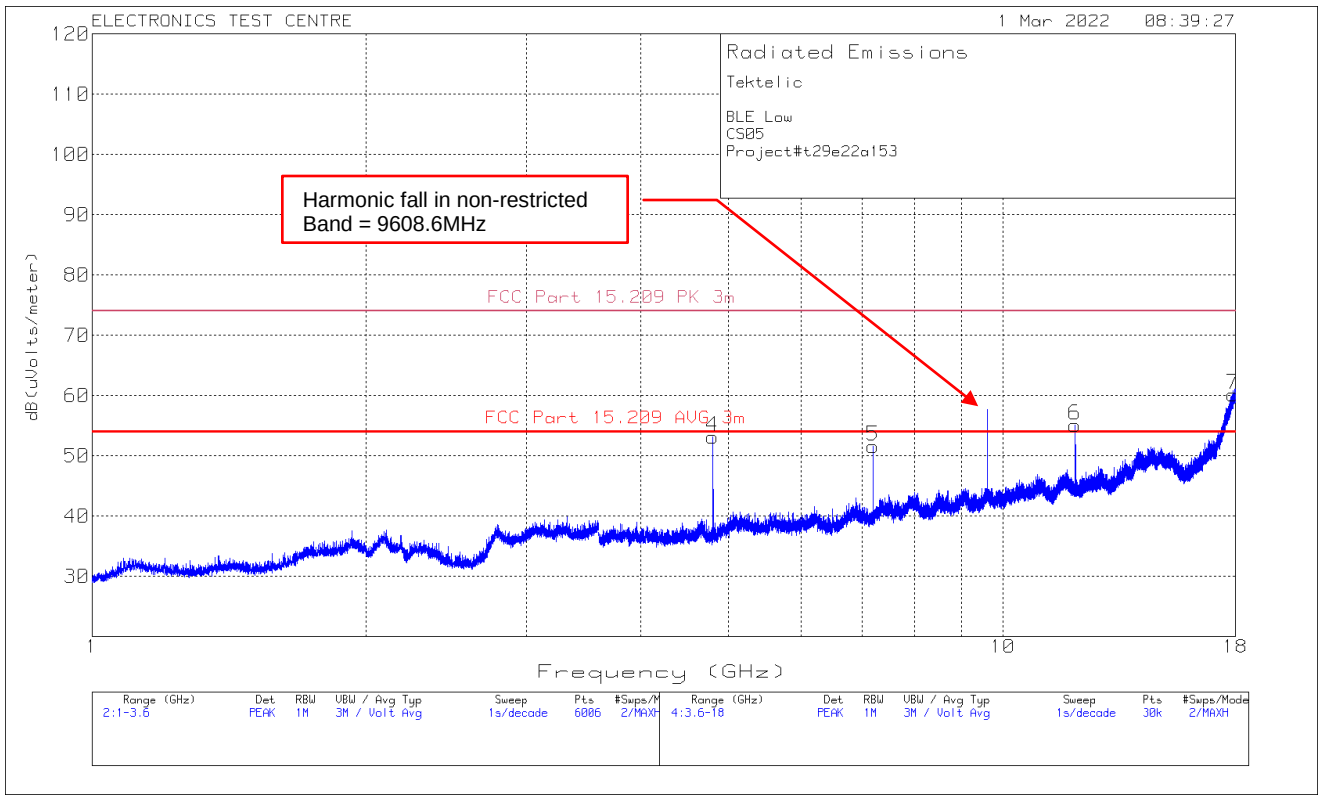
Plot of Radiated Emissions: Vertical polarization



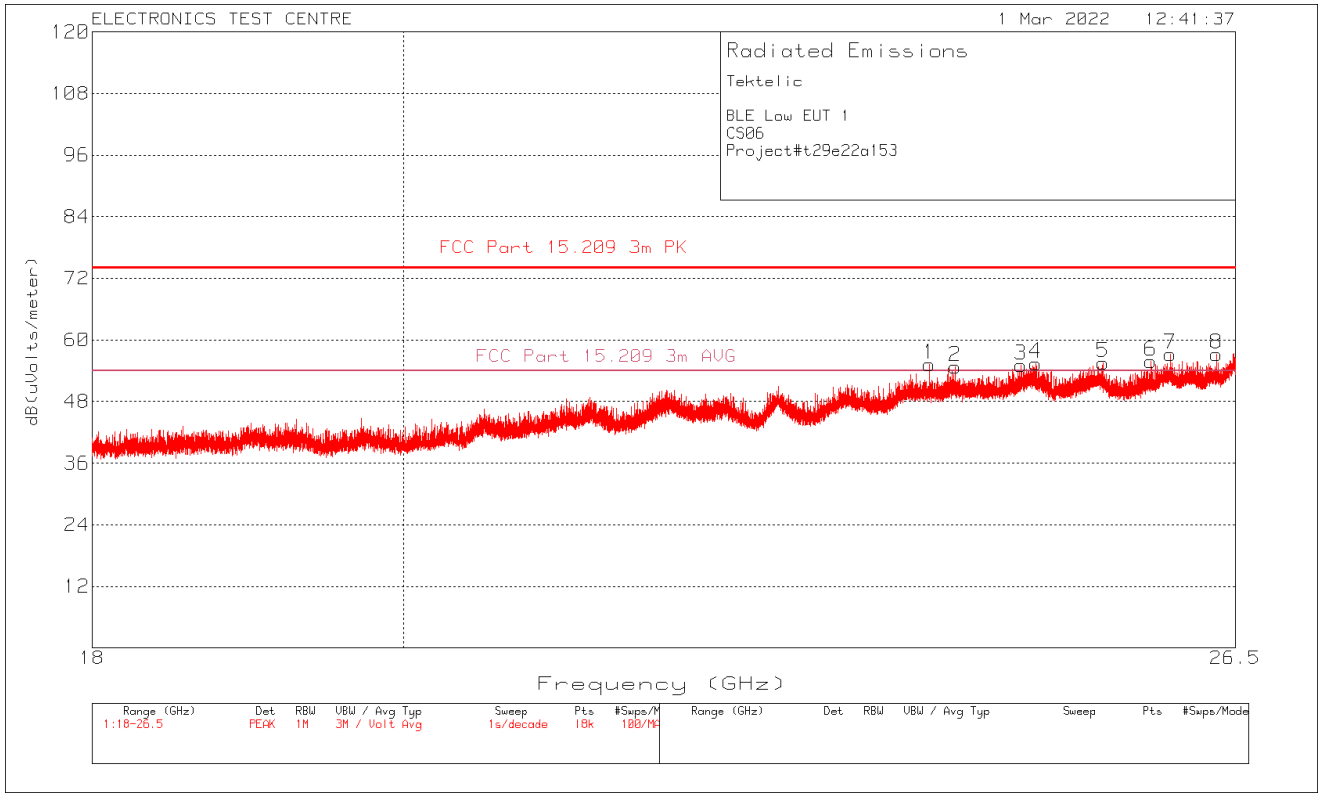
Plot of Radiated Emissions: Horizontal polarization



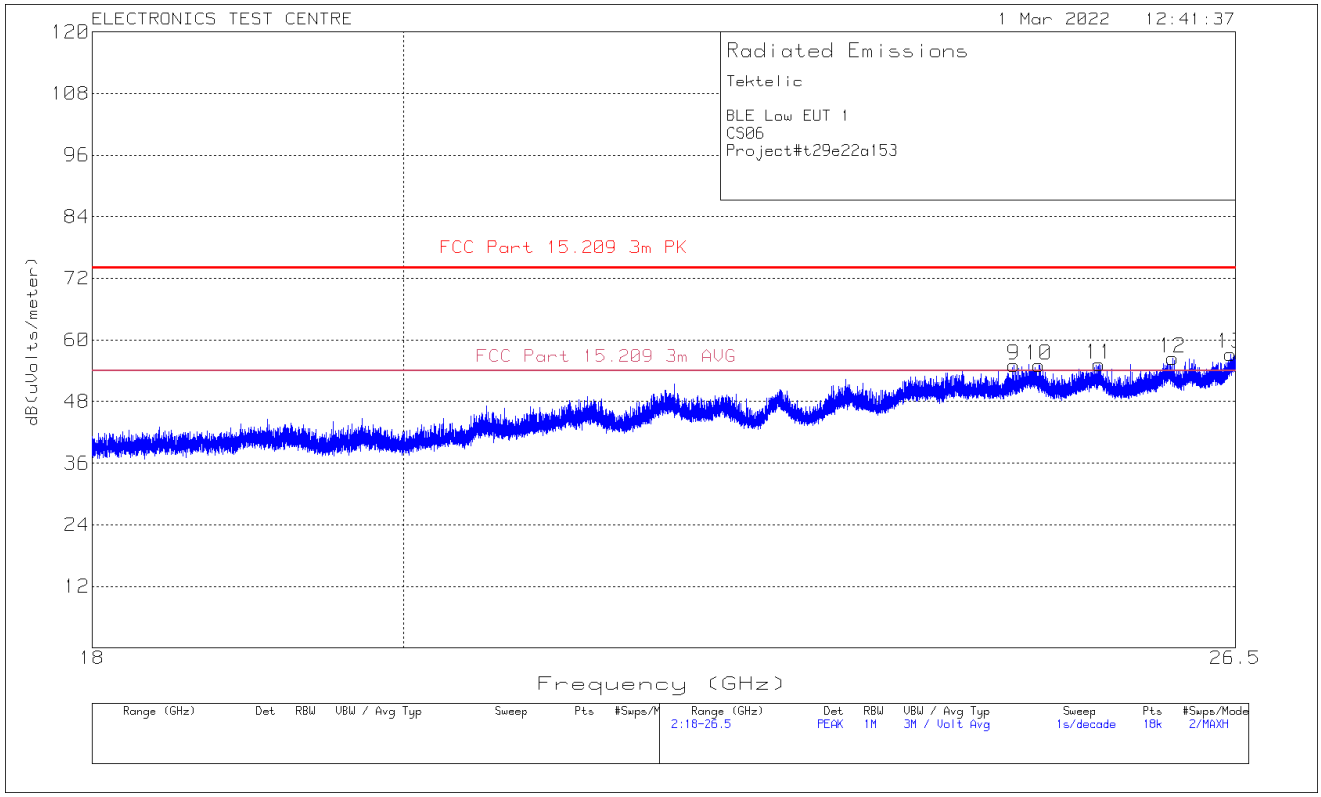
Plot of Radiated Emissions: Vertical polarization



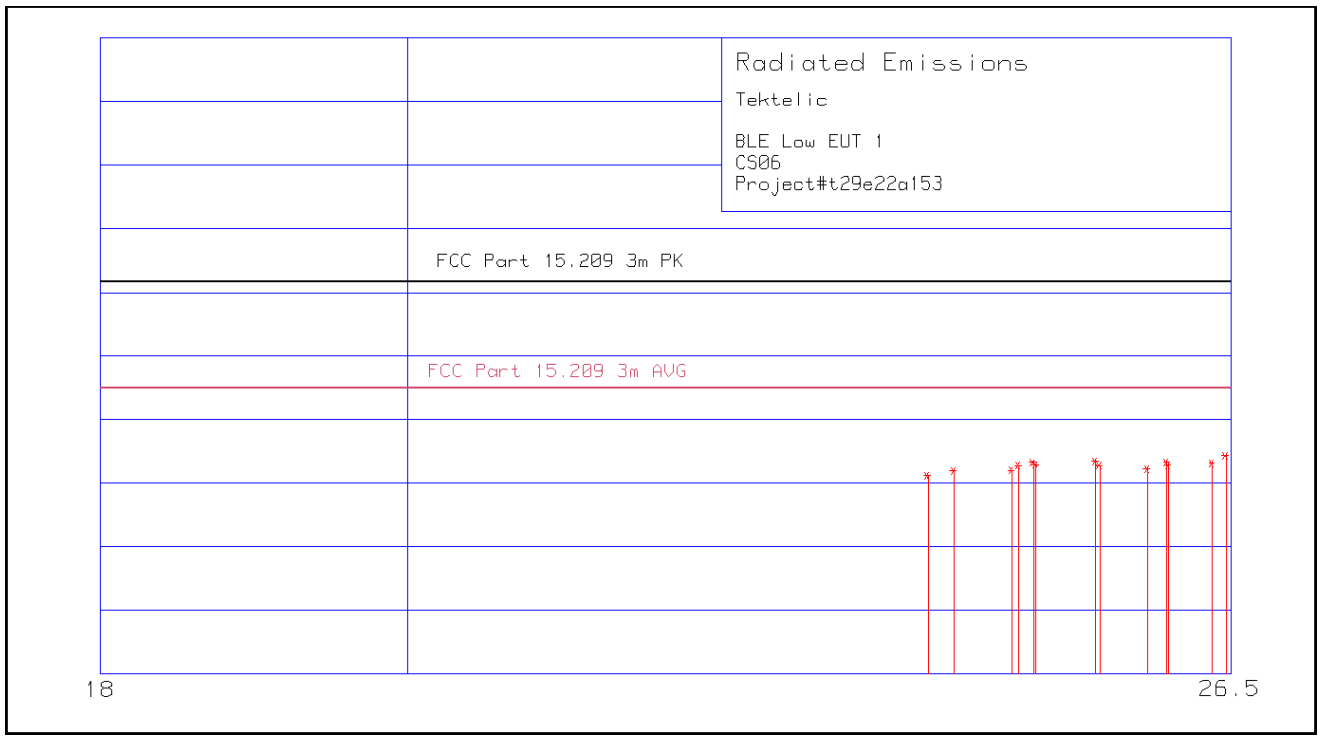
Plot of Radiated Emissions: Horizontal polarization



Plot of Radiated Emissions: Vertical polarization



Plot of Radiated Emissions: Horizontal/Vertical polarization Average analysis



2.9 RF Exposure

Test Lab: Electronics Test Centre, Airdrie	**EUT: Breeze-V**
Test Personnel:	**Standard: FCC PART 15.247**
Date:	

EUT status: Compliant

Compliant: RF exposure assessment to be provided in a separate Exhibit.

3.0 TEST FACILITY

3.1 Location

The Breeze-V was tested at the Electronics Test Centre laboratory located in Airdrie, Alberta, Canada. The Radio Frequency Anechoic Chamber (RFAC), identified as Chamber 1, has a usable working space measuring 10.6 m long x 7.3 m wide x 6.5 m high.

Measurements taken at this site are accepted by Industry Canada as evidence of conformity per registration file # 2046A. This site is also listed with the FCC under Registration Number CA2046.

The floor, walls and ceiling consist of annealed steel panels. The walls and ceiling are covered with ferrite tile, augmented by RF absorbant foam material on the end wall nearest the turntable, and on the adjacent walls and the ceiling. The chamber floor supports a 15 cm high internal floor, constructed of annealed steel panels, that forms the ground plane, and is bonded to the chamber walls.

The 3-m diameter turntable is flush-mounted with the floor. A sub-floor cable-way is provided to route cables between the turntable pit and EUT support equipment located in the Control Room. Cables reach the EUT through an opening in the centre of the turntable.

Test instrumentation and EUT support equipment is located in the Control Room, consisting of two shielded vestibules joined together at the side of the main room. Cables are routed through bulkhead panels between the rooms and the test chamber as required. Power feeds are routed into the main room and vestibules through line filters providing at least 100 dB of attenuation between 10 kHz and 10 GHz.

Either floor mounted or table-top equipment can be tested at this facility.

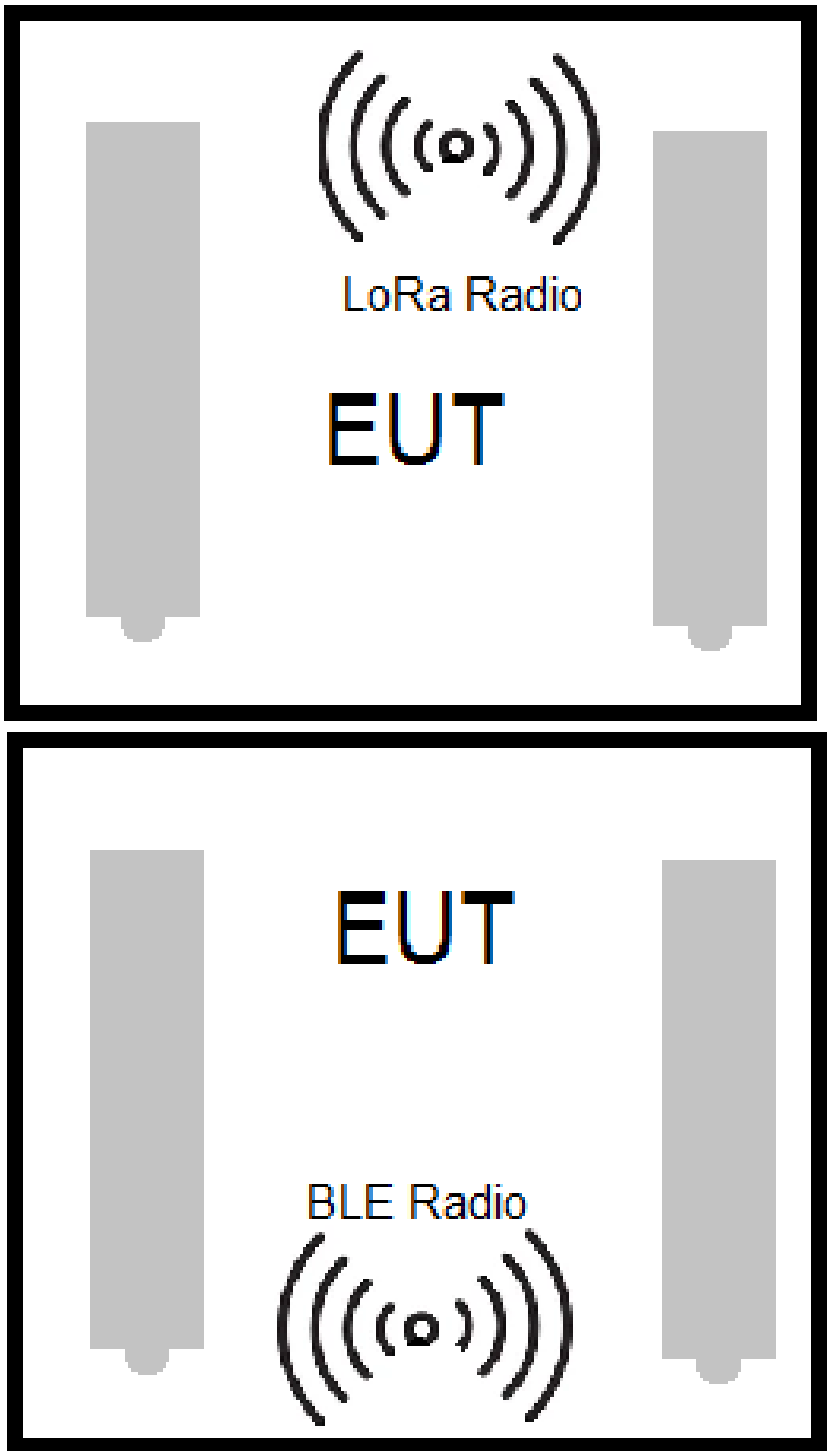
3.2 Grounding Plan

The Breeze-V was placed at the center of the test chamber turntable on top of an 80-cm high polystyrene foam table below 1GHz and at 1.5m high polystyrene foam table above 1 GHz. The EUT was grounded according to Tektelic Communication Inc. specifications.

3.3 Power Supply

All EUT power was supplied by an internal Battery.

Appendix A – Test Setup Block Diagram



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