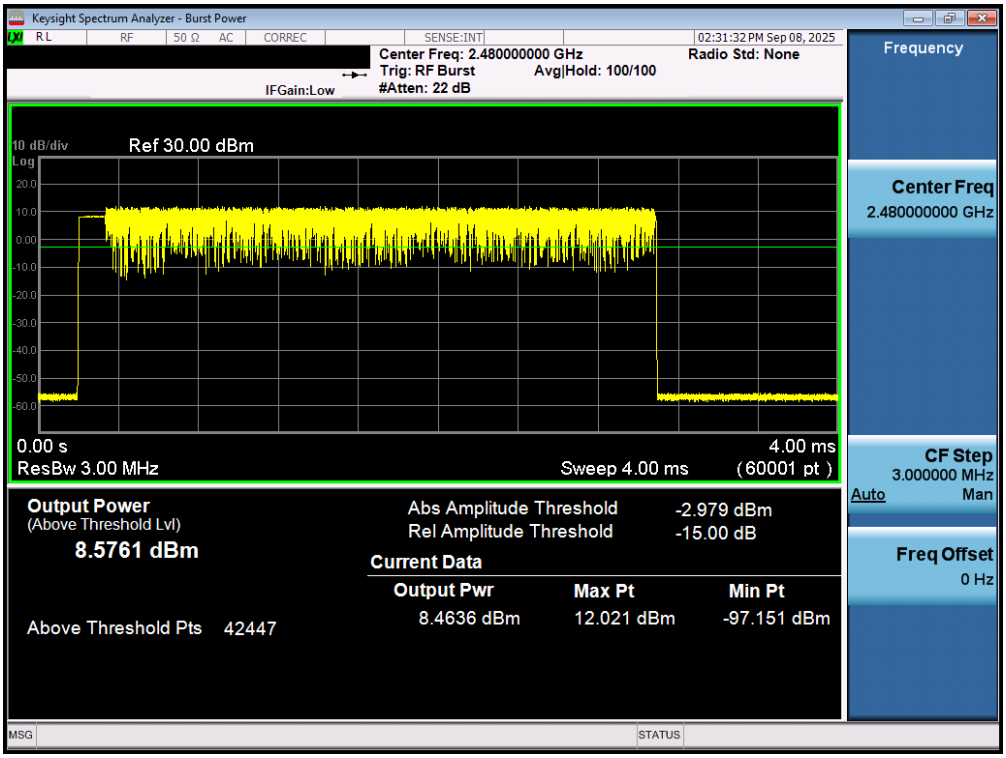


Plot 7-108. Average Conducted Power (3Mbps – Ch. 78) – Dual Ant 2

7.4 Band Edge Compliance

§15.247 (d); RSS-247 [5.5]

Test Overview and Limits

EUT operates in hopping and non-hopping transmission mode. Measurement is taken at the highest point located outside of the emission bandwidth. ***The maximum permissible out-of-band emission level is 20 dBc.***

Test Procedure Used

ANSI C63.10:2020 – Section 6.10.4

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW = 100kHz
4. VBW = 300kHz
5. Detector = Peak
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = max hold
8. Sweep time = auto couple
9. The trace was allowed to stabilize

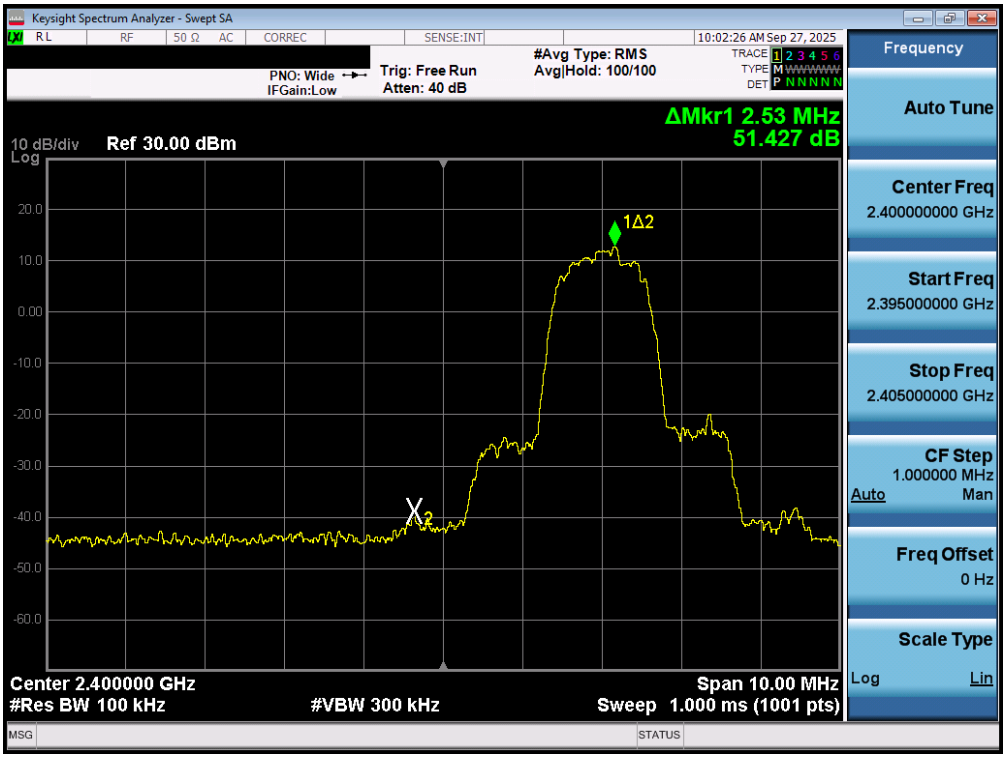
Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

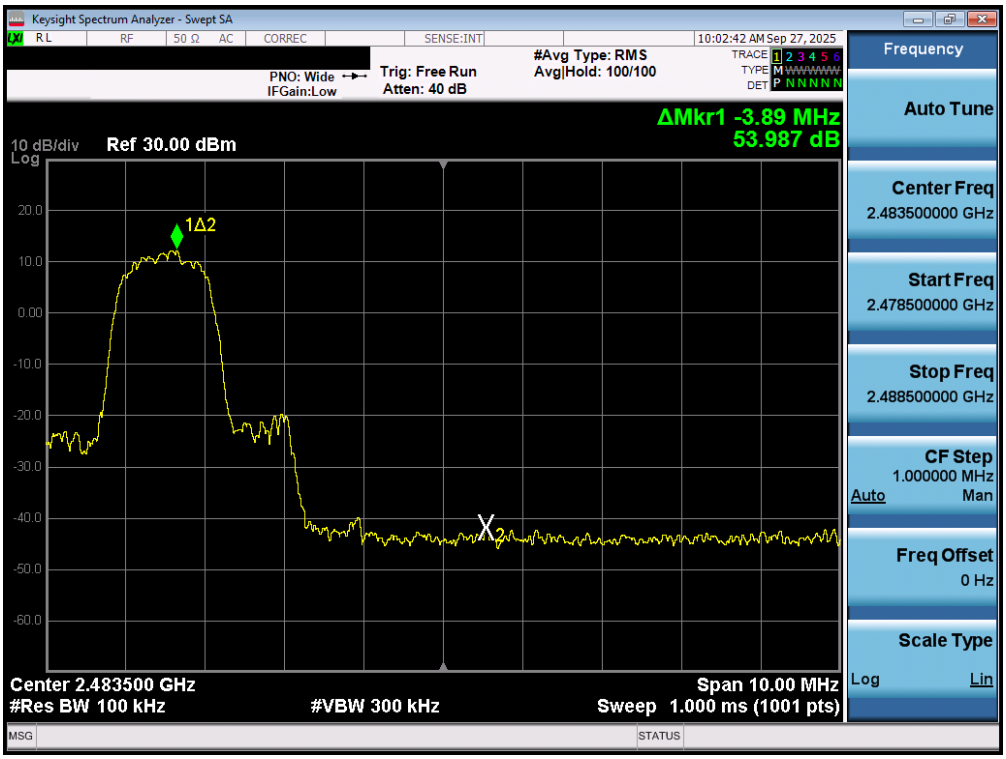
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

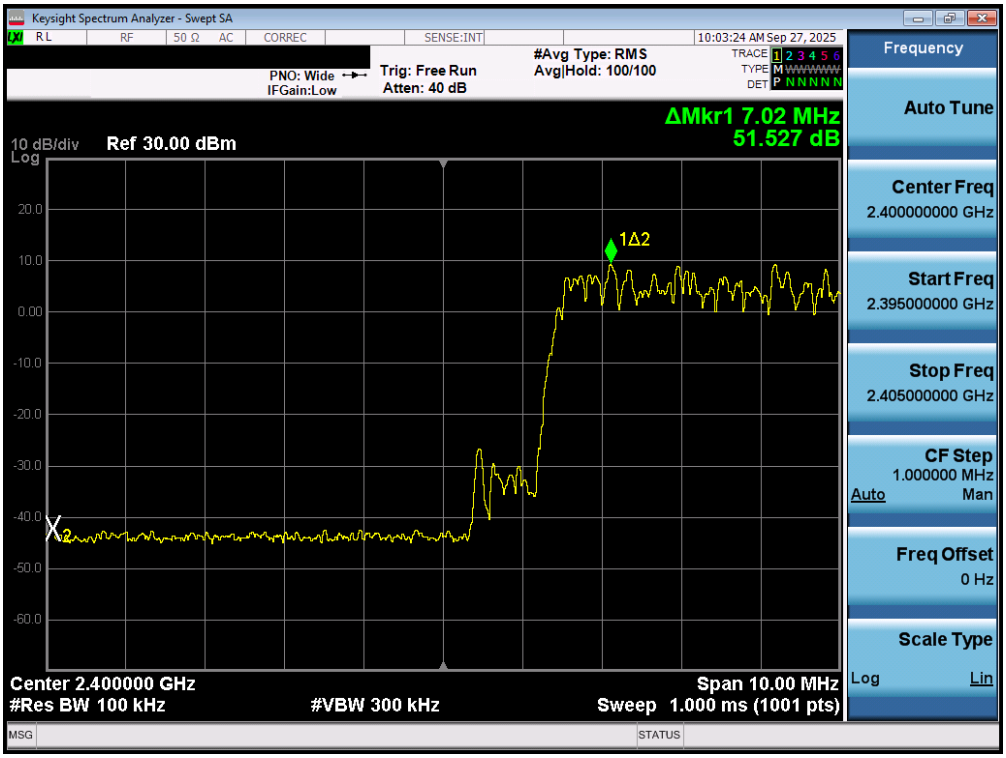
Out of band conducted spurious emissions at the band edge were investigated for all data rates in hopping and non-hopping modes. The worst case emissions were found with the EUT transmitting at 3 Mbps. Band edge emissions were also investigated with the EUT transmitting in all data rates. Plots of the worst case emissions are shown below.



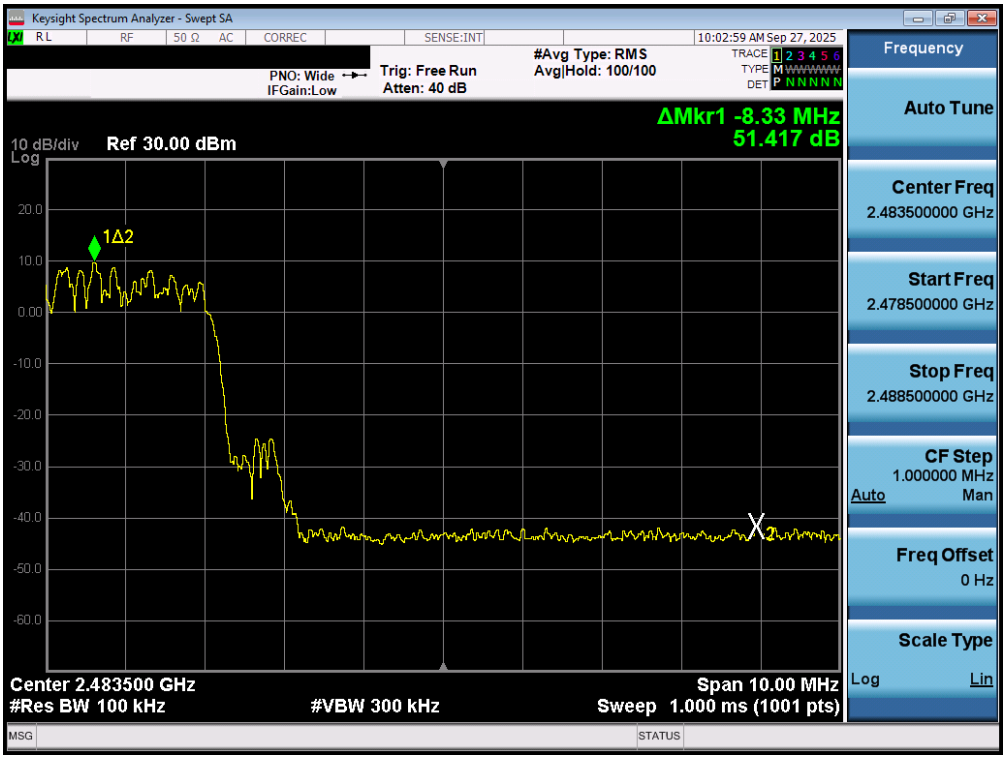
Plot 7-109. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 0) – Ant 1



Plot 7-110. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 78) – Ant 1



Plot 7-111. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – Ant 1

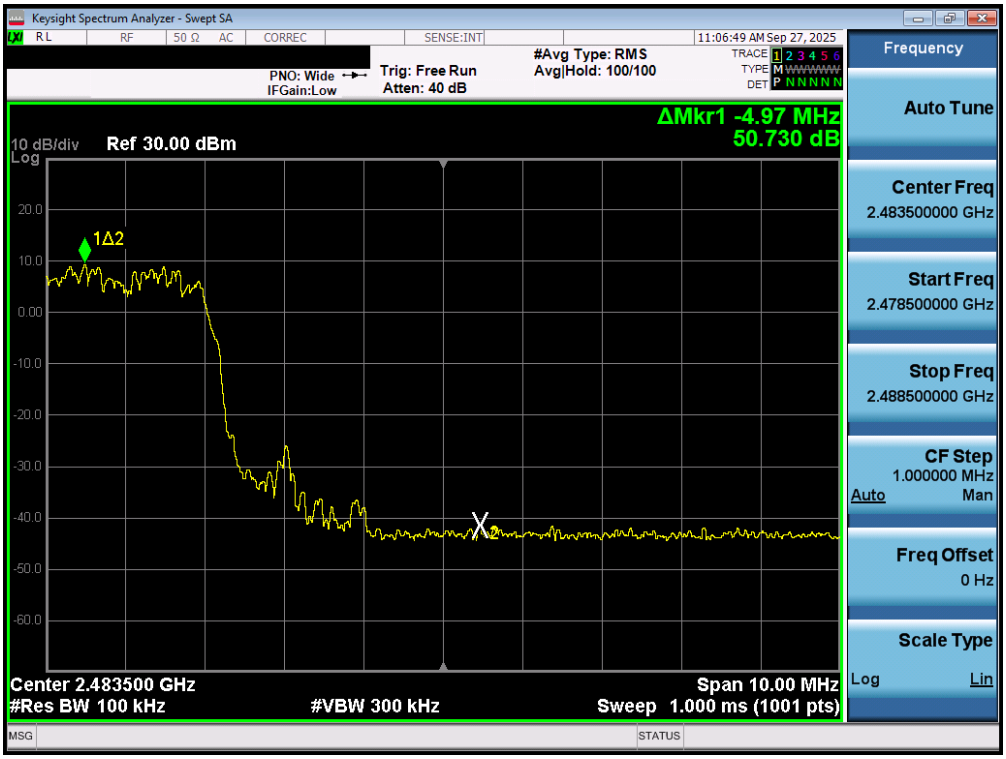


Plot 7-112. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – Ant 1

Plot 7-113. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 0) – Ant 2

Plot 7-114. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 78) – Ant 2

Plot 7-115. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – Ant 2

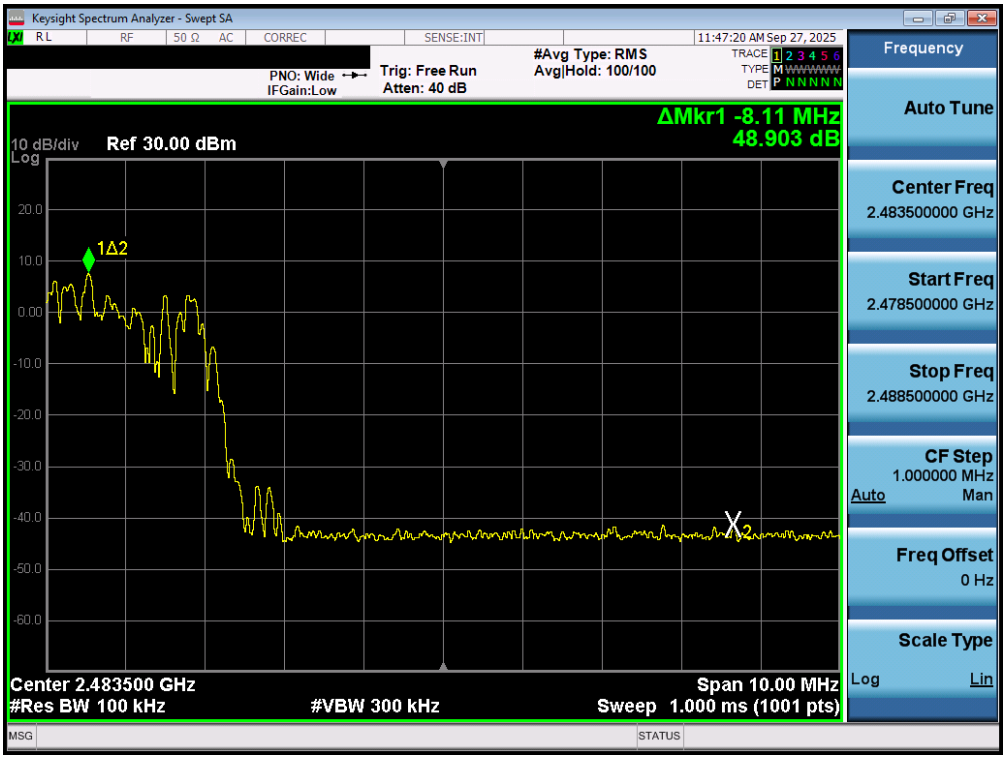


Plot 7-116. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – Ant 2

Plot 7-117. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 0) – Dual Ant 1

Plot 7-118. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 78) – Dual Ant 1

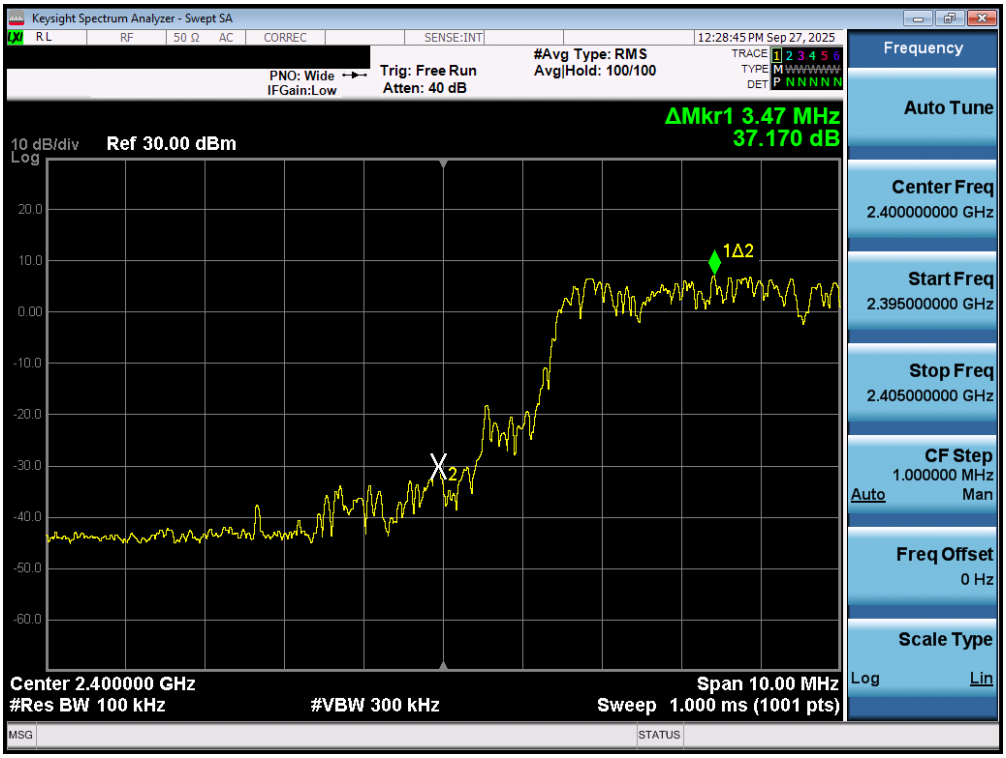
Plot 7-119. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – Dual Ant 1



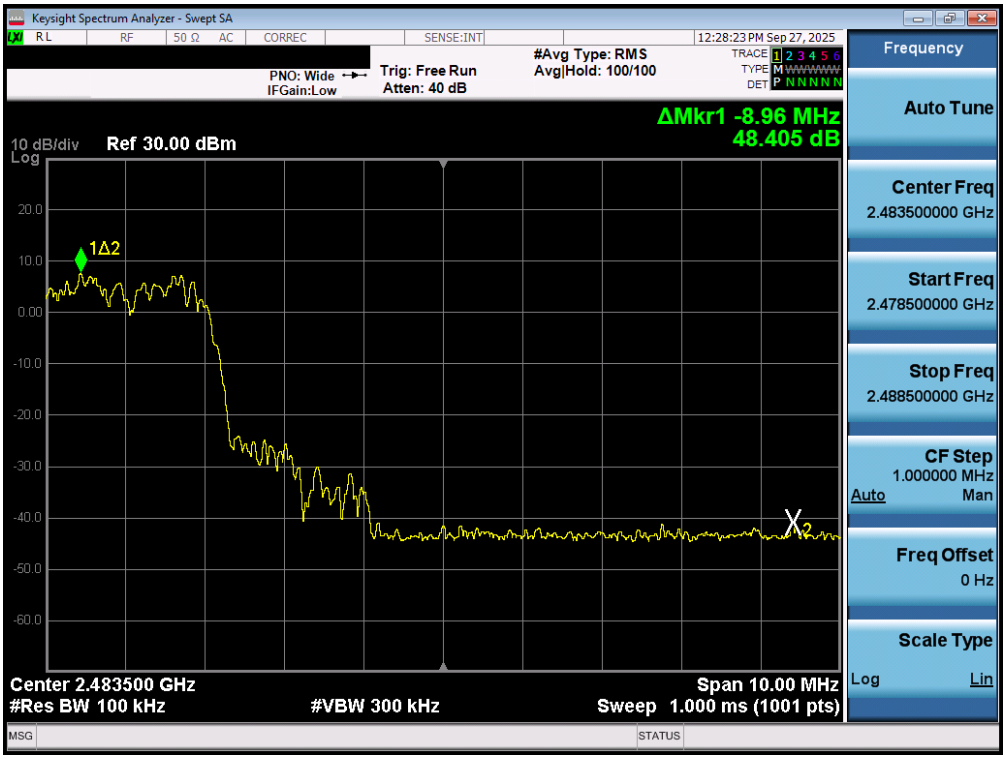
Plot 7-120. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – Dual Ant 1

Plot 7-121. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 0) – Dual Ant 2

Plot 7-122. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 78) – Dual Ant 2



Plot 7-123. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – Dual Ant 2



Plot 7-124. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – Dual Ant 2

7.5 Carrier Frequency Separation

§15.247 (a.1); RSS-247 [5.1(2)]

Test Overview and Limit

Measurement is made with EUT operating in hopping mode. ***The minimum permissible channel separation for this system is 2/3 the value of the 20dB BW.***

Test Procedure Used

ANSI C63.10:2020 – Section 7.8.2

Test Settings

1. Span = Wide enough to capture peaks of two adjacent channels
2. RBW = 30% of channel spacing. Adjust as necessary to best identify center of each individual channel
3. VBW ≥ RBW
4. Sweep = Auto
5. Detector = Peak
6. Trace mode = max hold
7. The trace was allowed to stabilize.
8. Marker-delta function used to determine separation between peaks of the adjacent channels

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

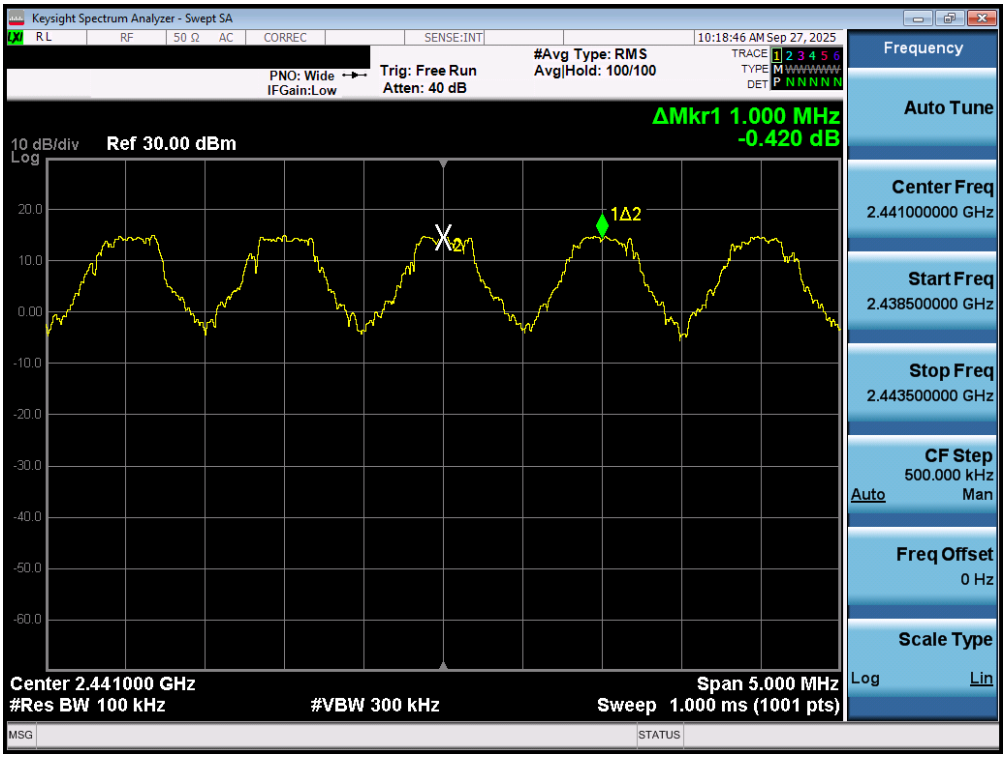
The EUT complies with the minimum channel separation requirement when it is operating in 1x/EDR mode using 79 channels and when operating in AFH mode using 20 channels.

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Min. Channel Separation [MHz]
2402	1.0	0	0.626
2441	1.0	39	0.634
2480	1.0	78	0.623
2402	2.0	0	0.718
2441	2.0	39	0.686
2480	2.0	78	0.640
2402	3.0	0	0.718
2441	3.0	39	0.683
2480	3.0	78	0.650

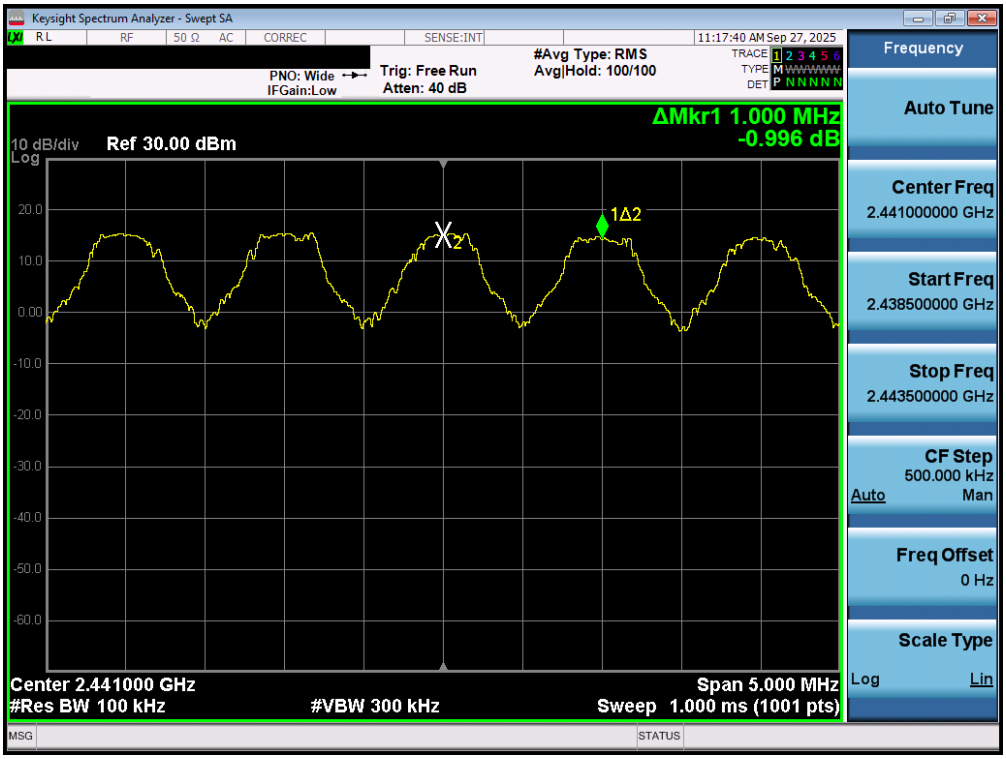
Table 7-9. Minimum Channel Separation – Ant 1

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Min. Channel Separation [MHz]
2402	1.0	0	0.613
2441	1.0	39	0.621
2480	1.0	78	0.629
2402	2.0	0	0.699
2441	2.0	39	0.703
2480	2.0	78	0.716
2402	3.0	0	0.699
2441	3.0	39	0.705
2480	3.0	78	0.721

Table 7-10. Minimum Channel Separation – Ant 2



Plot 7-125. Channel Spacing Plot (Bluetooth) – Ant 1



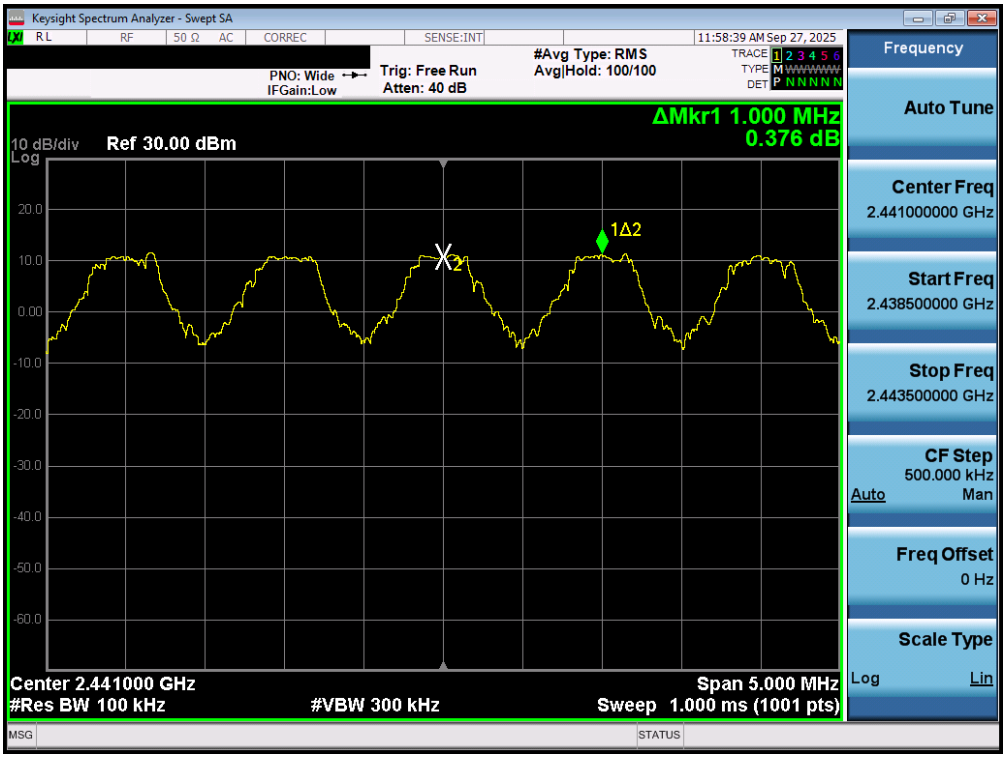
Plot 7-126. Channel Spacing Plot (Bluetooth) – Ant 2

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Min. Channel Separation [MHz]
2402	1.0	0	0.634
2441	1.0	39	0.629
2480	1.0	78	0.629
2402	2.0	0	0.676
2441	2.0	39	0.669
2480	2.0	78	0.682
2402	3.0	0	0.686
2441	3.0	39	0.672
2480	3.0	78	0.682

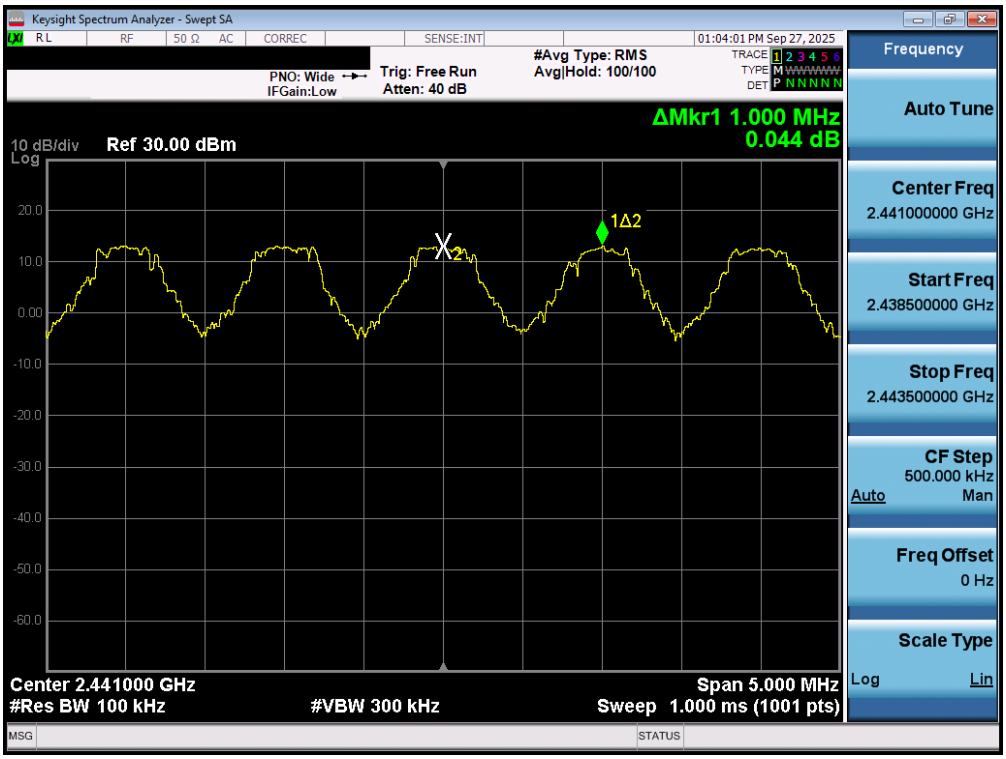
Table 7-11. Minimum Channel Separation – Dual Ant 1

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Min. Channel Separation [MHz]
2402	1.0	0	0.634
2441	1.0	39	0.635
2480	1.0	78	0.647
2402	2.0	0	0.671
2441	2.0	39	0.691
2480	2.0	78	0.624
2402	3.0	0	0.706
2441	3.0	39	0.715
2480	3.0	78	0.700

Table 7-12. Minimum Channel Separation – Dual Ant 2



Plot 7-127. Channel Spacing Plot (Bluetooth) – Dual Ant 1



Plot 7-128. Channel Spacing Plot (Bluetooth) – Dual Ant 2

7.6 Time of Occupancy

§15.247 (a.1.iii); RSS-247 [5.1(4)]

Test Overview and Limit

Measurement is made while EUT is operating in hopping mode with the spectrum analyzer set to zero span. ***The maximum permissible time of occupancy is 400 ms within a period of 400ms multiplied by the number of hopping channels employed.***

Test Procedure Used

ANSI C63.10:2020 – Section 7.8.4

Test Settings

1. Span = zero span, centered on a hopping channel
2. RBW ≤ channel spacing and >> 1/T, where T is expected dwell time per channel
3. Sweep = as necessary to capture entire dwell time. Second plot may be required to demonstrate two successive hops on a channel
4. Trigger is set with appropriate trigger delay to place pulse near the center of the plot
5. Detector = peak
6. Trace mode = max hold
7. Marker-delta function used to determine transmit time per hop

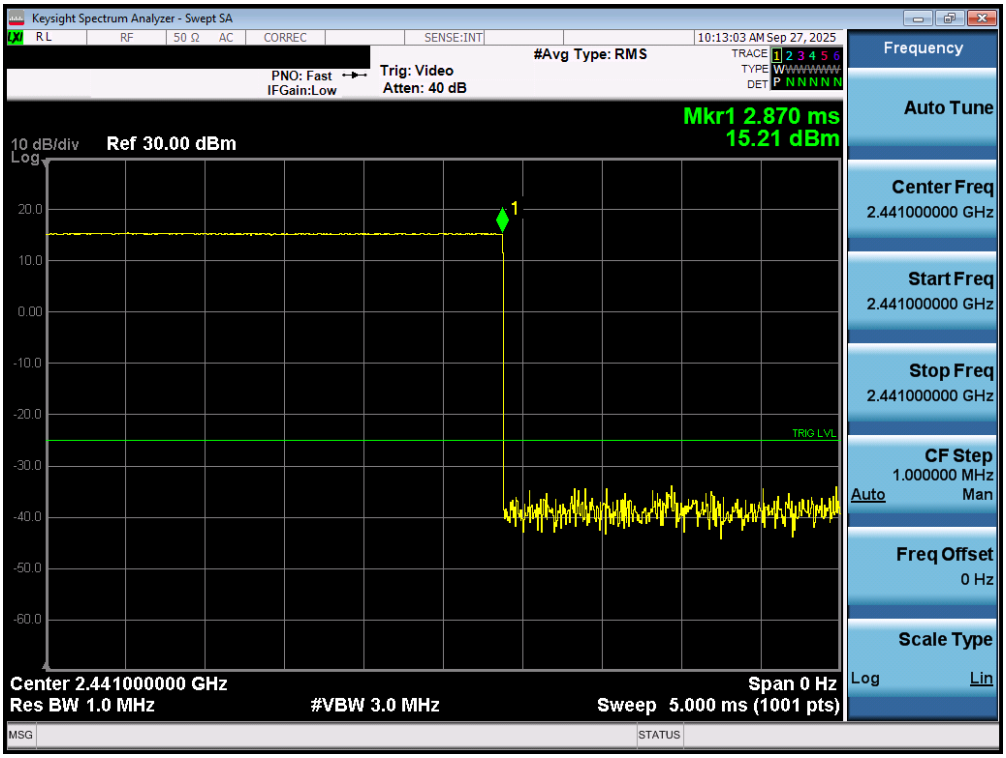
Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-5. Test Instrument & Measurement Setup

Test Notes

None



Plot 7-129. Time of Occupancy Plot (Bluetooth) – Ant 1

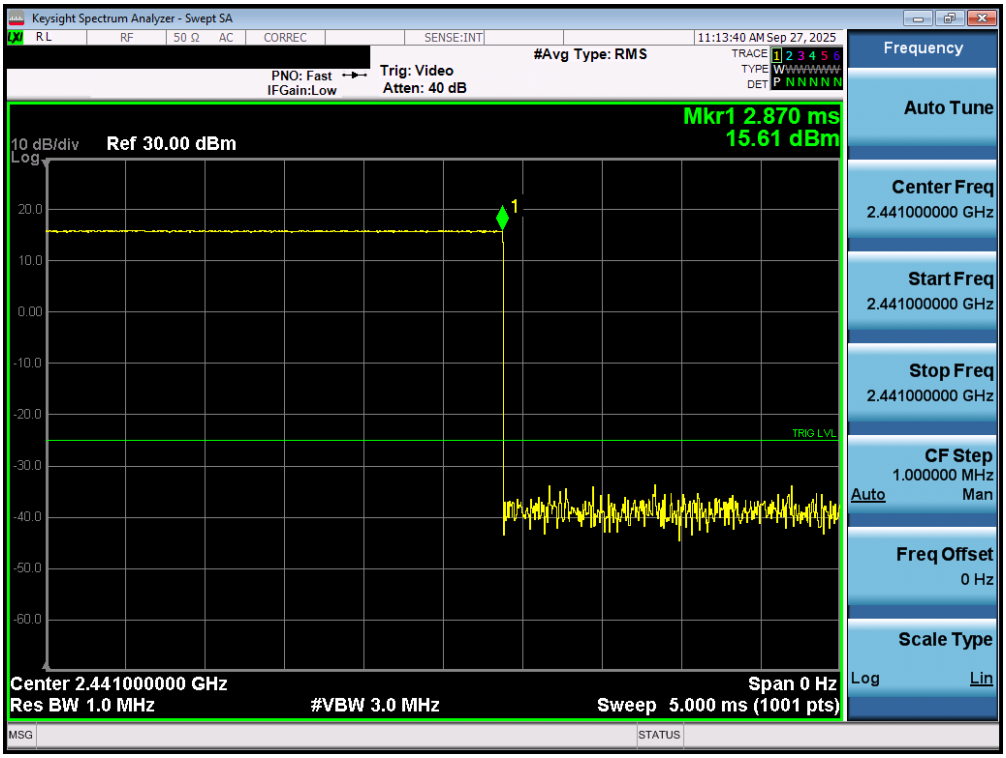
Bluetooth Time of Occupancy Calculation

Typically, Bluetooth 1x/EDR mode has a channel hopping rate of 1600 hops/s. Since 1x/EDR modes use 5 transmit and 1 receive slot, for a total of 6 slots, the Bluetooth transmitter is actually hopping at a rate of 1600 / 6 = 266.67 hops/s/slot

- 400ms x 79 hopping channels = 31.6 sec (Time of Occupancy Limit)
- Worst case BT has 266.67 hops/second (for 1x/EDR modes with DH5 operation)
- 266.67 hops/second / 79 channels = 3.38 hops/second (# of hops/second on one channel)
- 3.38 hops/second/channel x 31.6 seconds = 106.67 hops (# hops over a 31.6 second period)
- 106.67 hops x 2.87 ms/channel = 306.14 ms (worst case dwell time for one channel in 1x/EDR modes)

With AFH, the number of channels is reduced to a minimum of 20 channels and the channel hopping rate is reduced by 50% to 800 hops/s. AFH mode also uses 6 total slots so the Bluetooth transmitter hops at a rate of 800 / 6 = 133.3 hops/s/slot

- 400ms x 20 hopping channels = 8 sec (Time of Occupancy Limit)
- Worst case BT has 133.3 hops/second/slot (for AFH mode with DH5 operation)
- 133.3 hops/s / 20 channels = 6.67 hops/second (# of hops/second on one channel)
- 6.67 hops/s / channel x 8 seconds = 53.34 hops (# hops over a 8 second period)
- 53.34 hops x 2.87 ms/channel = 153.03 ms (worst case dwell time for one channel in AFH mode)



Plot 7-130. Time of Occupancy Plot (Bluetooth) – Ant 2

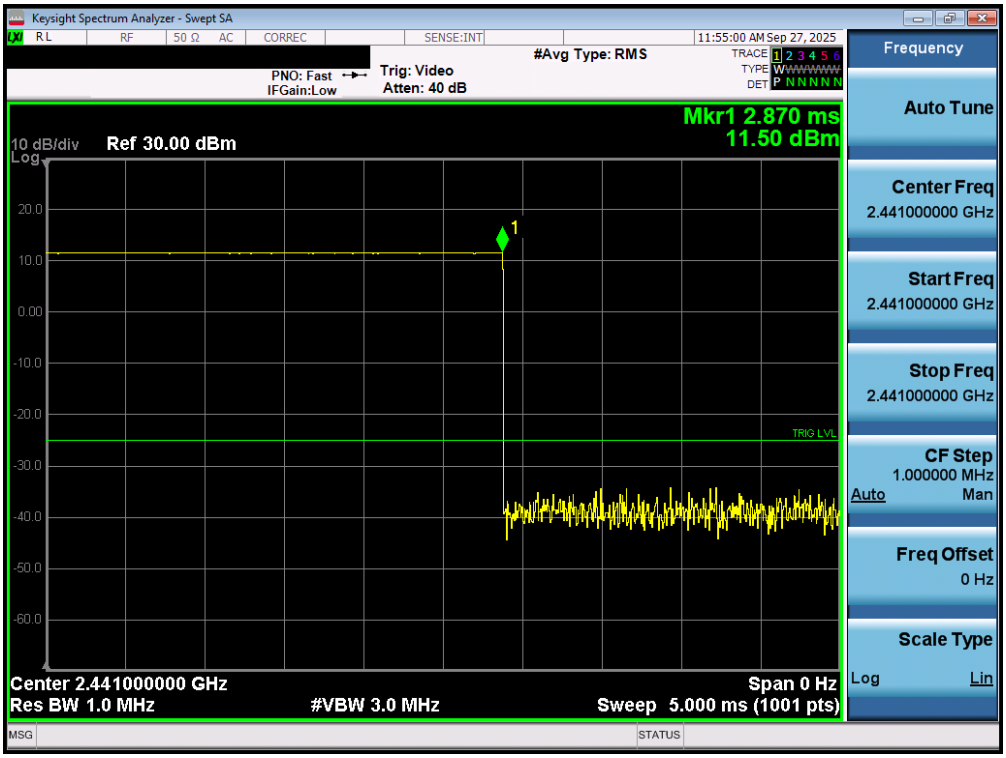
Bluetooth Time of Occupancy Calculation

Typically, Bluetooth 1x/EDR mode has a channel hopping rate of 1600 hops/s. Since 1x/EDR modes use 5 transmit and 1 receive slot, for a total of 6 slots, the Bluetooth transmitter is actually hopping at a rate of 1600 / 6 = 266.67 hops/s/slot

- 400ms x 79 hopping channels = 31.6 sec (Time of Occupancy Limit)
- Worst case BT has 266.67 hops/second (for 1x/EDR modes with DH5 operation)
- 266.67 hops/second / 79 channels = 3.38 hops/second (# of hops/second on one channel)
- 3.38 hops/second/channel x 31.6 seconds = 106.67 hops (# hops over a 31.6 second period)
- 106.67 hops x 2.87 ms/channel = 306.14 ms (worst case dwell time for one channel in 1x/EDR modes)

With AFH, the number of channels is reduced to a minimum of 20 channels and the channel hopping rate is reduced by 50% to 800 hops/s. AFH mode also uses 6 total slots so the Bluetooth transmitter hops at a rate of 800 / 6 = 133.3 hops/s/slot

- 400ms x 20 hopping channels = 8 sec (Time of Occupancy Limit)
- Worst case BT has 133.3 hops/second/slot (for AFH mode with DH5 operation)
- 133.3 hops/s / 20 channels = 6.67 hops/second (# of hops/second on one channel)
- 6.67 hops/s / channel x 8 seconds = 53.34 hops (# hops over a 8 second period)
- 53.34 hops x 2.87 ms/channel = 153.03 ms (worst case dwell time for one channel in AFH mode)



Plot 7-131. Time of Occupancy Plot (Bluetooth) – Dual Ant 1

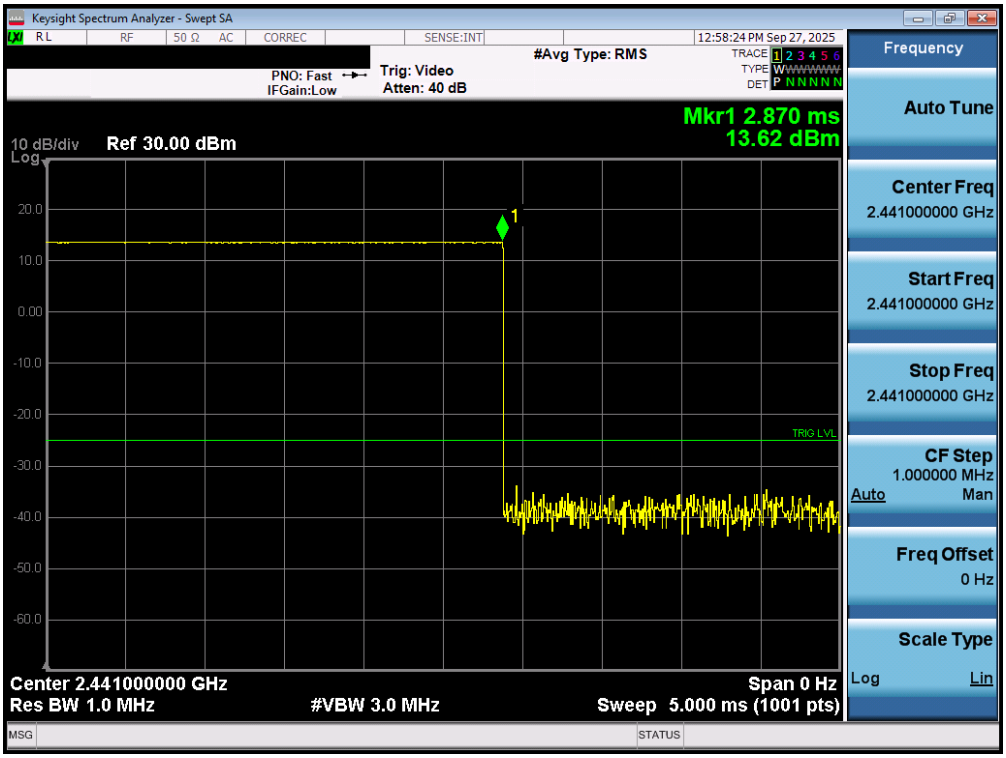
Bluetooth Time of Occupancy Calculation

Typically, Bluetooth 1x/EDR mode has a channel hopping rate of 1600 hops/s. Since 1x/EDR modes use 5 transmit and 1 receive slot, for a total of 6 slots, the Bluetooth transmitter is actually hopping at a rate of 1600 / 6 = 266.67 hops/s/slot

- 400ms x 79 hopping channels = 31.6 sec (Time of Occupancy Limit)
- Worst case BT has 266.67 hops/second (for 1x/EDR modes with DH5 operation)
- 266.67 hops/second / 79 channels = 3.38 hops/second (# of hops/second on one channel)
- 3.38 hops/second/channel x 31.6 seconds = 106.67 hops (# hops over a 31.6 second period)
- 106.67 hops x 2.87 ms/channel = 306.14 ms (worst case dwell time for one channel in 1x/EDR modes)

With AFH, the number of channels is reduced to a minimum of 20 channels and the channel hopping rate is reduced by 50% to 800 hops/s. AFH mode also uses 6 total slots so the Bluetooth transmitter hops at a rate of 800 / 6 = 133.3 hops/s/slot

- 400ms x 20 hopping channels = 8 sec (Time of Occupancy Limit)
- Worst case BT has 133.3 hops/second/slot (for AFH mode with DH5 operation)
- 133.3 hops/s / 20 channels = 6.67 hops/second (# of hops/second on one channel)
- 6.67 hops/s / channel x 8 seconds = 53.34 hops (# hops over a 8 second period)
- 53.34 hops x 2.87 ms/channel = 153.03 ms (worst case dwell time for one channel in AFH mode)



Plot 7-132. Time of Occupancy Plot (Bluetooth) – Dual Ant 2

Bluetooth Time of Occupancy Calculation

Typically, Bluetooth 1x/EDR mode has a channel hopping rate of 1600 hops/s. Since 1x/EDR modes use 5 transmit and 1 receive slot, for a total of 6 slots, the Bluetooth transmitter is actually hopping at a rate of 1600 / 6 = 266.67 hops/s/slot

- 400ms x 79 hopping channels = 31.6 sec (Time of Occupancy Limit)
- Worst case BT has 266.67 hops/second (for 1x/EDR modes with DH5 operation)
- 266.67 hops/second / 79 channels = 3.38 hops/second (# of hops/second on one channel)
- 3.38 hops/second/channel x 31.6 seconds = 106.67 hops (# hops over a 31.6 second period)
- 106.67 hops x 2.87 ms/channel = 306.14 ms (worst case dwell time for one channel in 1x/EDR modes)

With AFH, the number of channels is reduced to a minimum of 20 channels and the channel hopping rate is reduced by 50% to 800 hops/s. AFH mode also uses 6 total slots so the Bluetooth transmitter hops at a rate of 800 / 6 = 133.3 hops/s/slot

- 400ms x 20 hopping channels = 8 sec (Time of Occupancy Limit)
- Worst case BT has 133.3 hops/second/slot (for AFH mode with DH5 operation)
- 133.3 hops/s / 20 channels = 6.67 hops/second (# of hops/second on one channel)
- 6.67 hops/s / channel x 8 seconds = 53.34 hops (# hops over a 8 second period)
- 53.34 hops x 2.875 ms/channel = 153.03 ms (worst case dwell time for one channel in AFH mode)

7.7 Number of Hopping Channels

§15.247 (a.1.iii); RSS-247 [5.1(4)]

Test Overview and Limit

Measurement is made while EUT is operating in hopping mode. ***This frequency hopping system must employ a minimum of 15 hopping channels.***

Test Procedure Used

ANSI C63.10:2020 – Section 7.8.3

Test Settings

1. Span = frequency of band of operation (divided into two plots)
2. RBW < 30% of channel spacing or 20dB bandwidth, whichever is smaller
3. VBW ≥ RBW
4. Sweep = auto
5. Detector = peak
6. Trace mode = max hold
7. Trace was allowed to stabilize

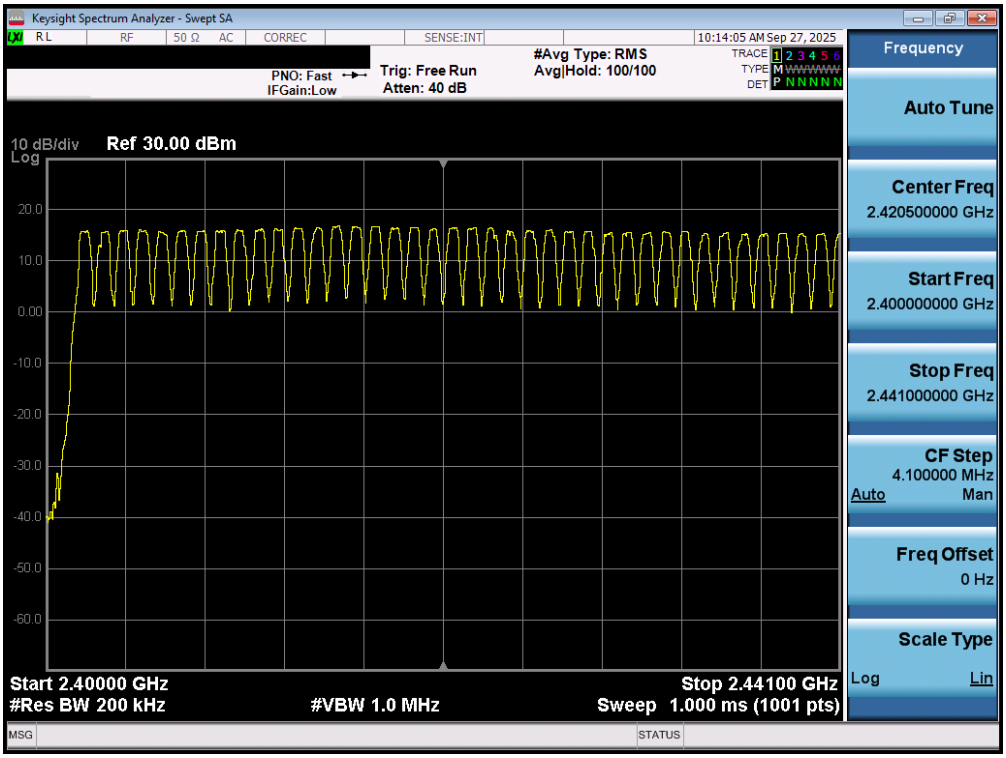
Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

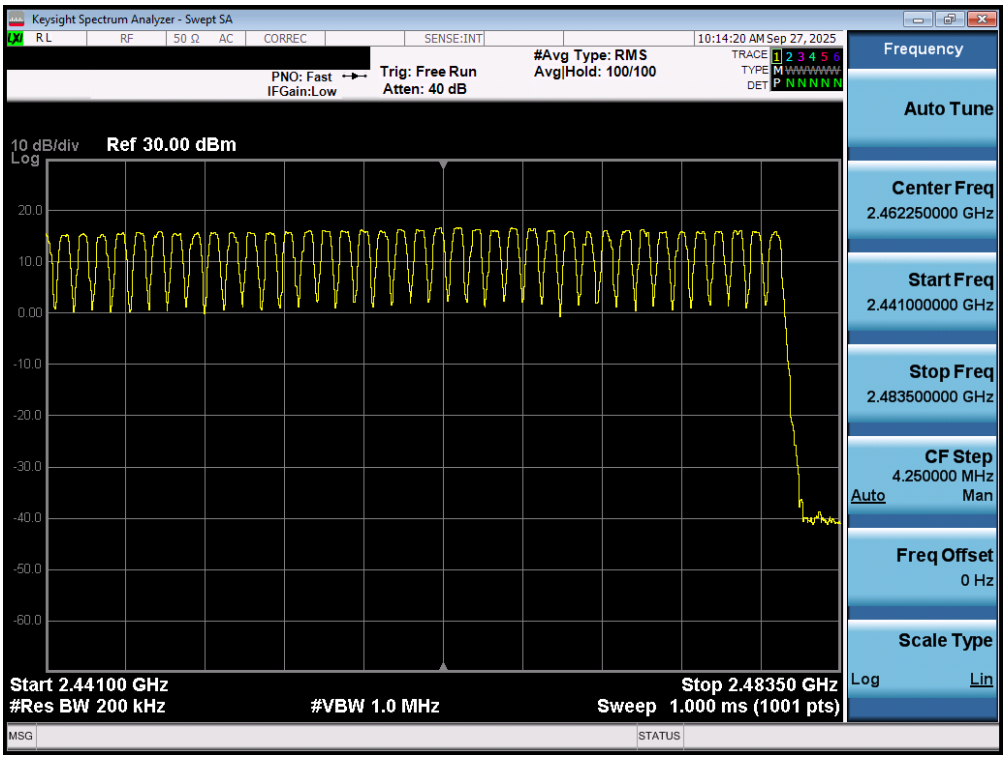
Figure 7-6. Test Instrument & Measurement Setup

Test Notes

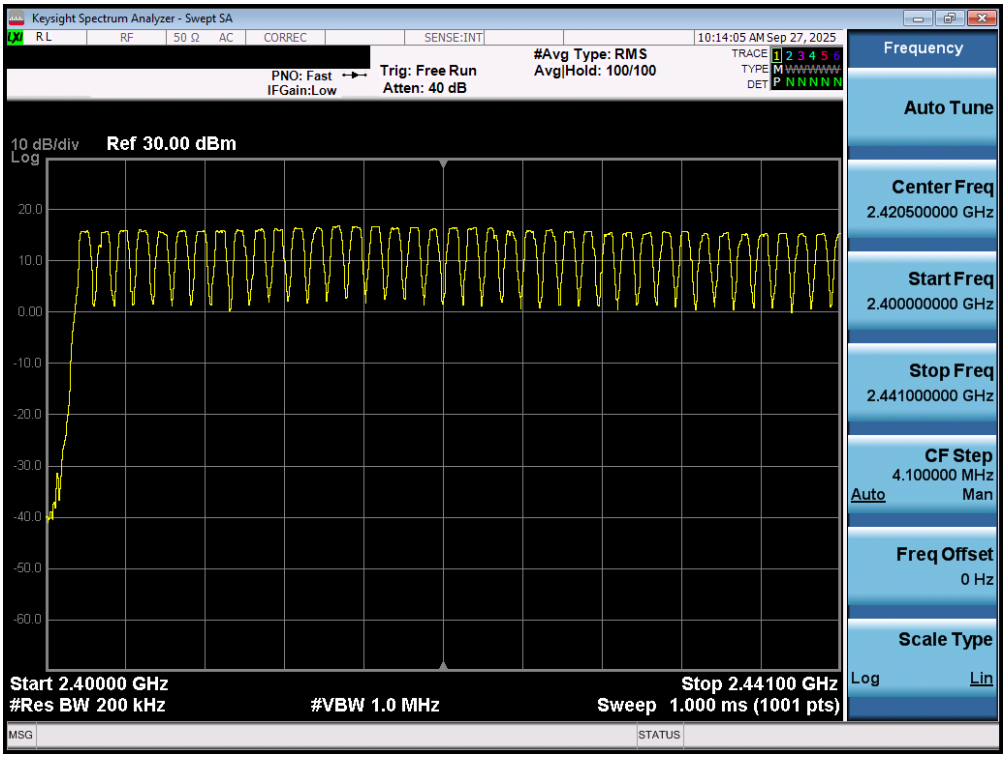
The frequency spectrum was broken up into two sub-ranges to clearly show all the hopping frequencies. In AFH mode, this device operates using 20 channels so the requirement for minimum number of hopping channels is satisfied.



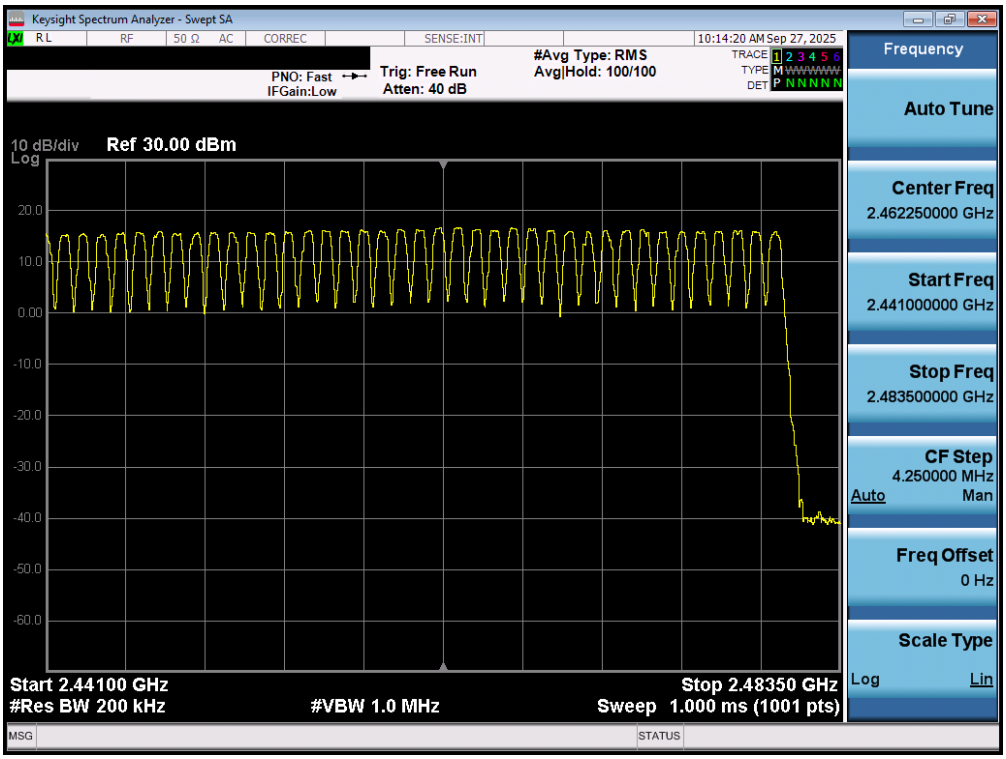
Plot 7-133. Low End Spectrum Channel Hopping Plot (Bluetooth) – Ant 1



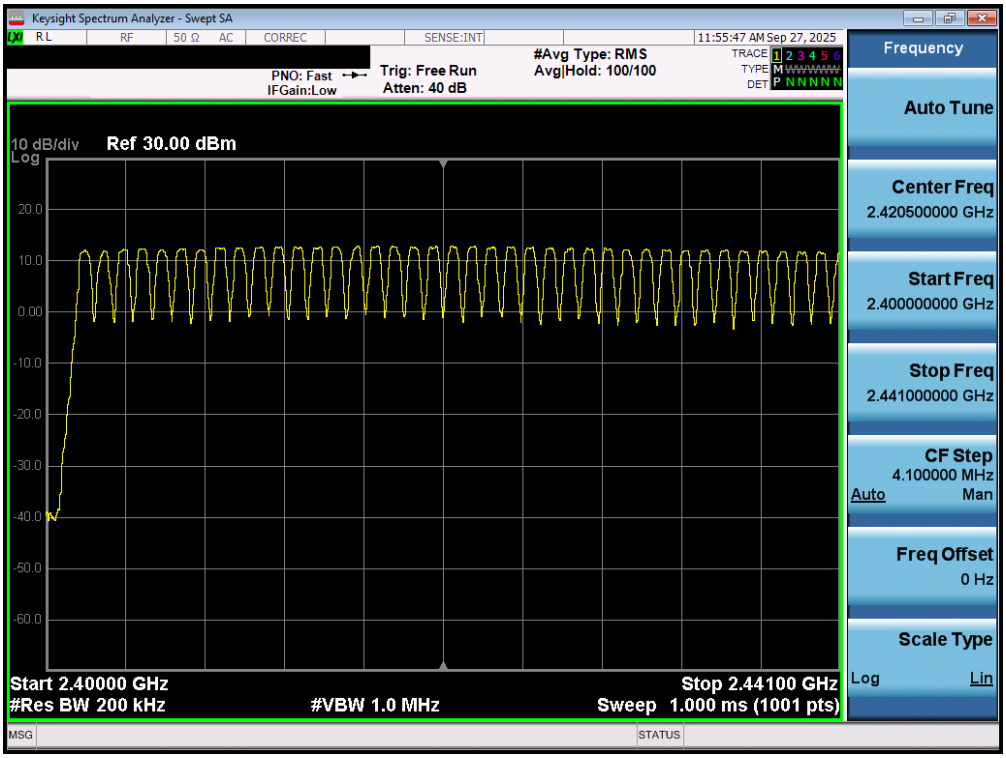
Plot 7-134. High End Spectrum Channel Hopping Plot (Bluetooth) – Ant 1



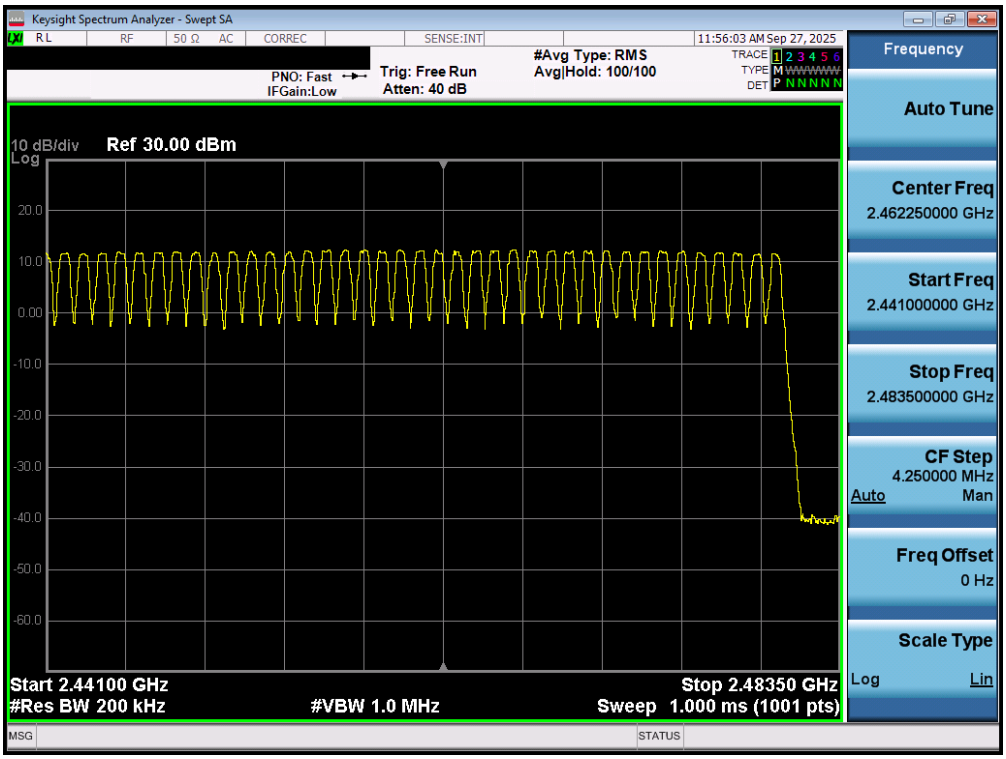
Plot 7-135. Low End Spectrum Channel Hopping Plot (Bluetooth) – Ant 2



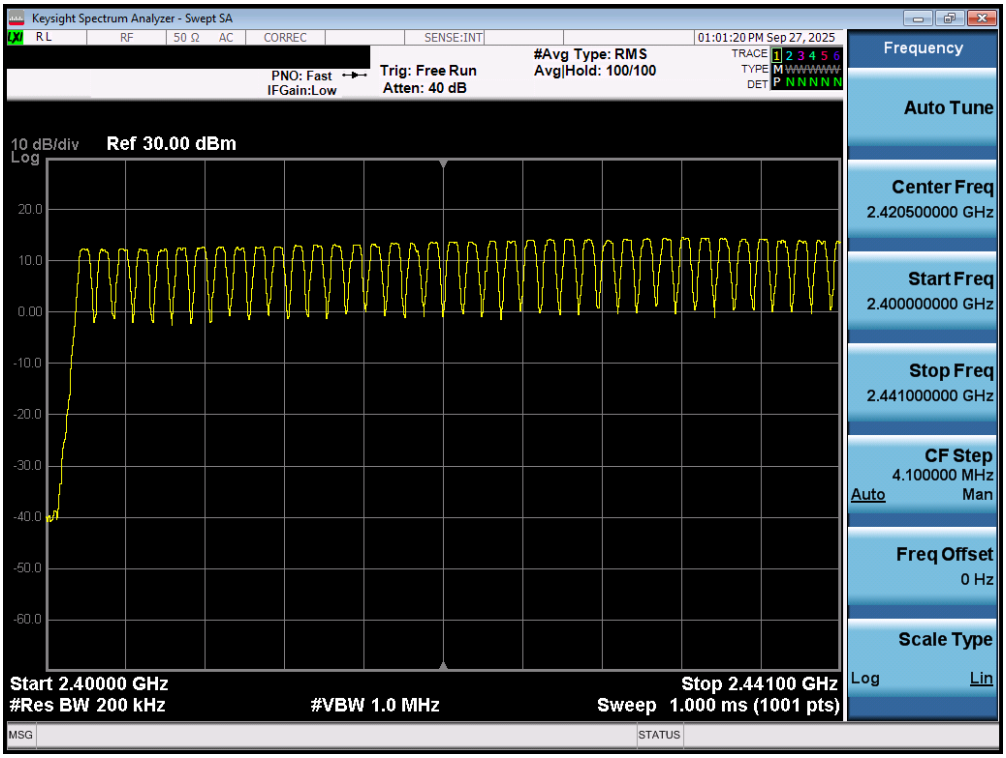
Plot 7-136. High End Spectrum Channel Hopping Plot (Bluetooth) – Ant 2



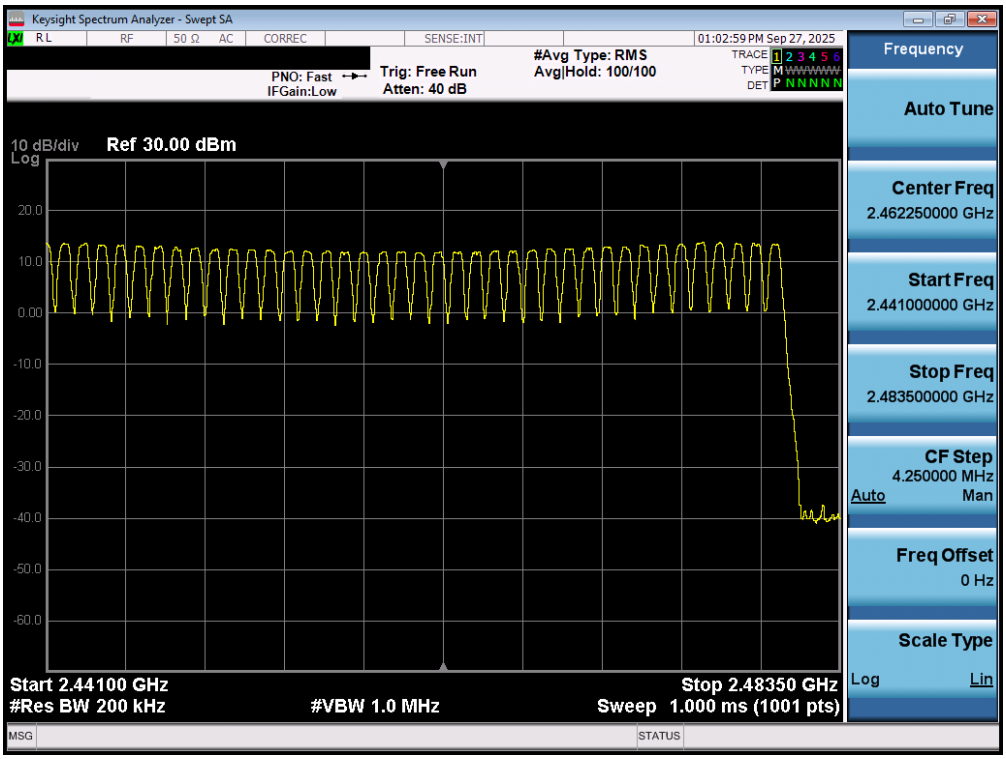
Plot 7-137. Low End Spectrum Channel Hopping Plot (Bluetooth) – Dual Ant 1



Plot 7-138. High End Spectrum Channel Hopping Plot (Bluetooth) – Dual Ant 1



Plot 7-139. Low End Spectrum Channel Hopping Plot (Bluetooth) – Dual Ant 2



Plot 7-140. High End Spectrum Channel Hopping Plot (Bluetooth) – Dual Ant 2

7.8 Conducted Spurious Emissions

§15.247 (d); RSS-247 [5.5]

Test Overview and Limit

Conducted out-of-band spurious emissions were investigated from 30MHz up to 25GHz to include the 10th harmonic of the fundamental transmit frequency. ***The maximum permissible out-of-band emission level is 20 dBc.***

Test Procedure Used

ANSI C63.10:2020 – Section 7.8.7

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 25GHz (separated into two plots per channel)
2. RBW = 1MHz* (See note below)
3. VBW = 3MHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

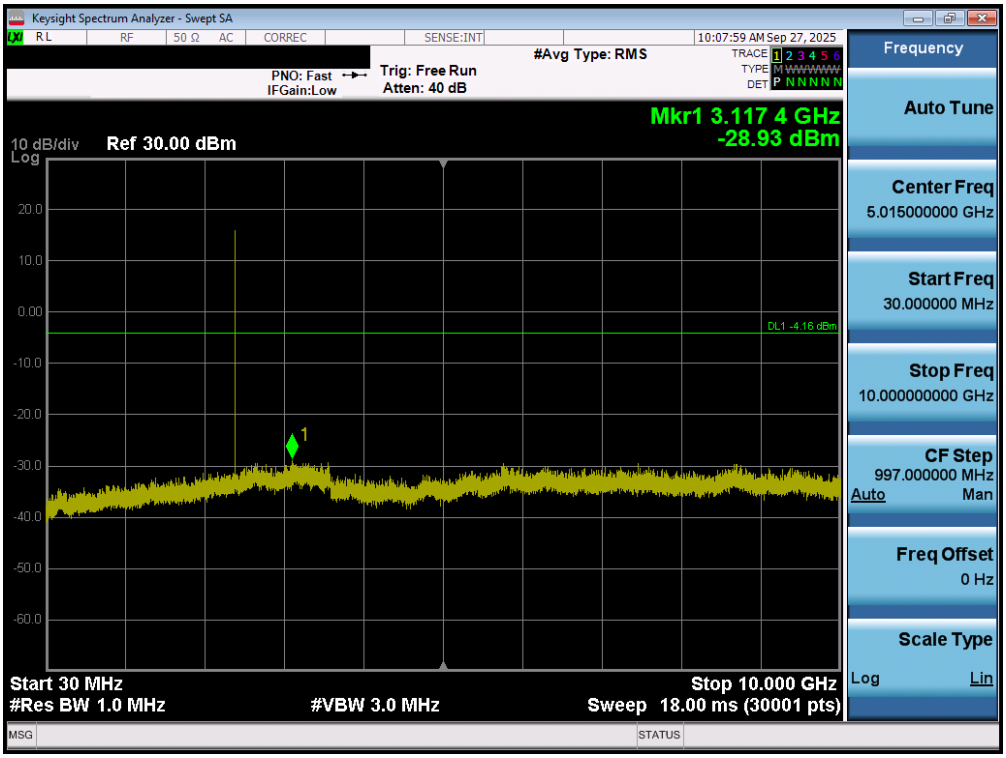
Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

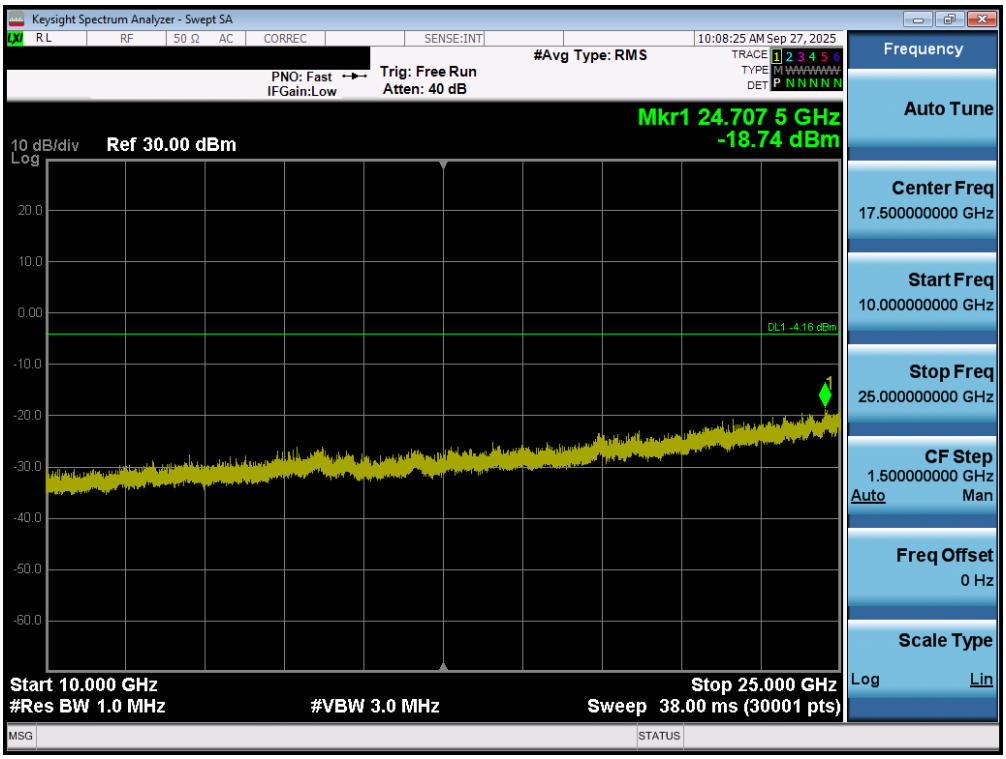
Figure 7-7. Test Instrument & Measurement Setup

Test Notes

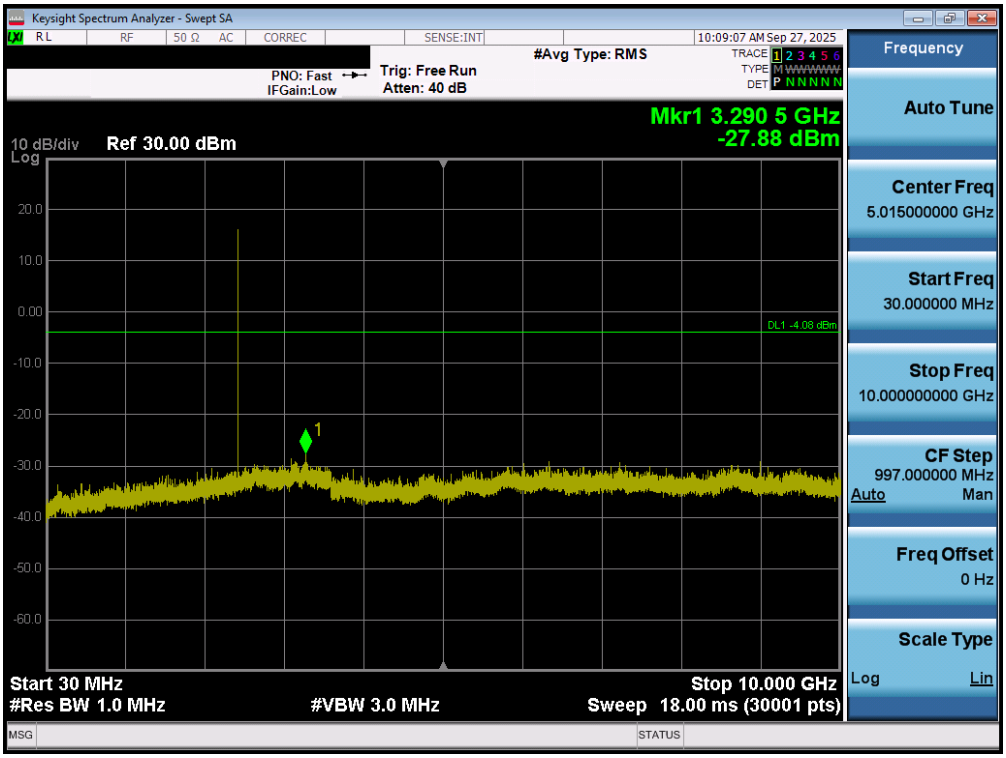
Out-of-band conducted spurious emissions were investigated for all data rates and the worst-case emissions were found with the EUT transmitting at 1Mbps. The display line shown in the following plots is the limit at 20dB below the fundamental emission level measured in a 100kHz bandwidth. However, the traces in the following plots are measured with a 1MHz RBW to reduce test time, so the display line may not necessarily appear to be 20dB below the level of the fundamental in a 1MHz bandwidth.



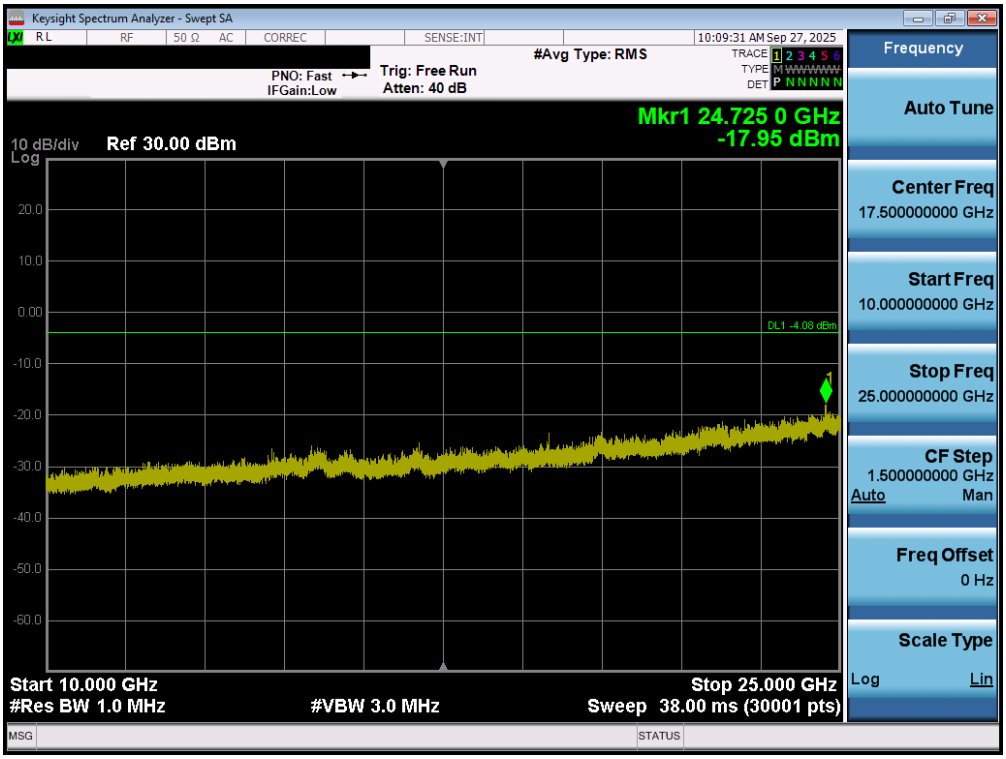
Plot 7-141. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 0) – Ant 1



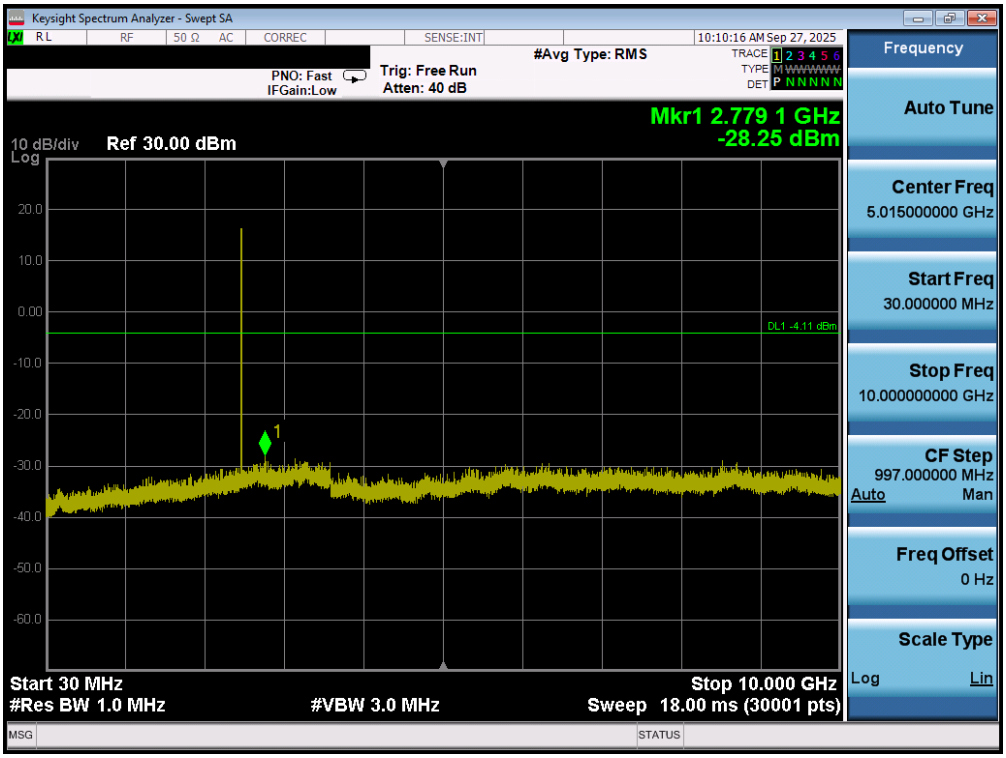
Plot 7-142. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 0) – Ant 1



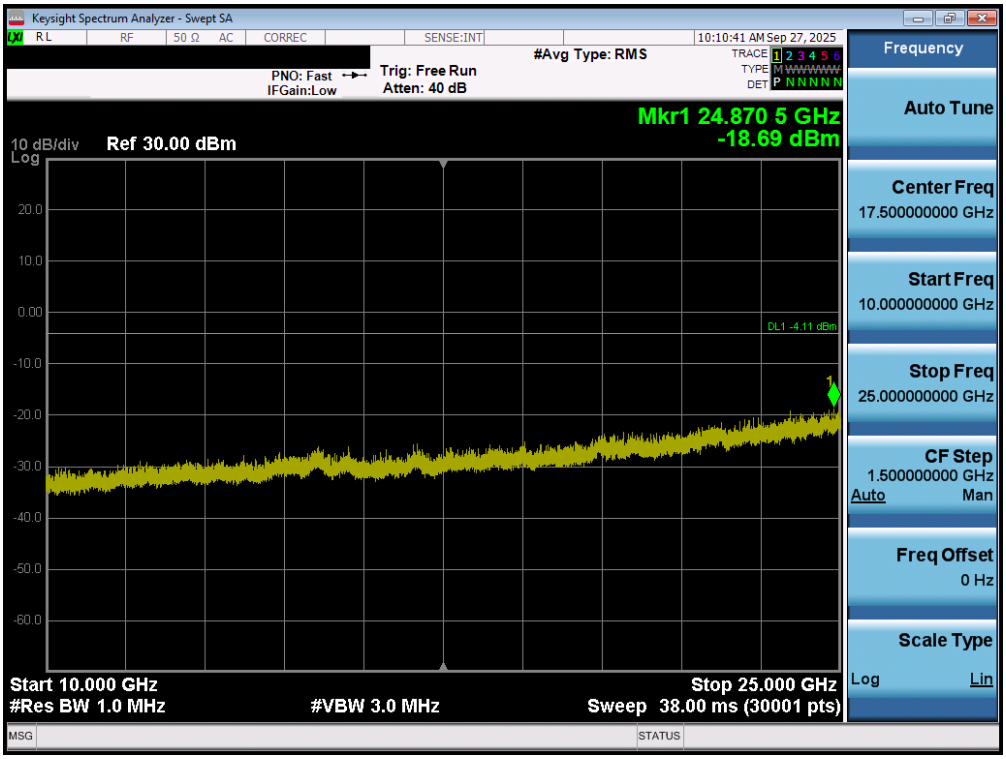
Plot 7-143. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 39) – Ant 1



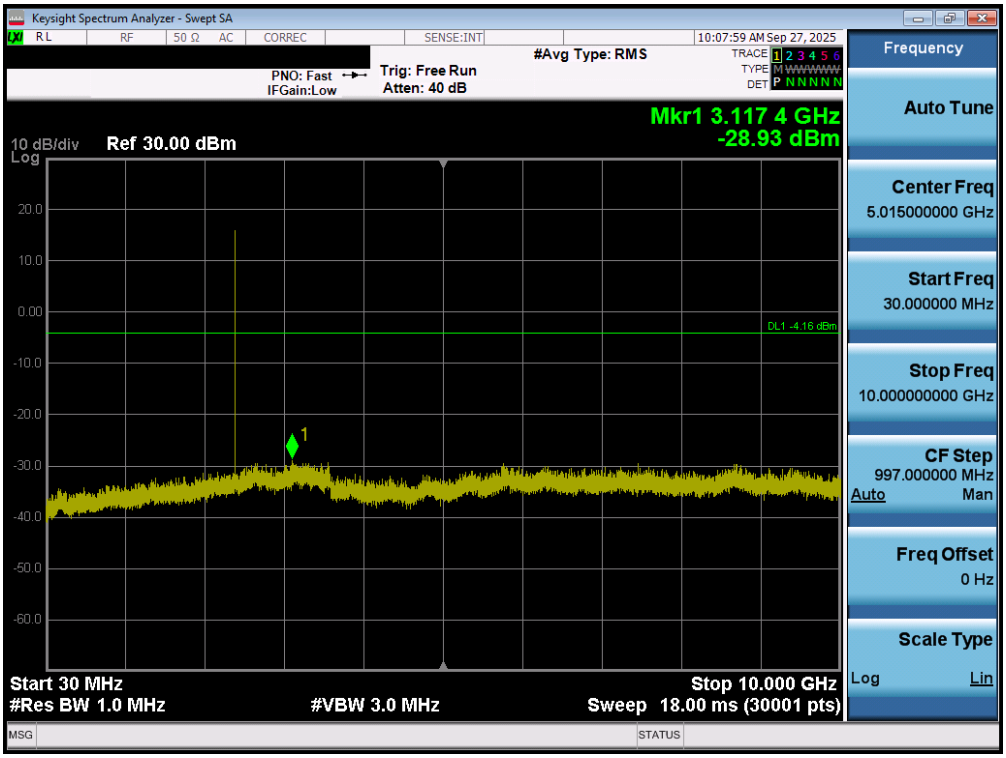
Plot 7-144. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 39) – Ant 1



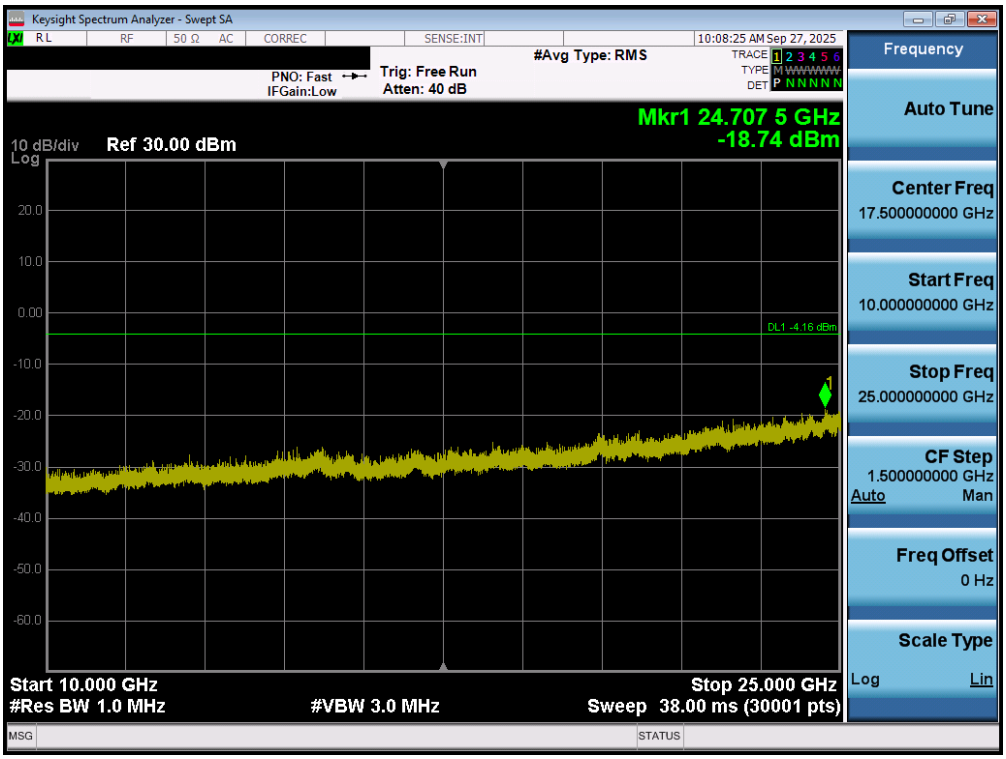
Plot 7-145. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 78) – Ant 1



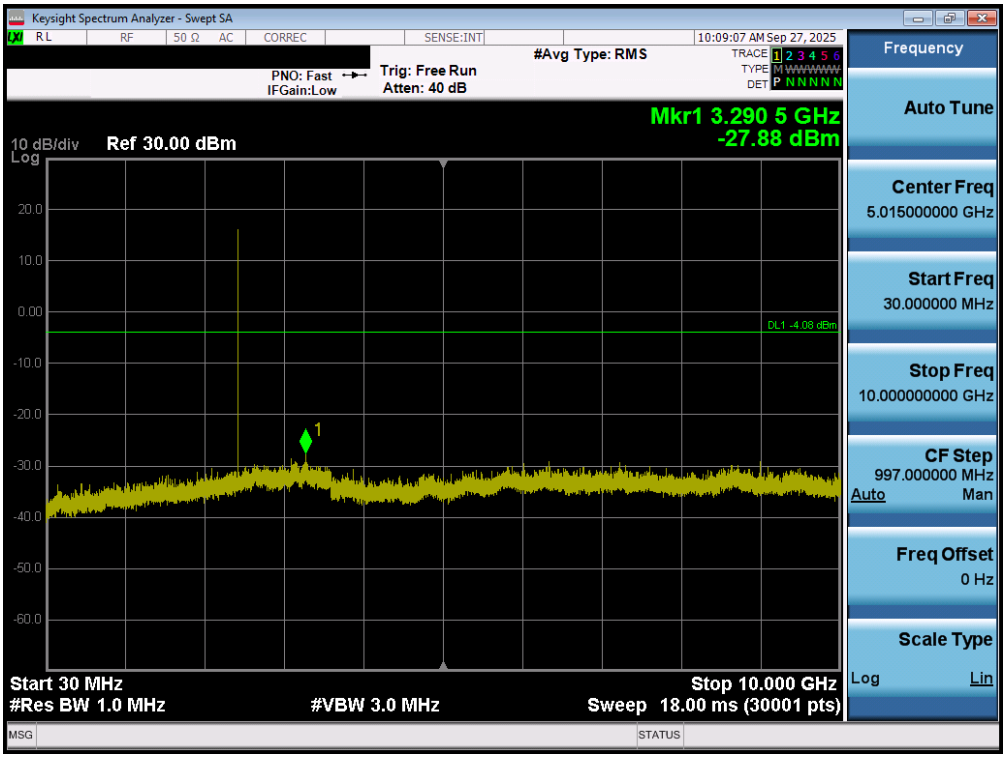
Plot 7-146. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 78) – Ant 1



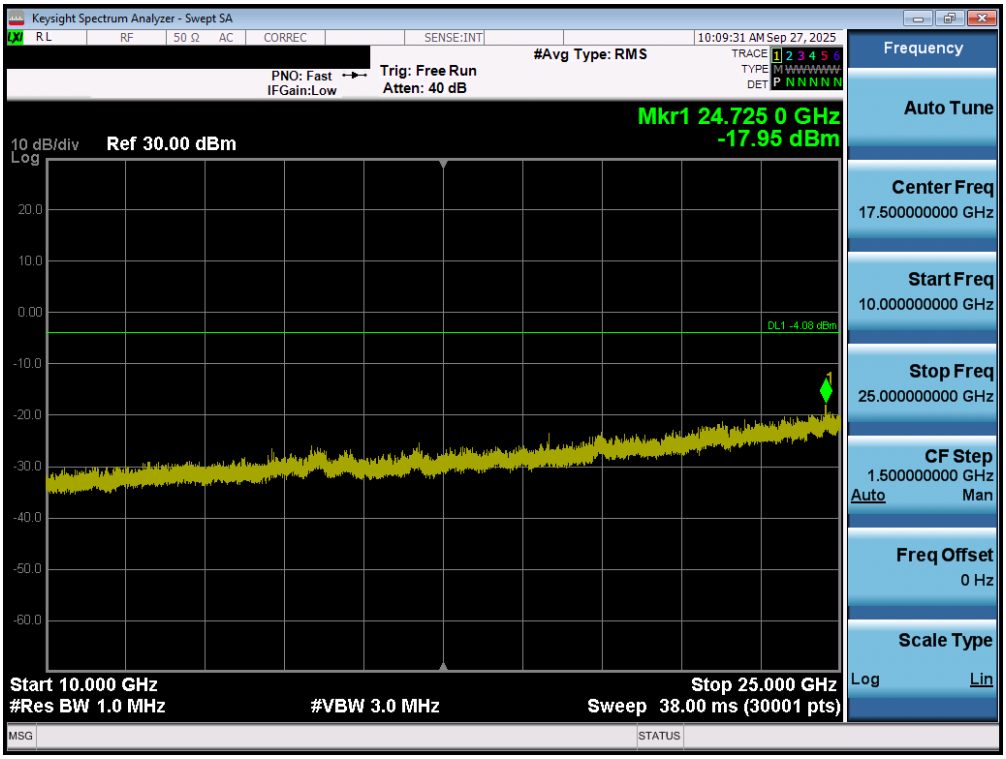
Plot 7-147. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 0) – Ant 2



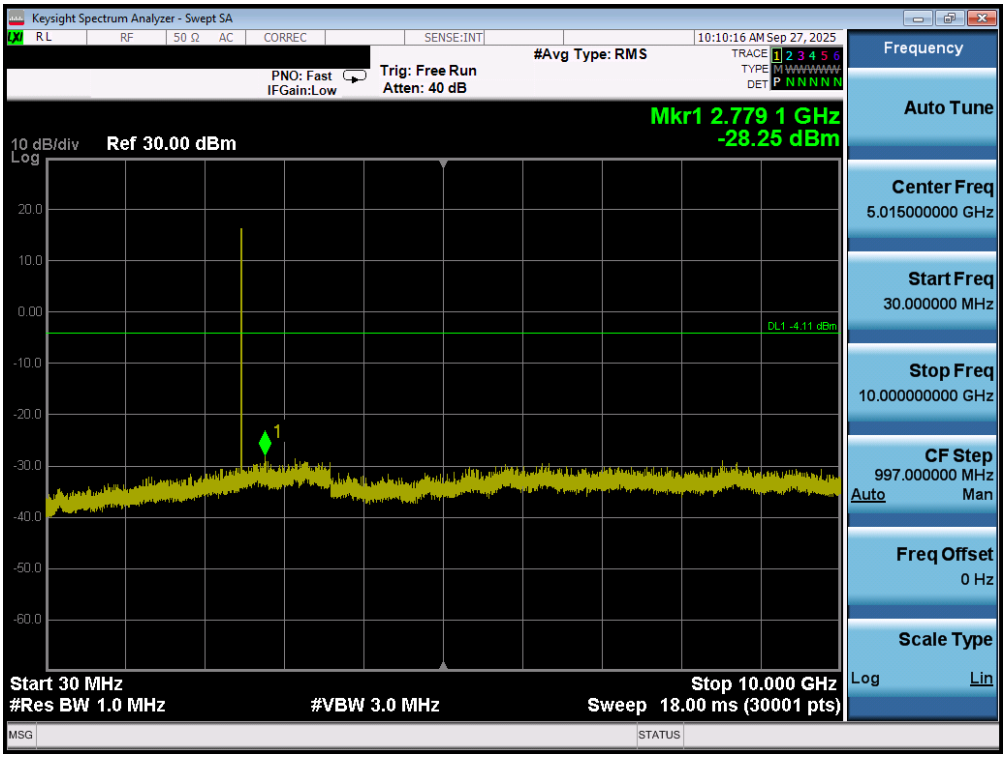
Plot 7-148. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 0) – Ant 2



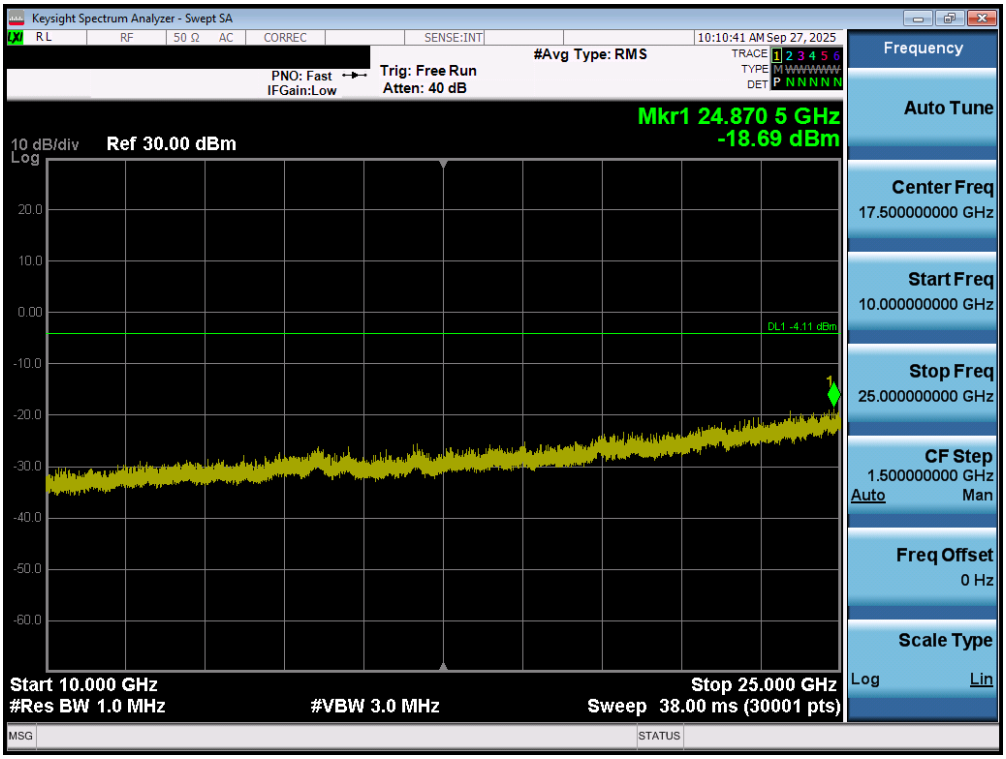
Plot 7-149. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 39) – Ant 2



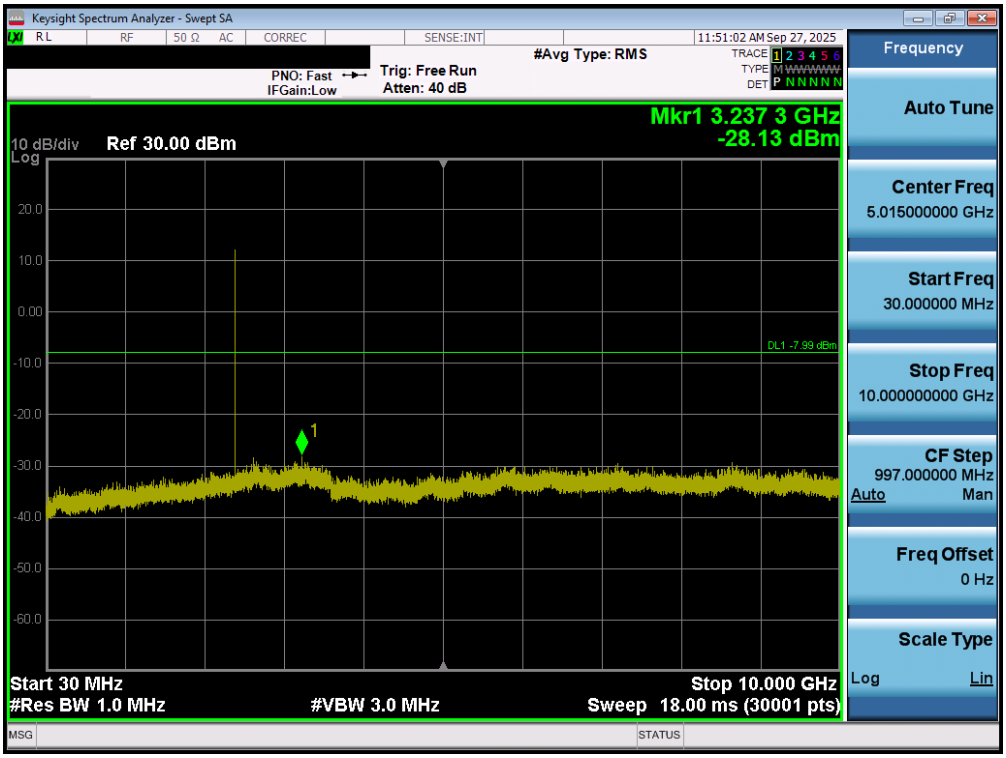
Plot 7-150. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 39) – Ant 2



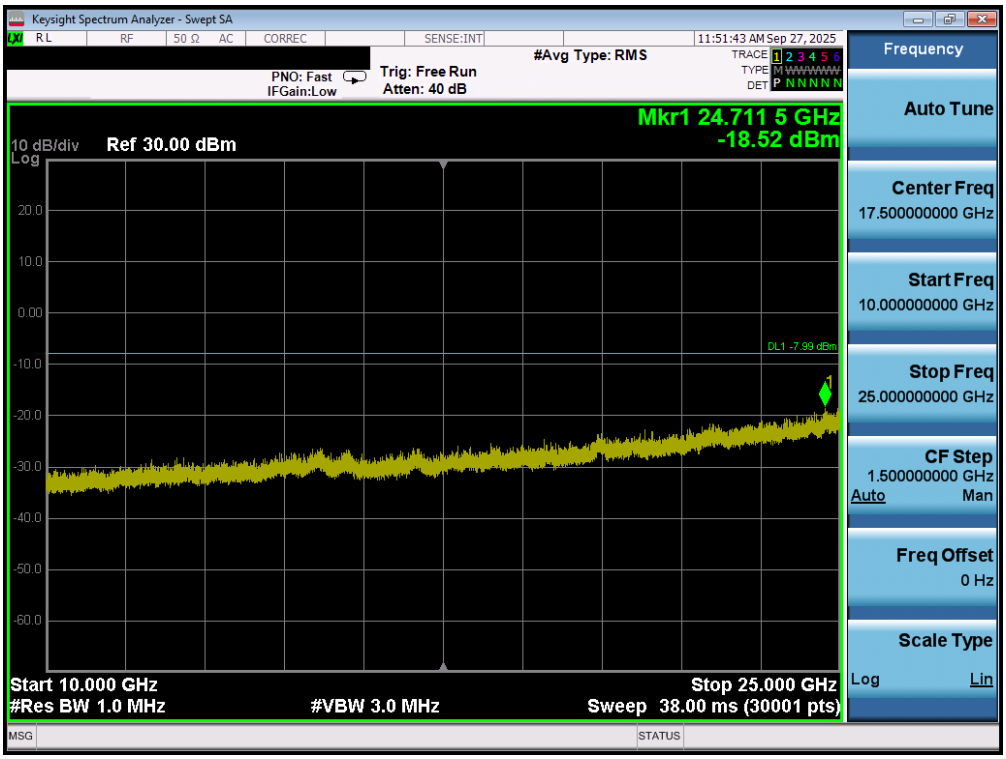
Plot 7-151. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 78) – Ant 2



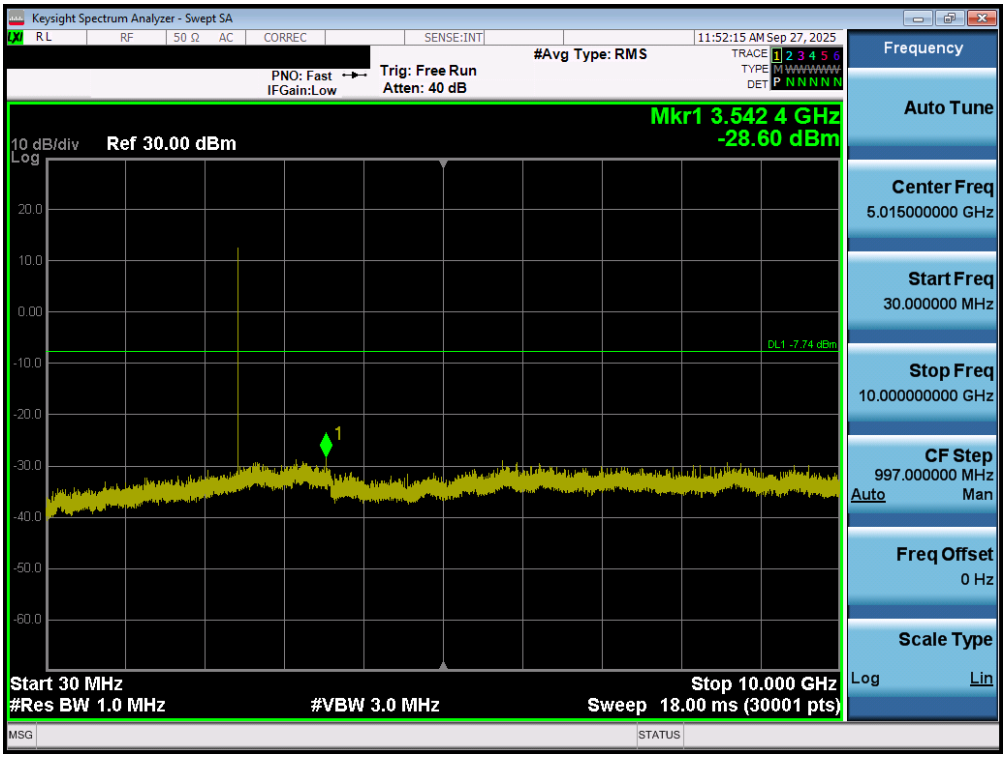
Plot 7-152. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 78) – Ant 2



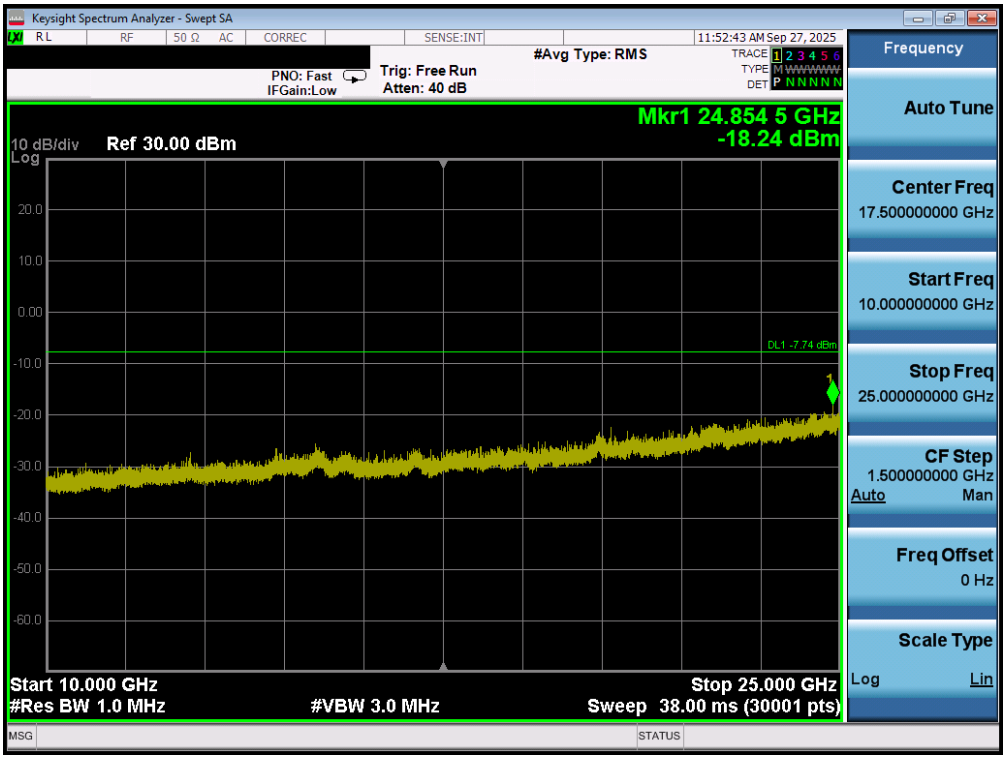
Plot 7-153. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 0) – Dual Ant 1



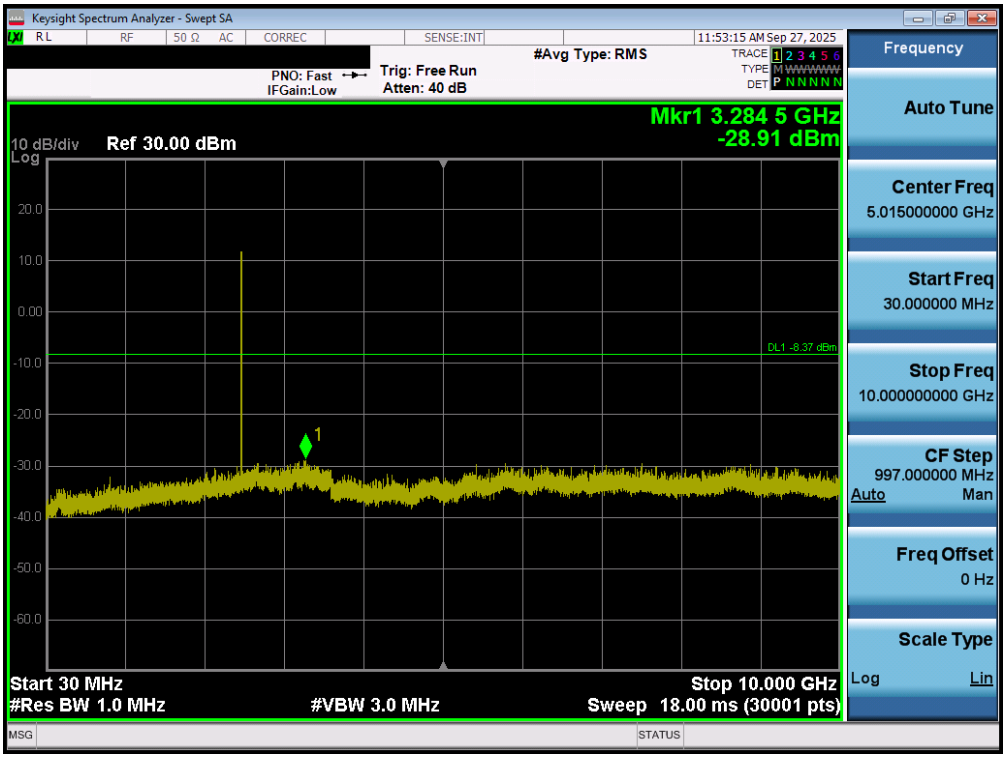
Plot 7-154. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 0) – Dual Ant 1



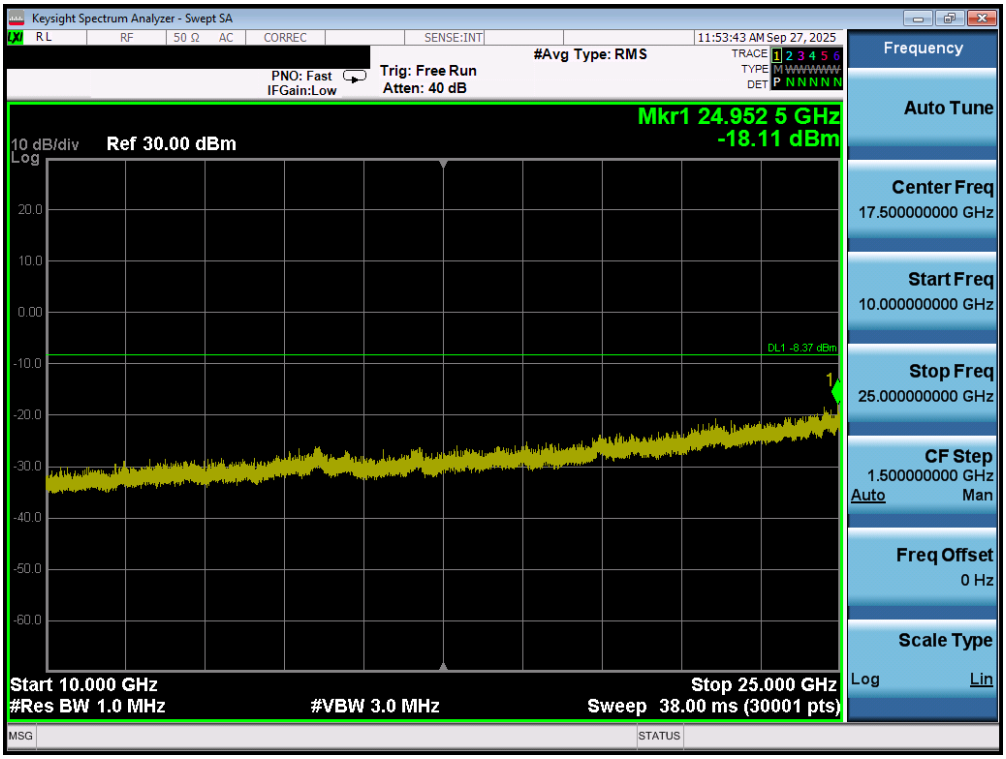
Plot 7-155. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 39) – Dual Ant 1



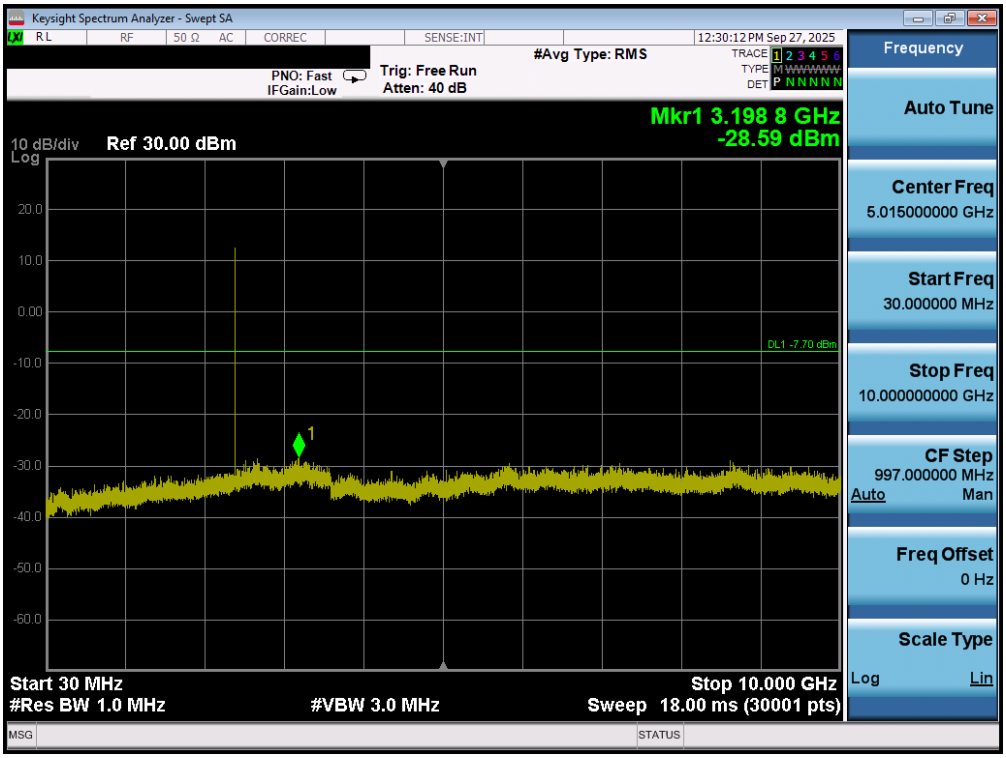
Plot 7-156. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 39) – Dual Ant 1



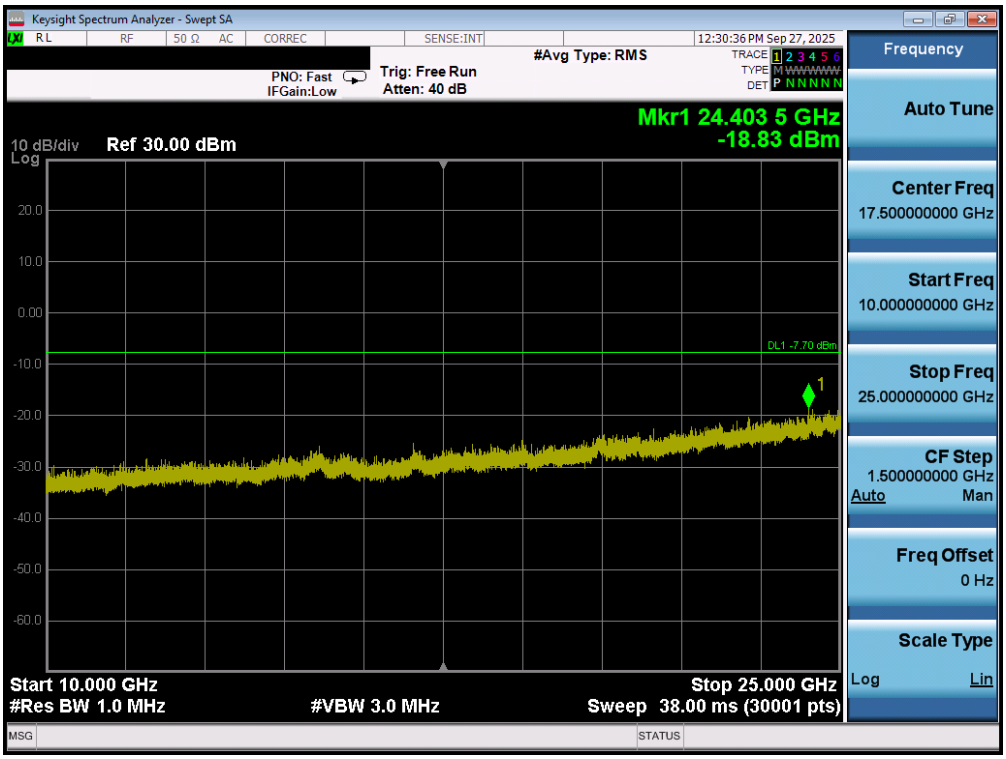
Plot 7-157. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 78) – Dual Ant 1



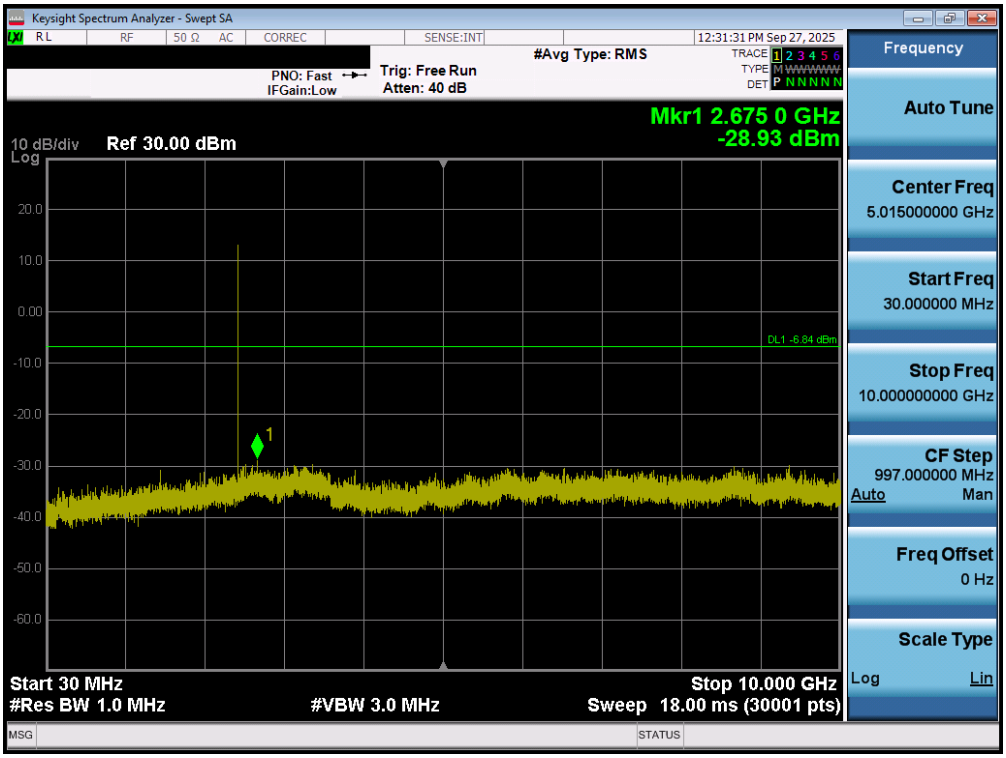
Plot 7-158. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 78) – Dual Ant 1



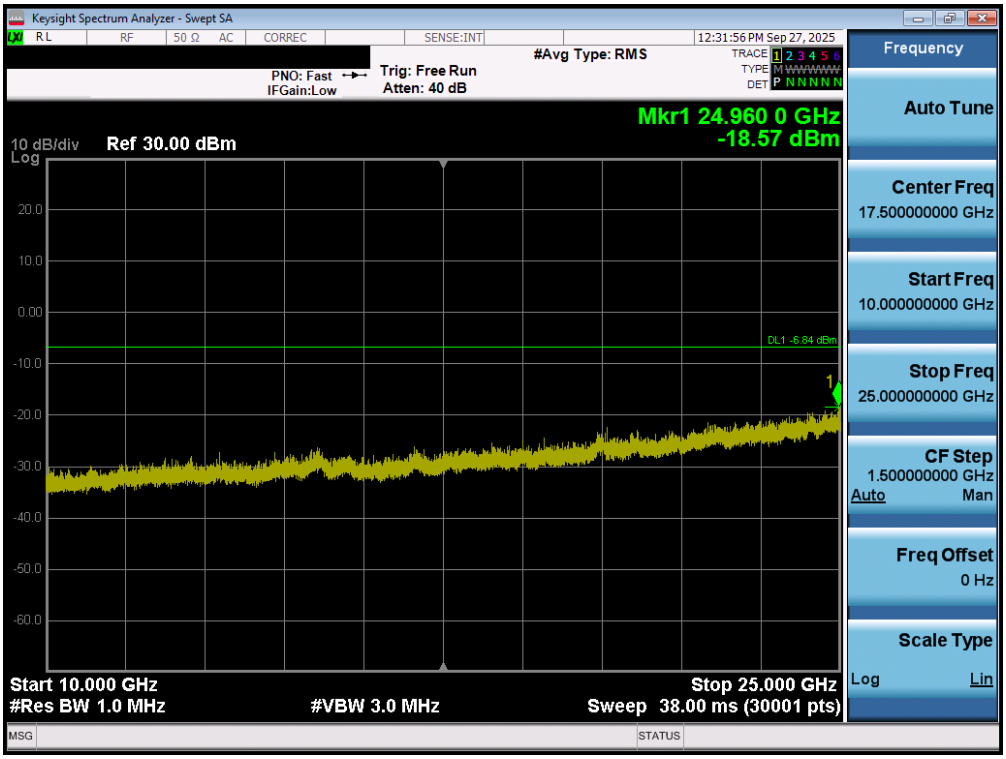
Plot 7-159. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 0) – Dual Ant 2



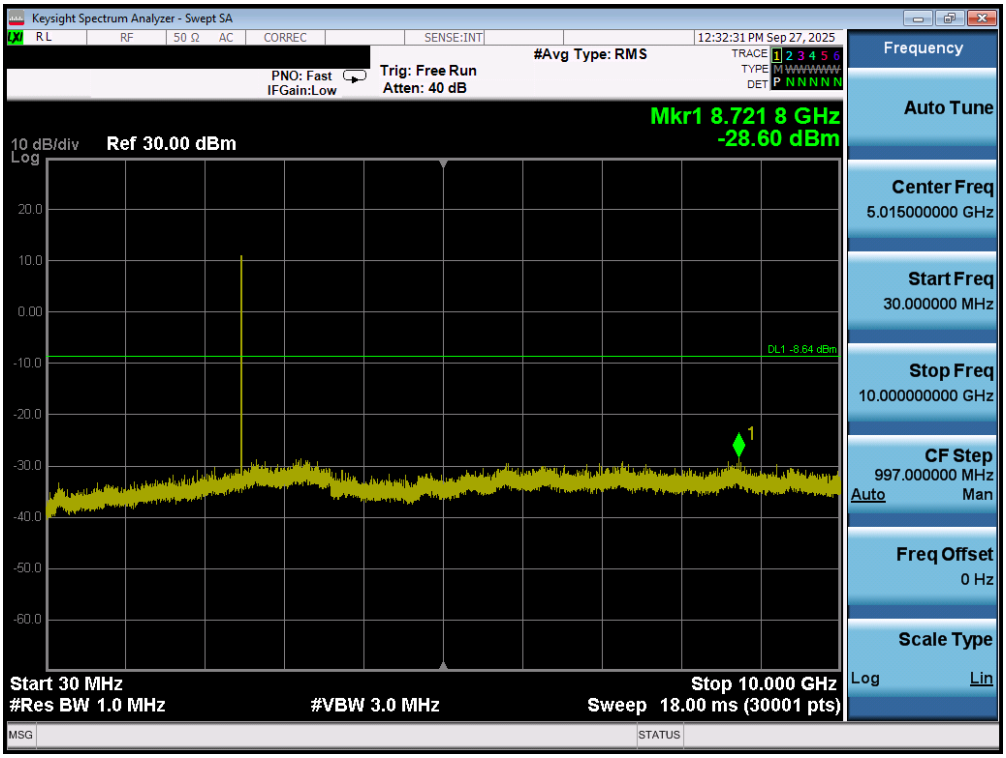
Plot 7-160. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 0) – Dual Ant 2



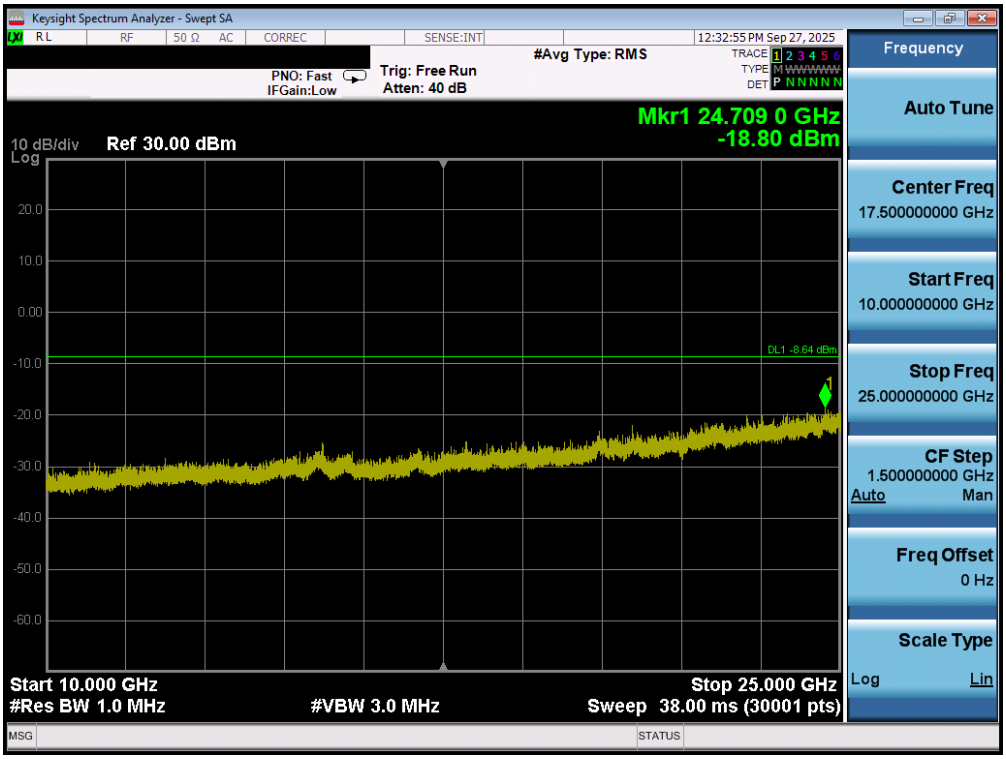
Plot 7-161. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 39) – Dual Ant 2



Plot 7-162. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 39) – Dual Ant 2



Plot 7-163. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 78) – Dual Ant 2



Plot 7-164. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 78) – Dual Ant 2

7.9 Radiated Spurious Emission Measurements – Above 1GHz

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at maximum power and at the appropriate frequencies. Only the radiated emissions of the configuration that produced the worst-case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown below per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
Above 960.0 MHz	500	3

Table 7-13. Radiated Limits

Test Procedure Used

ANSI C63.10:2020 – Section 6.6.4.3

Test Settings

Average Field Strength Measurements per Section 4.1.5.2.3 of ANSI C63.10:2020

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 1kHz ≥ 1/τ Hz, where τ = pulse width in seconds
4. Averaging type was set to RMS to ensure that video filtering was applied in the power domain
5. Detector = peak
6. Sweep time = auto
7. Trace mode = max hold
8. Trace was allowed to stabilize

Peak Field Strength Measurements per Section 4.1.5.2.2 of ANSI C63.10:2020

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW is set depending on measurement frequency, as specified in Table 7-14 below
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Frequency	RBW
9 – 150kHz	200 – 300Hz
0.15 – 30MHz	9 – 10kHz
30 – 1000MHz	100 – 120kHz
> 1000MHz	1MHz

Table 7-14. RBW as a Function of Frequency

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

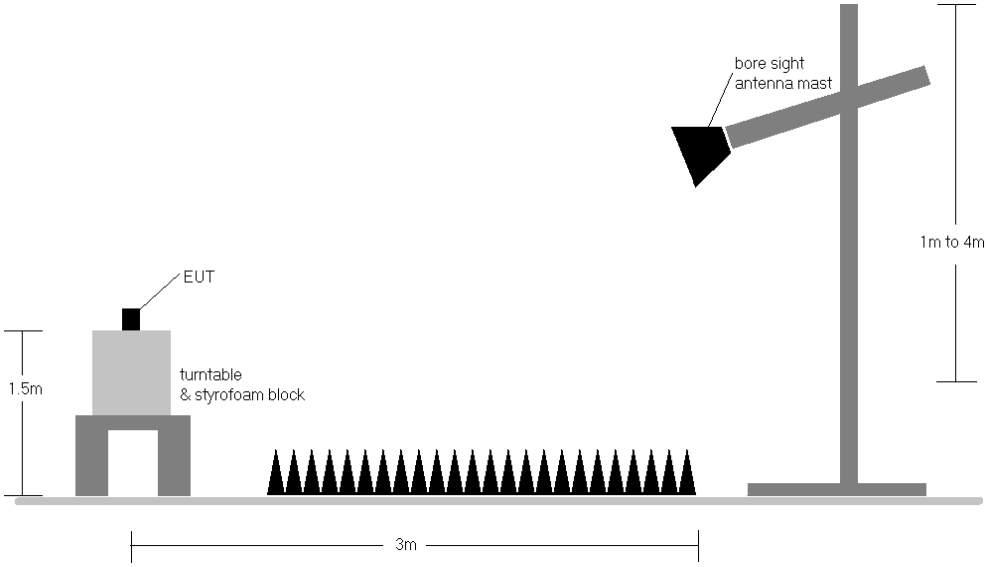


Figure 7-8. Radiated Test Setup >1GHz

Test Notes

1. All emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in §15.209.
2. No significant radiated emissions were found in the 2310 - 2390MHz restricted band.
3. The antenna is manipulated through typical positions, polarity, and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested with its standard battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
6. The duty cycle correction factor was not applied to noise floor measurements.
7. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. Any emissions found to be within 20dB of the limit are fully investigated and the results are shown in this section.
8. The "-" shown in the following RSE tables is used to denote a noise floor measurement.

Sample Calculation

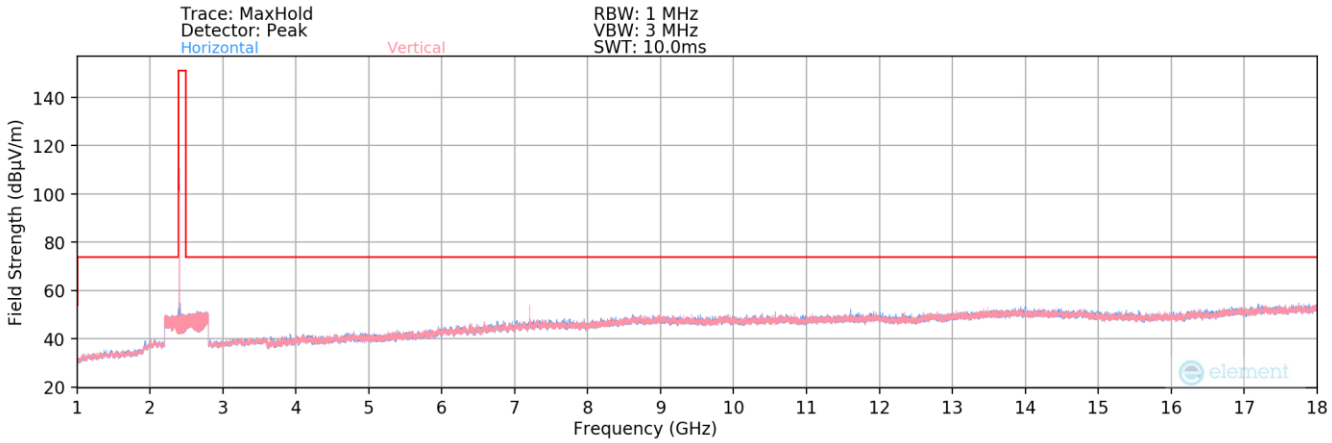
- Field Strength Level $_{[dB\mu V/m]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$ + Duty Cycle Correction $_{[dB]}$
- AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB\mu V/m]}$ – Limit $_{[dB\mu V/m]}$

Duty Cycle Correction Factor Calculation

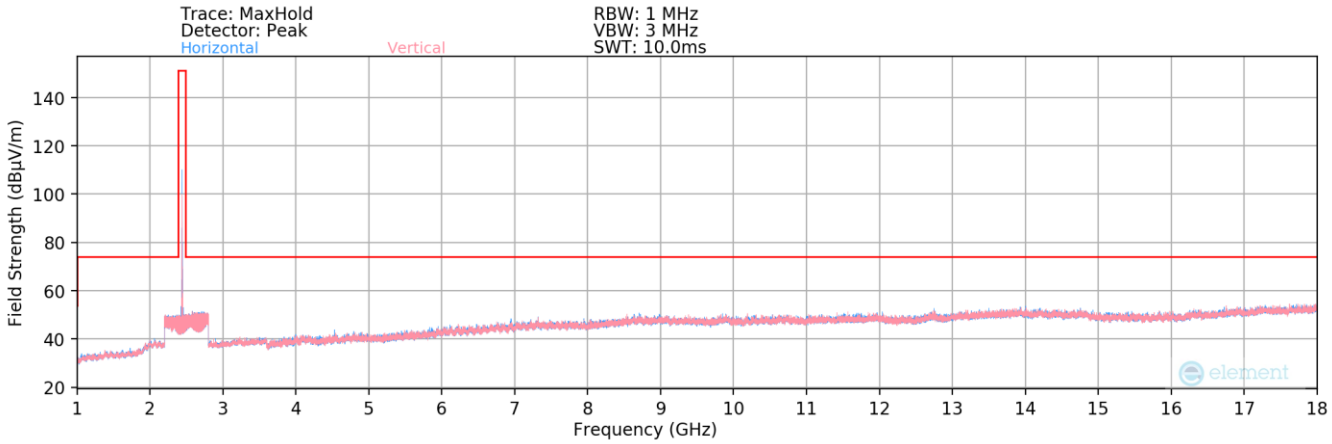
- Channel hop rate = 800 hops/second (AFH Mode)
- Adjusted channel hop rate for DH5 mode **=** 133.33 hops/second
- Time per channel hop **=** 1 / 133.33 hops/second = 7.50 ms
- Time to cycle through all channels = 7.50 x 20 channels = 150 ms
- Number of times transmitter hits on one channel = 100 ms / 150 ms = 1 time(s)
- Worst case dwell time = 7.5 ms
- Duty cycle correction factor = $20\log_{10}(7.5ms/100ms)$ = -22.5 dB

Radiated Spurious Emission Measurements

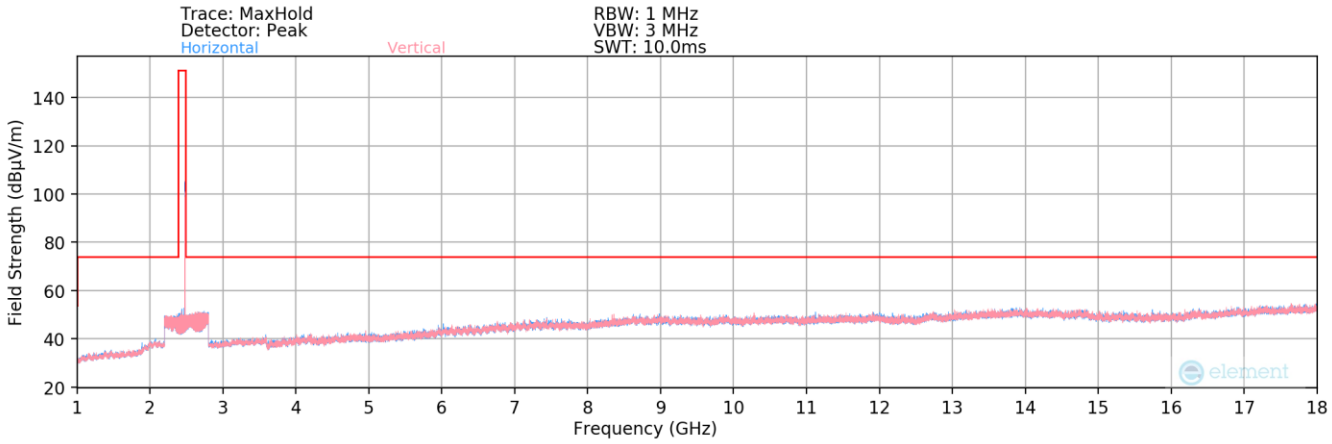
§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]



Plot 7-165. Radiated Spurious Plot above 1GHz (BT – Ch. 0) – Ant 1



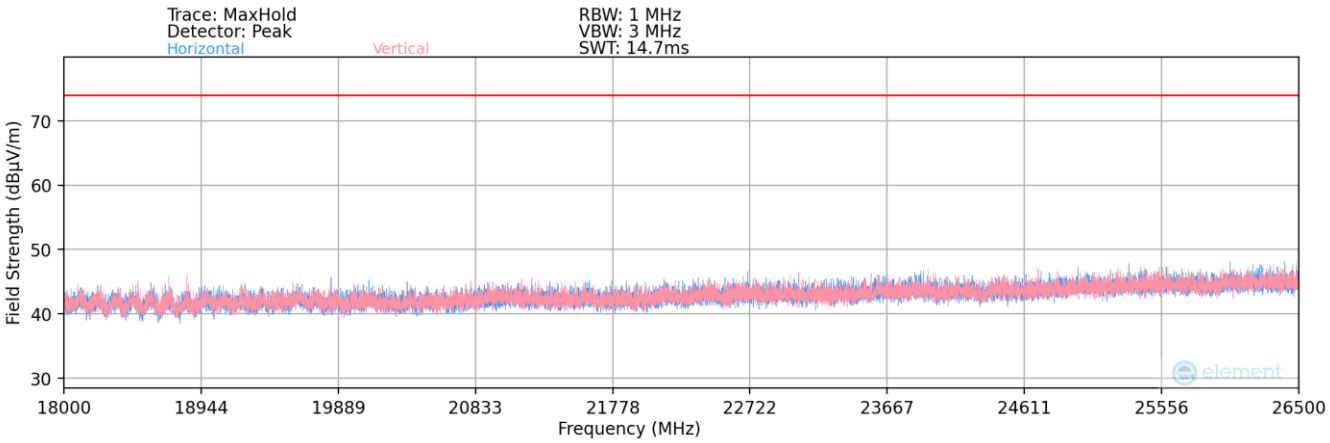
Plot 7-166. Radiated Spurious Plot above 1GHz (BT – Ch. 39) – Ant 1



Plot 7-167. Radiated Spurious Plot above 1GHz (BT – Ch. 78) – Ant 1

Radiated Spurious Emissions Measurements (Above 18GHz)

§15.209; RSS-Gen [8.9]



Plot 7-168. Radiated Spurious Plot above 18GHz – Ant 1

Radiated Spurious Emission Measurements

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2402MHz
Channel:	0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	H	-	-	-71.39	2.72	0.00	38.33	53.98	-15.65
4804.00	Peak	H	-	-	-66.67	2.72	0.00	43.05	73.98	-30.93
12010.00	Avg	H	-	-	-72.58	13.32	0.00	47.74	53.98	-6.24
12010.00	Peak	H	-	-	-68.43	13.32	0.00	51.89	73.98	-22.09

Table 7-15. Radiated Measurements – Ant 1

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2441MHz
Channel:	39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4882.00	Avg	H	-	-	-69.61	3.10	0.00	40.49	53.98	-13.49
4882.00	Peak	H	-	-	-60.24	3.10	0.00	49.86	73.98	-24.12
7323.00	Avg	H	-	-	-71.85	9.53	0.00	44.68	53.98	-9.30
7323.00	Peak	H	-	-	-61.92	9.53	0.00	54.61	73.98	-19.37
12205.00	Avg	H	-	-	-71.75	13.21	0.00	48.46	53.98	-5.52
12205.00	Peak	H	-	-	-61.40	13.21	0.00	58.81	73.98	-15.17

Table 7-16. Radiated Measurements– Ant 1

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4960.00	Avg	H	120	77	-75.07	3.05	-22.50	12.48	53.98	-41.50
4960.00	Peak	H	120	77	-64.02	3.05	0.00	46.03	73.98	-27.95
7440.00	Avg	H	-	-	-77.18	9.19	0.00	39.01	53.98	-14.97
7440.00	Peak	H	-	-	-66.44	9.19	0.00	49.75	73.98	-24.23
12400.00	Avg	H	-	-	-77.53	13.27	0.00	42.74	53.98	-11.24
12400.00	Peak	H	-	-	-67.36	13.27	0.00	52.91	73.98	-21.07

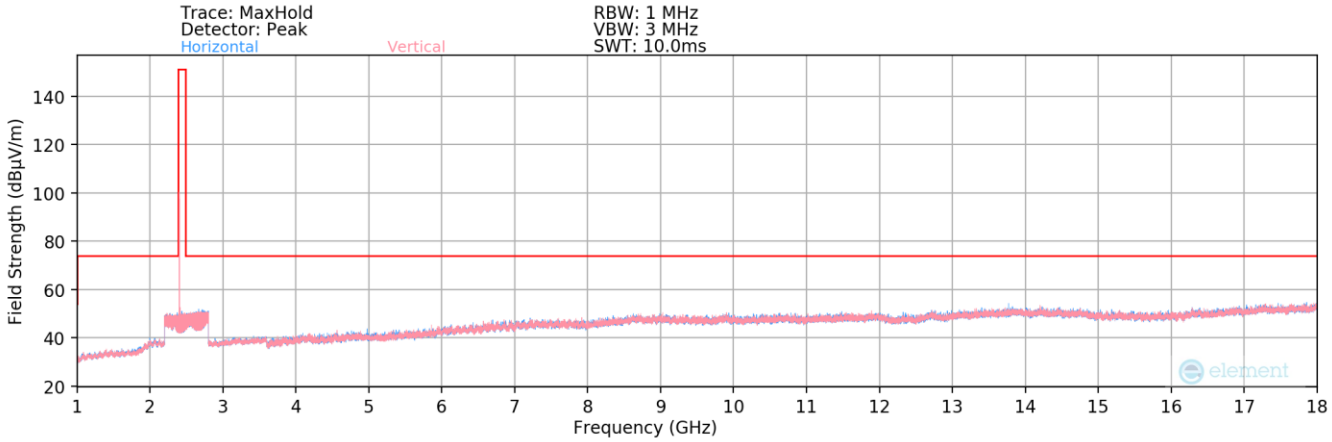
Table 7-17. Radiated Measurements – Ant 1

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78

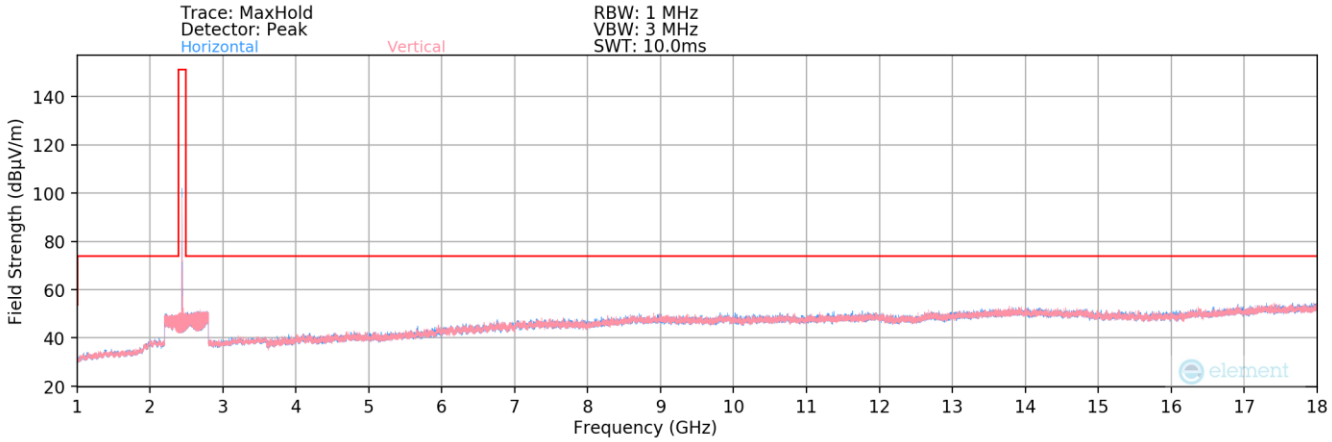
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	H	-	-	-76.47	2.72	0.00	33.25	53.98	-20.73
4804.00	Peak	H	-	-	-66.00	2.72	0.00	43.72	73.98	-30.26
7206.70	Avg	V	-	-	-76.81	8.80	0.00	38.99	53.98	-14.98
7206.70	Peak	V	-	-	-65.77	8.80	0.00	50.03	73.98	-23.94
12010.00	Avg	H	-	-	-77.29	13.32	0.00	43.03	53.98	-10.95
12010.00	Peak	H	-	-	-65.66	13.32	0.00	54.66	73.98	-19.32

Table 7-18. Radiated Measurements – Ant 1 - WCP

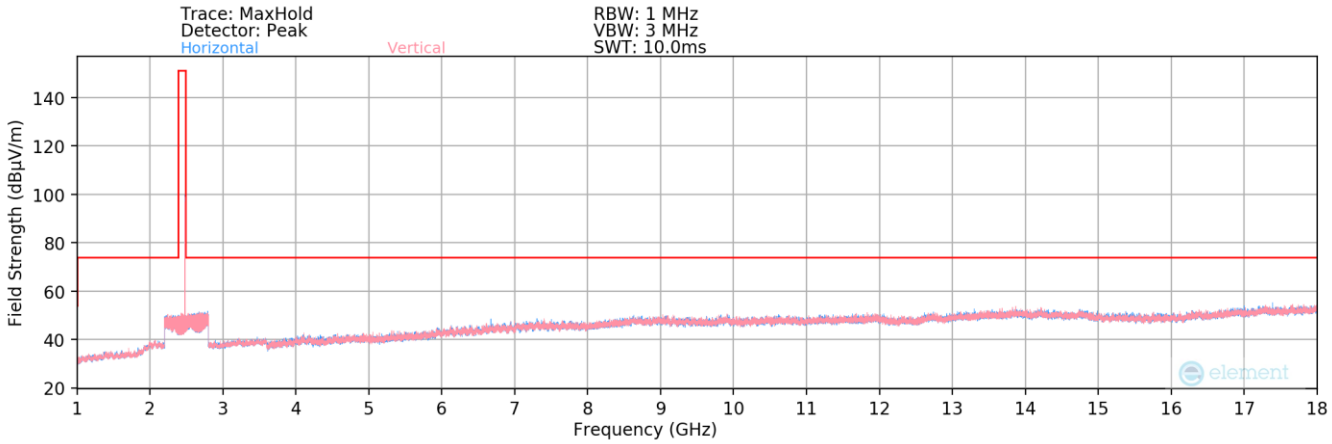
Radiated Spurious Emission Measurements



Plot 7-169. Radiated Spurious Plot above 1GHz (BT – Ch. 0) – Ant 2

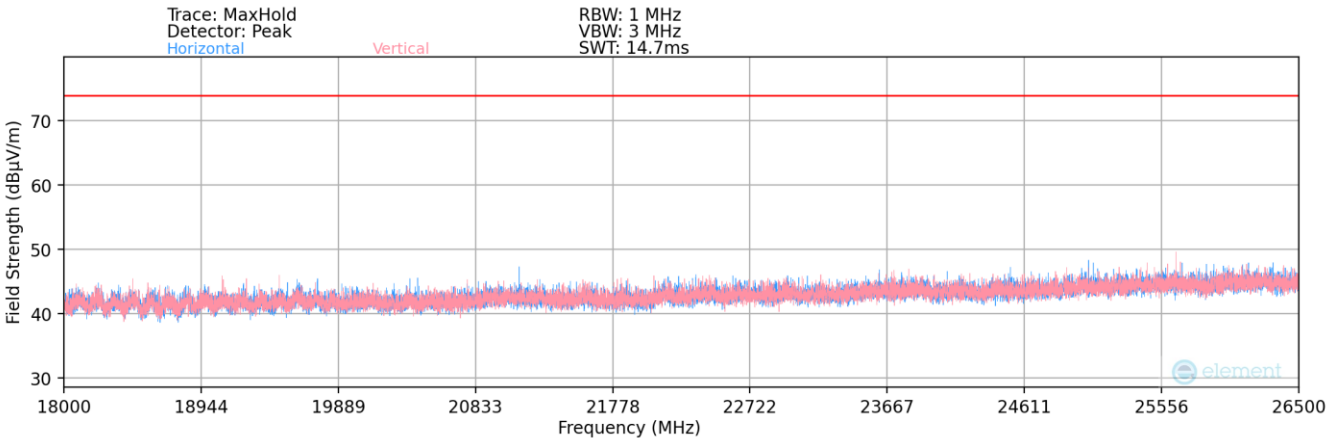


Plot 7-170. Radiated Spurious Plot above 1GHz (BT – Ch. 39) – Ant 2



Plot 7-171. Radiated Spurious Plot above 1GHz (BT – Ch. 78) – Ant 2

Radiated Spurious Emissions Measurements (Above 18GHz)



Plot 7-172. Radiated Spurious Plot above 18GHz – Ant 2

Radiated Spurious Emission Measurements

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2402MHz
Channel:	0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	V	-	-	-74.42	2.72	0.00	35.30	53.98	-18.68
4804.00	Peak	V	-	-	-63.95	2.72	0.00	45.77	73.98	-28.21
12010.00	Avg	V	-	-	-74.81	13.32	0.00	45.51	53.98	-8.47
12010.00	Peak	V	-	-	-65.88	13.32	0.00	54.44	73.98	-19.54

Table 7-19. Radiated Measurements – Ant 2

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2441MHz
Channel:	39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4882.00	Avg	V	-	-	-74.41	3.10	0.00	35.69	53.98	-18.29
4882.00	Peak	V	-	-	-64.44	3.10	0.00	45.66	73.98	-28.32
7323.00	Avg	V	-	-	-74.92	9.53	0.00	41.61	53.98	-12.37
7323.00	Peak	V	-	-	-65.25	9.53	0.00	51.28	73.98	-22.70
12205.00	Avg	V	-	-	-75.04	13.21	0.00	45.17	53.98	-8.81
12205.00	Peak	V	-	-	-64.94	13.21	0.00	55.27	73.98	-18.71

Table 7-20. Radiated Measurements – Ant 2

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4960.00	Avg	V	-	-	-74.39	3.05	0.00	35.66	53.98	-18.32
4960.00	Peak	V	-	-	-64.26	3.05	0.00	45.79	73.98	-28.19
7440.00	Avg	V	-	-	-74.60	9.19	0.00	41.59	53.98	-12.39
7440.00	Peak	V	-	-	-65.32	9.19	0.00	50.87	73.98	-23.11
12400.00	Avg	V	-	-	-75.11	13.27	0.00	45.16	53.98	-8.82
12400.00	Peak	V	-	-	-65.13	13.27	0.00	55.14	73.98	-18.84

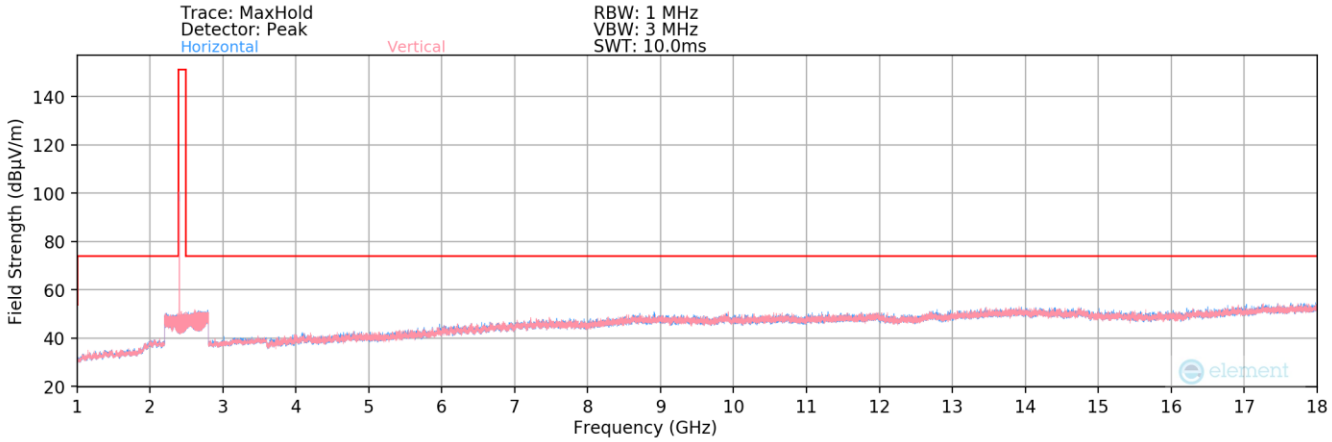
Table 7-21. Radiated Measurements – Ant 2

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2441MHz
Channel:	39

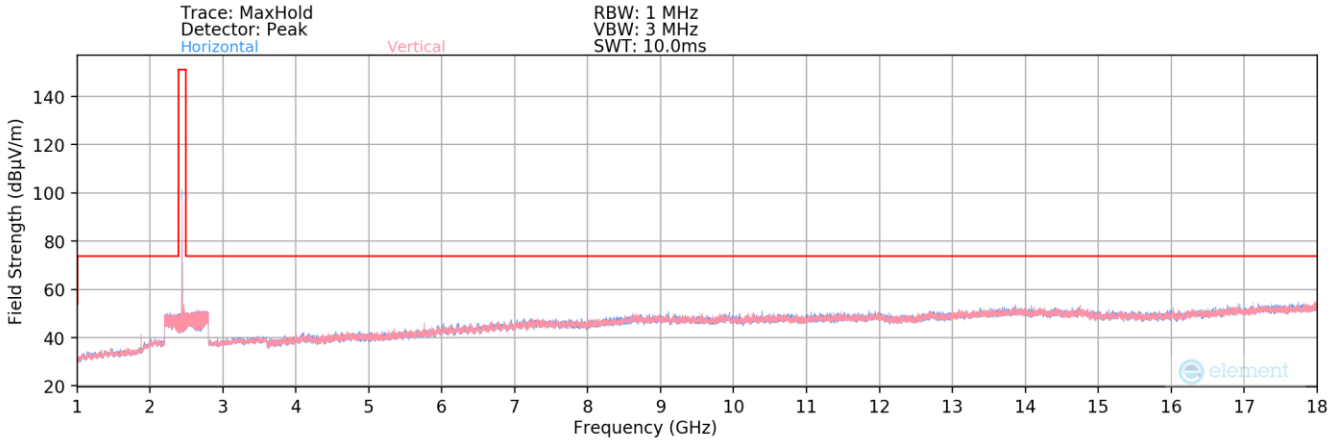
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	H	-	-	-74.58	2.72	0.00	35.14	53.98	-18.84
4804.00	Peak	H	-	-	-64.30	2.72	0.00	45.42	73.98	-28.56
12010.00	Avg	H	-	-	-75.00	13.32	0.00	45.32	53.98	-8.66
12010.00	Peak	H	-	-	-65.76	13.32	0.00	54.56	73.98	-19.42

Table 7-22. Radiated Measurements – Ant 2 - WCP

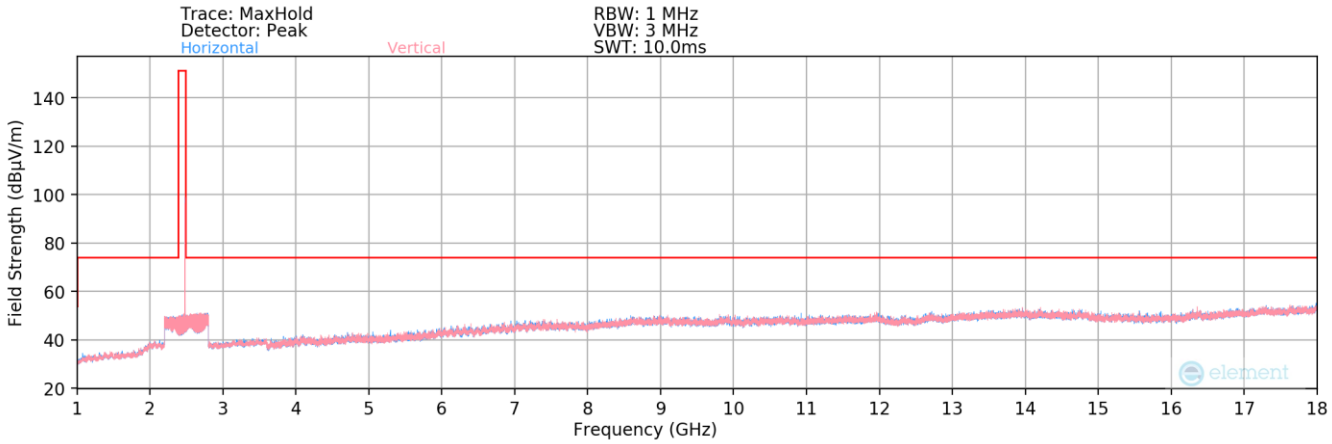
Radiated Spurious Emission Measurements



Plot 7-173. Radiated Spurious Plot above 1GHz (BT – Ch. 0) – Dual



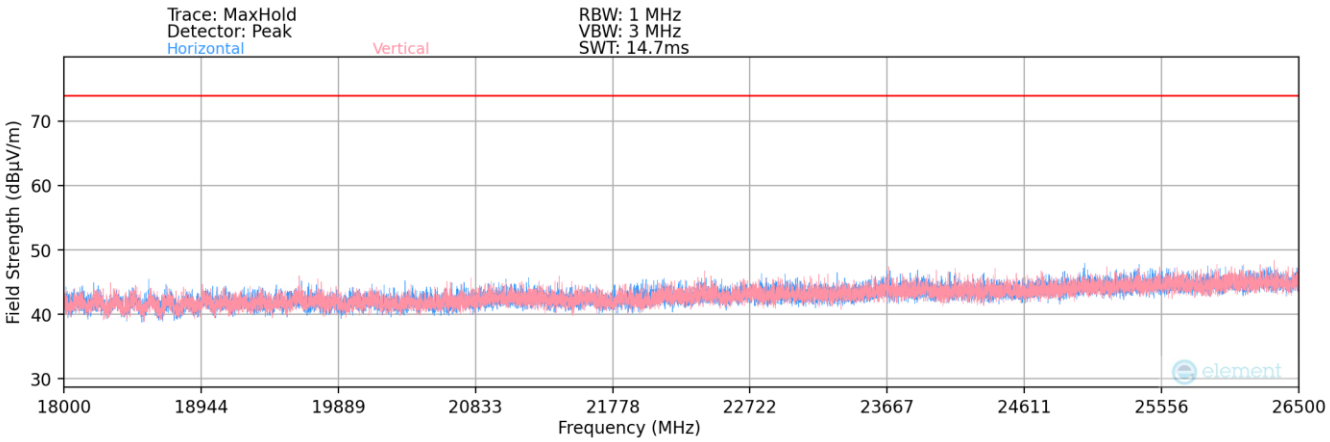
Plot 7-174. Radiated Spurious Plot above 1GHz (BT – Ch. 39) – Dual



Plot 7-175. Radiated Spurious Plot above 1GHz (BT – Ch. 78) – Dual

Radiated Spurious Emissions Measurements (Above 18GHz)

§15.209; RSS-Gen [8.9]



Plot 7-176. Radiated Spurious Plot above 18GHz – Dual

Radiated Spurious Emission Measurements

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2402MHz
Channel:	0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	H	-	-	-74.87	2.72	0.00	34.85	53.98	-19.13
4804.00	Peak	H	-	-	-65.87	2.72	0.00	43.85	73.98	-30.13
12010.00	Avg	H	-	-	-76.47	13.32	0.00	43.85	53.98	-10.13
12010.00	Peak	H	-	-	-68.41	13.32	0.00	51.91	73.98	-22.07

Table 7-23. Radiated Measurements – Dual

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2441MHz
Channel:	39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4882.00	Avg	H	-	-	-75.31	3.10	0.00	34.79	53.98	-19.19
4882.00	Peak	H	-	-	-67.41	3.10	0.00	42.69	73.98	-31.29
7323.00	Avg	H	-	-	-75.72	9.53	0.00	40.81	53.98	-13.17
7323.00	Peak	H	-	-	-67.78	9.53	0.00	48.75	73.98	-25.23
12205.00	Avg	H	-	-	-76.76	13.21	0.00	43.45	53.98	-10.53
12205.00	Peak	H	-	-	-68.22	13.21	0.00	51.99	73.98	-21.99

Table 7-24. Radiated Measurements – Dual

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correctio n [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4960.00	Avg	H	-	-	-75.31	3.05	0.00	34.74	53.98	-19.24
4960.00	Peak	H	-	-	-66.91	3.05	0.00	43.14	73.98	-30.84
7440.00	Avg	H	-	-	-75.73	9.19	0.00	40.46	53.98	-13.52
7440.00	Peak	H	-	-	-67.45	9.19	0.00	48.74	73.98	-25.24
12400.00	Avg	H	-	-	-76.44	13.27	0.00	43.83	53.98	-10.15
12400.00	Peak	H	-	-	-68.14	13.27	0.00	52.13	73.98	-21.85

Table 7-25. Radiated Measurements – Dual

Worst Case Mode:	Bluetooth
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2441MHz
Channel:	39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	H	-	-	-74.88	2.72	0.00	34.84	53.98	-19.14
4804.00	Peak	H	-	-	-65.61	2.72	0.00	44.11	73.98	-29.87
12010.00	Avg	H	-	-	-76.54	13.32	0.00	43.78	53.98	-10.20
12010.00	Peak	H	-	-	-67.66	13.32	0.00	52.66	73.98	-21.32

Table 7-26. Radiated Measurements with WCP – Dual

7.10 Radiated Restricted Band Edge Measurements

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated emissions at the band edge are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at maximum power, at the appropriate frequencies, and with hopping disabled. Only the radiated emissions of the configuration that produced the worst-case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown below per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [µV/m]	Measured Distance [Meters]
Above 960.0 MHz	500	3

Table 7-27. Radiated Limits

Test Procedure Used

ANSI C63.10:2020 – Section 6.10.5.2

Test Settings

1. Span is set large enough to capture the peak level of the emission operating on the channel closest to the band edge
2. Reference level offset is set with the appropriate corrections for the frequencies shown in the plots
3. Reference level is set to provide the appropriate amount of “head room” above the signal as specified in ANSI C63.10:2020 Section 4.1.6.2
4. Attenuation is set to a low enough level to maintain enough dynamic range between the noise floor and the radiated limit
5. Sweep time = Auto coupled
6. RBW = 1MHz
7. VBW = 3 x RBW for peak measurements and 1kHz for RMS measurements
8. Detector = RMS and peak
9. Trace = Max Hold
10. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

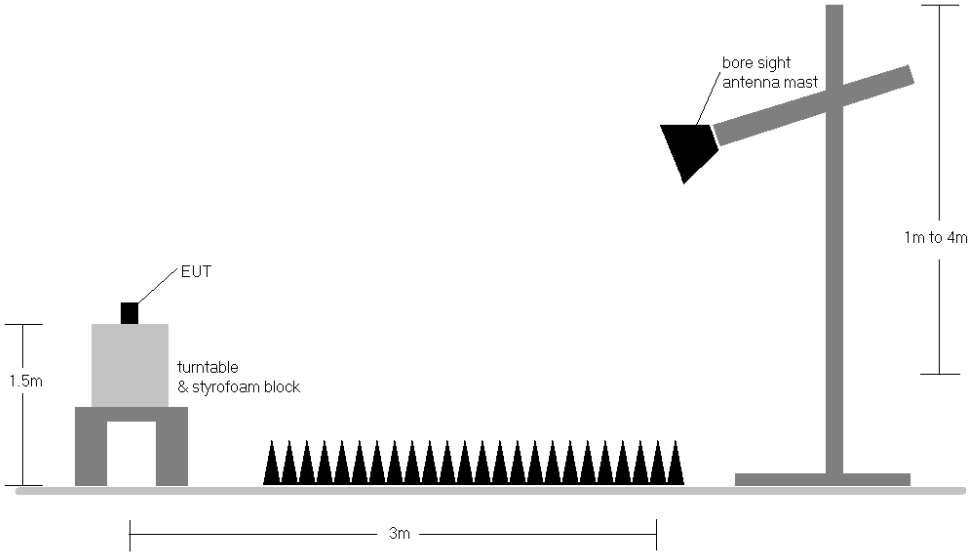


Figure 7-9. Radiated Test Setup >1GHz

Test Notes

1. All emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limits shown in §15.209.
2. No significant radiated emissions were found in the 2310 - 2390MHz restricted band.
3. The antenna is manipulated through typical positions, polarity, and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested with its standard battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.
6. Two different amplitude offsets were used depending on whether peak or average measurements were measured. The average measurements use a duty cycle correction factor (DCCF).

   The amplitude offset shown in the following plots for average measurements was calculated using the formula:

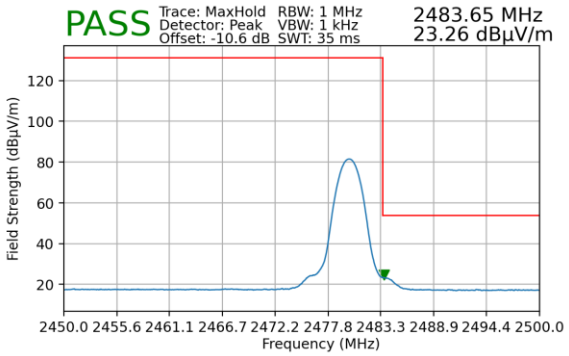
   Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain + DCCF

7. The "-" shown in the following RSE tables is used to denote a noise floor measurement.

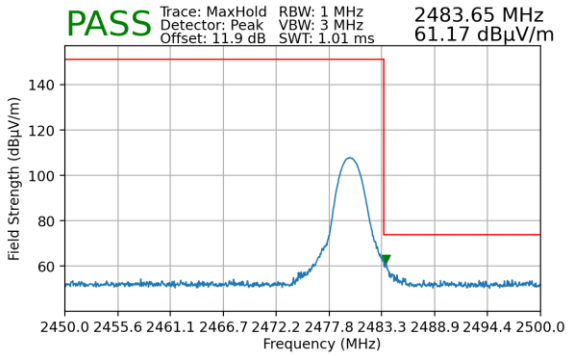
Radiated Restricted Band Edge Measurements – Ant 1

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

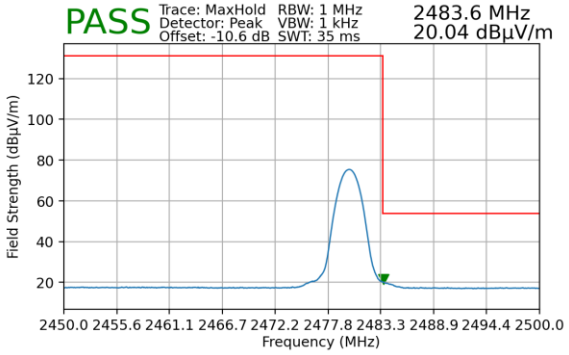
Worst Case Mode:	Bluetooth – 3Mbps
Worst Case Data Rate:	1 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78



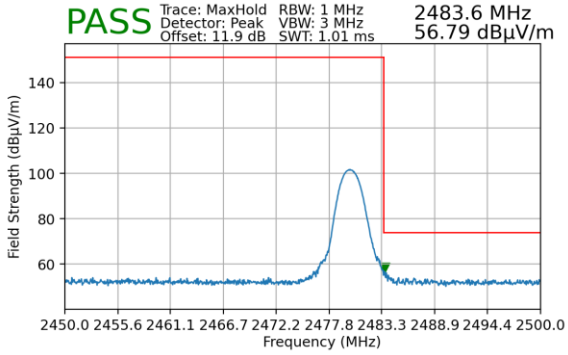
Plot 7-177. Radiated Restricted Upper Band Edge Measurement (Average)



Plot 7-178. Radiated Restricted Upper Band Edge Measurement (Peak)



Plot 7-179. Radiated Restricted Upper Band Edge Measurement (Average) – with WCP

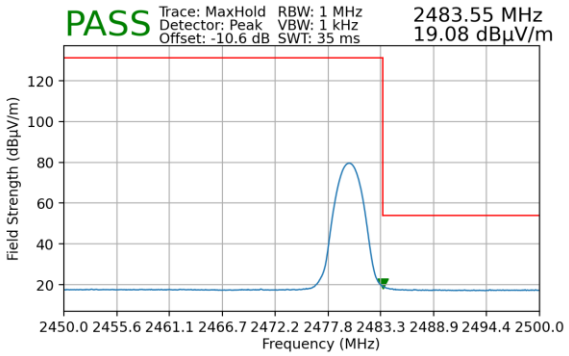


Plot 7-180. Radiated Restricted Upper Band Edge Measurement (Peak) – with WCP

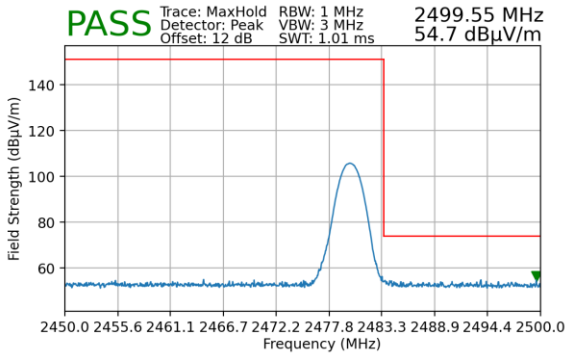
Radiated Restricted Band Edge Measurements – Ant 2

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

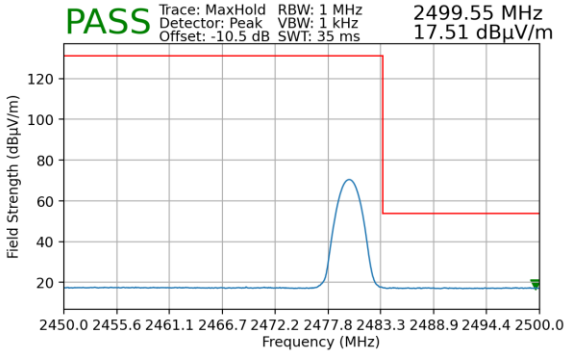
Worst Case Mode:	Bluetooth – 3Mbps
Worst Case Data Rate:	3 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78



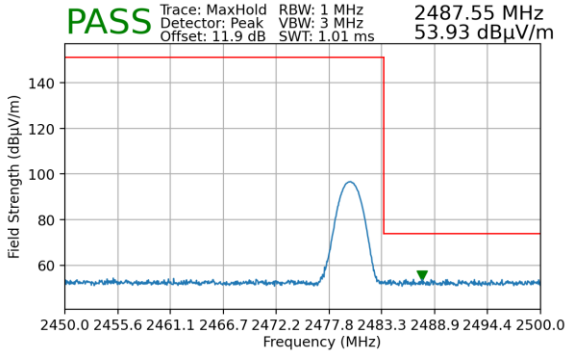
Plot 7-181. Radiated Restricted Upper Band Edge Measurement (Average)



Plot 7-182. Radiated Restricted Upper Band Edge Measurement (Peak)



Plot 7-183. Radiated Restricted Upper Band Edge Measurement (Average) – with WCP

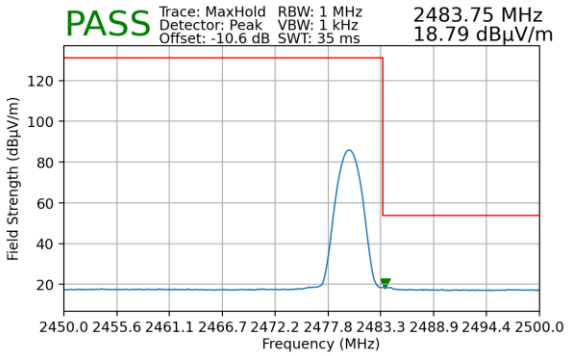


Plot 7-184. Radiated Restricted Upper Band Edge Measurement (Peak) – with WCP

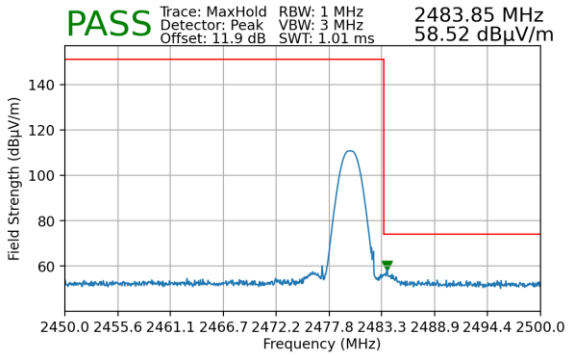
Radiated Restricted Band Edge Measurements – Dual

§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

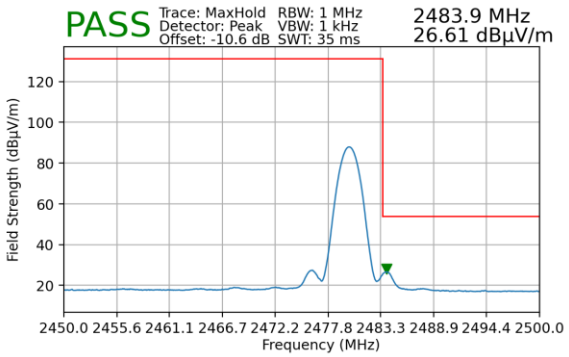
Worst Case Mode:	Bluetooth – 3Mbps
Worst Case Data Rate:	3 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78



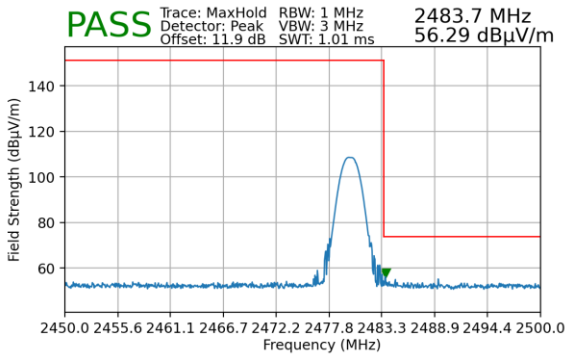
Plot 7-185. Radiated Restricted Upper Band Edge Measurement (Average)



Plot 7-186. Radiated Restricted Upper Band Edge Measurement (Peak)



Plot 7-187. Radiated Restricted Upper Band Edge Measurement (Average) – with WCP



Plot 7-188. Radiated Restricted Upper Band Edge Measurement (Peak) – with WCP

7.11 Radiated Spurious Emissions Measurements – Below 1GHz

§15.209; RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions must not exceed the limits shown below per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [µV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 7-28. Radiated Limits

Test Procedures Used

ANSI C63.10:2020

Test Settings

Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagrams below.

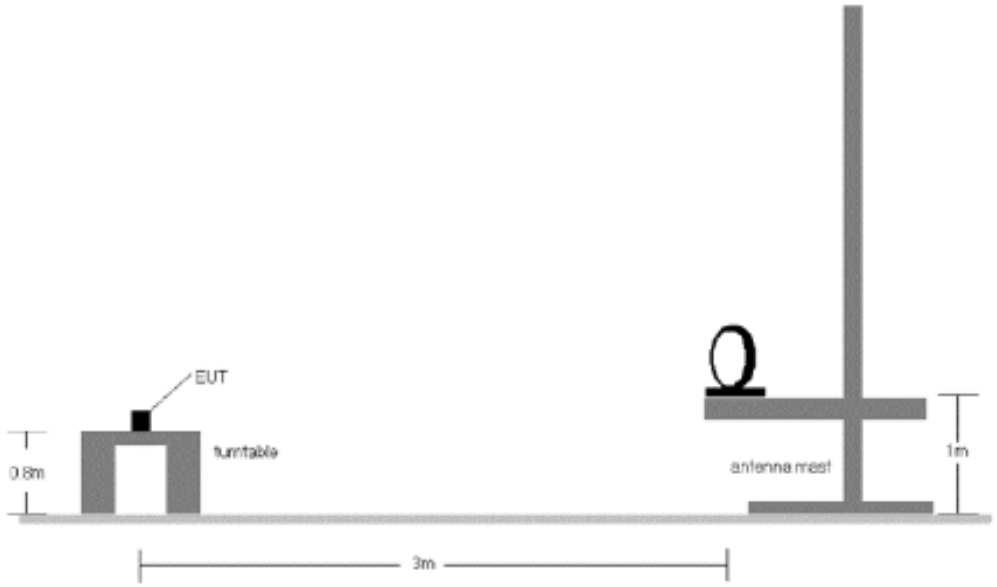


Figure 7-10. Radiated Test Setup < 30Mhz

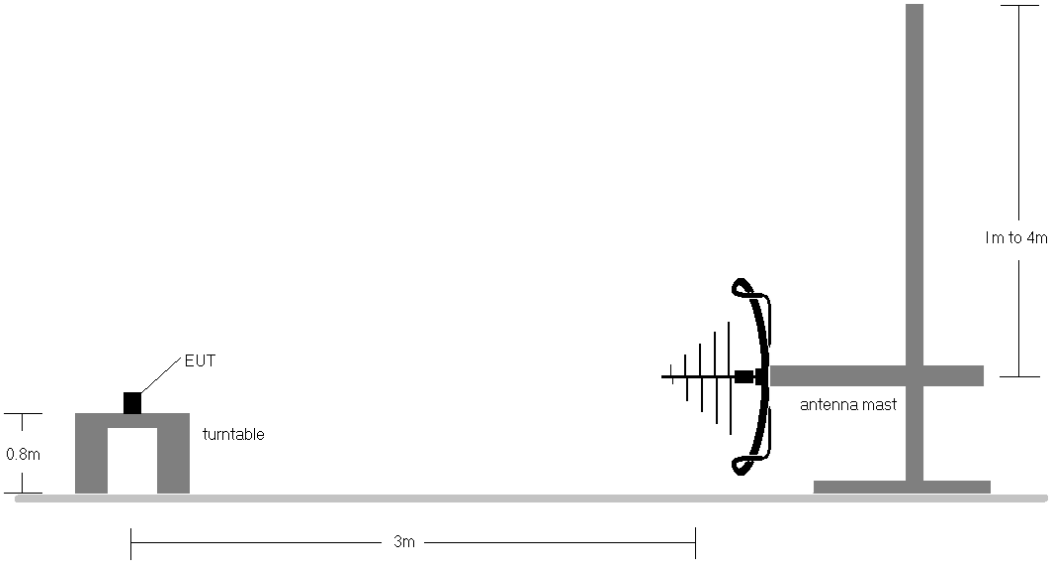


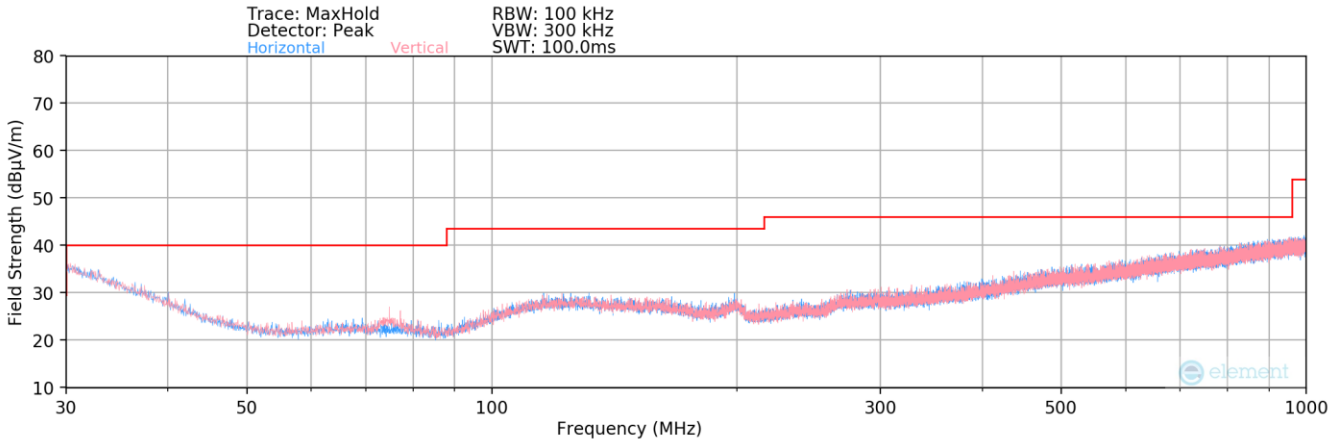
Figure 7-11. Radiated Test Setup < 1GHz

Test Notes

1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen (8.10) are below the limits shown in §15.209.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested with its standard battery.
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

Radiated Spurious Emissions Measurements (Below 1GHz)

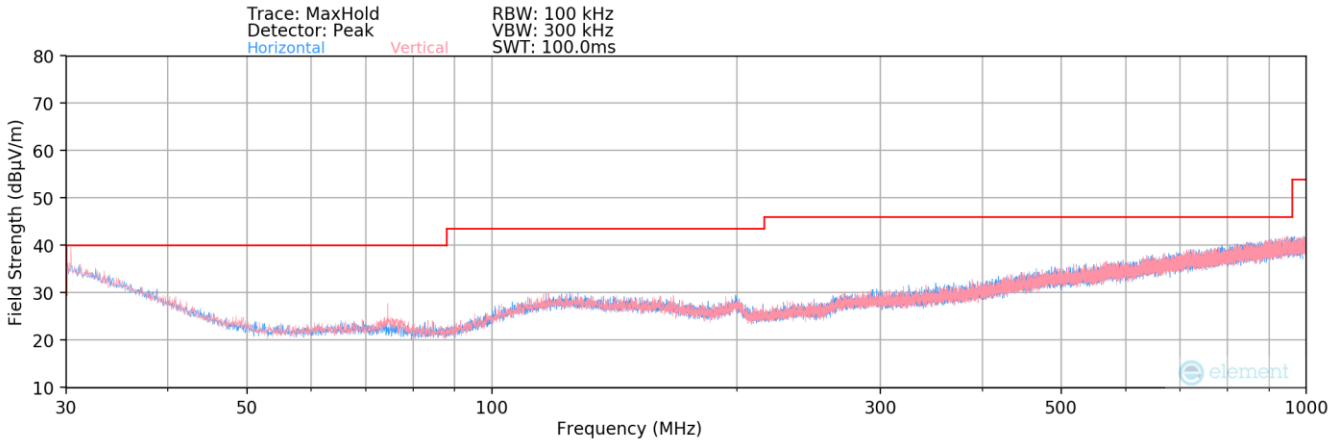
§15.209; RSS-Gen [8.9]



Plot 7-189. Radiated Spurious Plot below 1GHz – Ant 1

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
74.55	Quasi-Peak	V	253	76	-93.81	14.78	27.97	40.00	-12.03
117.45	Quasi-Peak	H	-	-	-96.64	20.34	30.70	43.52	-12.82
326.15	Quasi-Peak	H	-	-	-96.73	21.72	31.99	46.02	-14.03
516.45	Quasi-Peak	H	-	-	-96.94	26.10	36.16	46.02	-9.86
635.50	Quasi-Peak	H	-	-	-96.86	27.90	38.04	46.02	-7.98
984.05	Quasi-Peak	H	-	-	-96.71	31.84	42.13	53.98	-11.85

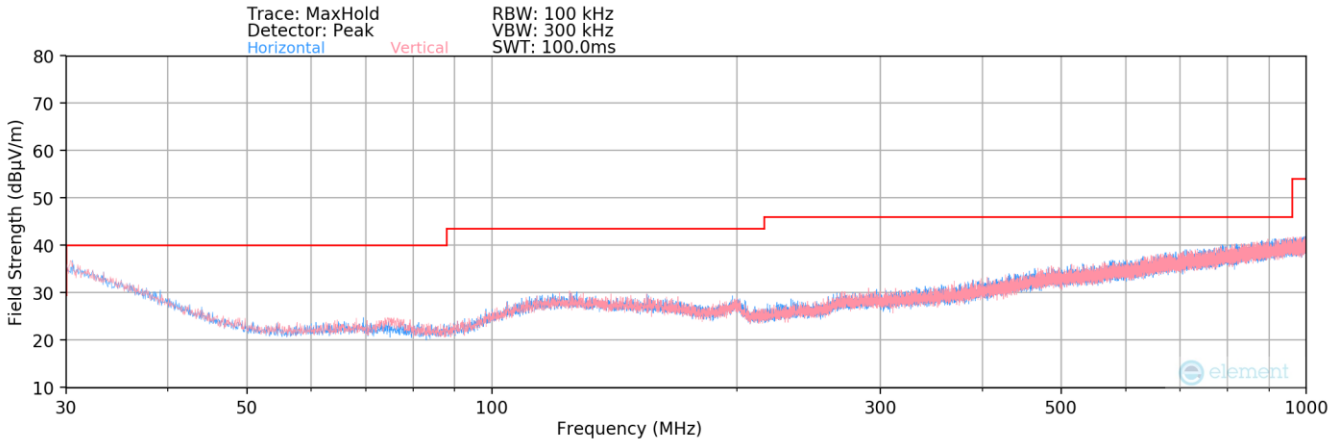
Table 7-29. Radiated Spurious Emissions Below 1GHz – Ant 1



Plot 7-190. Radiated Spurious Plot below 1GHz – Ant 2

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
74.55	Quasi-Peak	V	205	324	-93.96	14.78	27.82	40.00	-12.18
359.15	Quasi-Peak	V	-	-	-96.31	22.40	33.09	46.02	-12.93
435.75	Quasi-Peak	V	-	-	-96.89	24.53	34.64	46.02	-11.38
496.85	Quasi-Peak	V	-	-	-96.82	25.85	36.03	46.02	-9.99
700.00	Quasi-Peak	H	135	62	-94.23	28.81	41.58	46.02	-4.45
735.70	Quasi-Peak	V	-	-	-96.93	29.30	39.37	46.02	-6.65

Table 7-30. Radiated Spurious Emissions Below 1GHz – Ant 2



Plot 7-191. Radiated Spurious Plot below 1GHz – Dual

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
77.20	Quasi-Peak	H	221	302	-94.19	1.38	14.19	40.00	-25.81
194.05	Quasi-Peak	H	-	-	-96.82	2.07	12.25	43.52	-31.27
573.25	Quasi-Peak	H	-	-	-96.73	3.86	14.13	46.02	-31.89
624.00	Quasi-Peak	H	-	-	-96.77	4.45	14.68	46.02	-31.34
702.65	Quasi-Peak	H	221	78	-94.90	4.87	16.97	46.02	-29.05
885.20	Quasi-Peak	H	-	-	-96.37	5.94	16.57	46.02	-29.45

Table 7-31. Radiated Spurious Emissions Below 1GHz – Dual

7.12 Line Conducted Measurement Data

§15.207; RSS-Gen [8.8]

Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

All conducted emissions must not exceed the limits shown in the table below per Section 15.207 and RSS-Gen (8.8).

Frequency of emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

Table 7-32. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10:2020, Section 6.2

Test Settings

Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = RMS
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

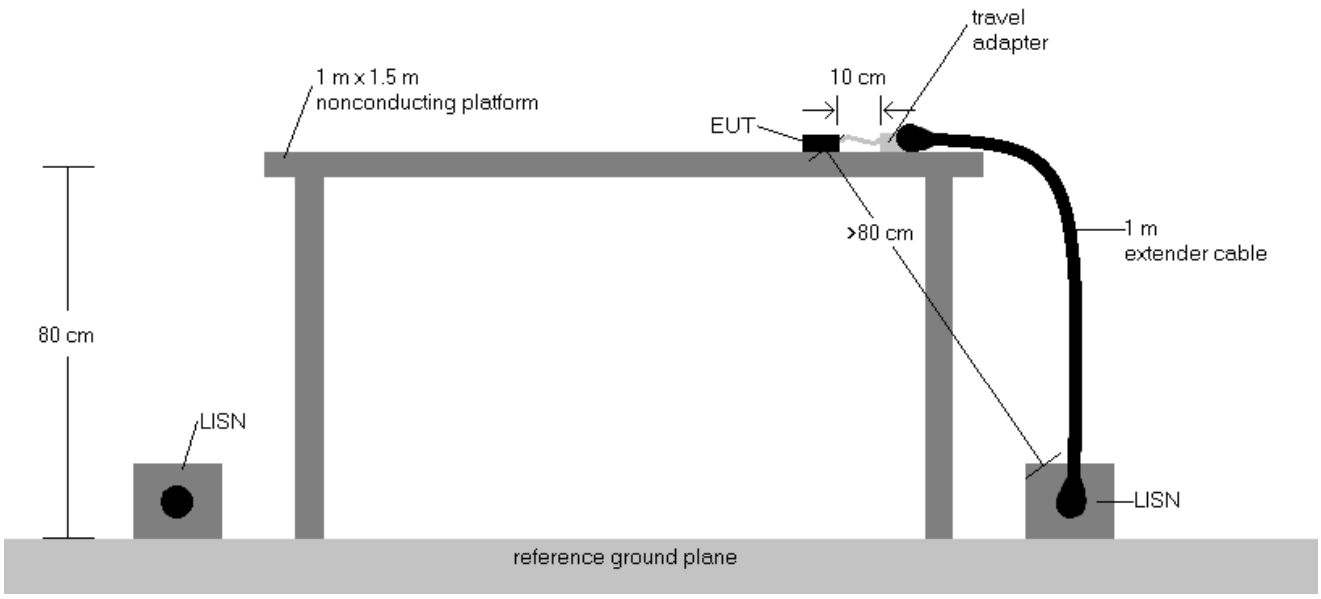
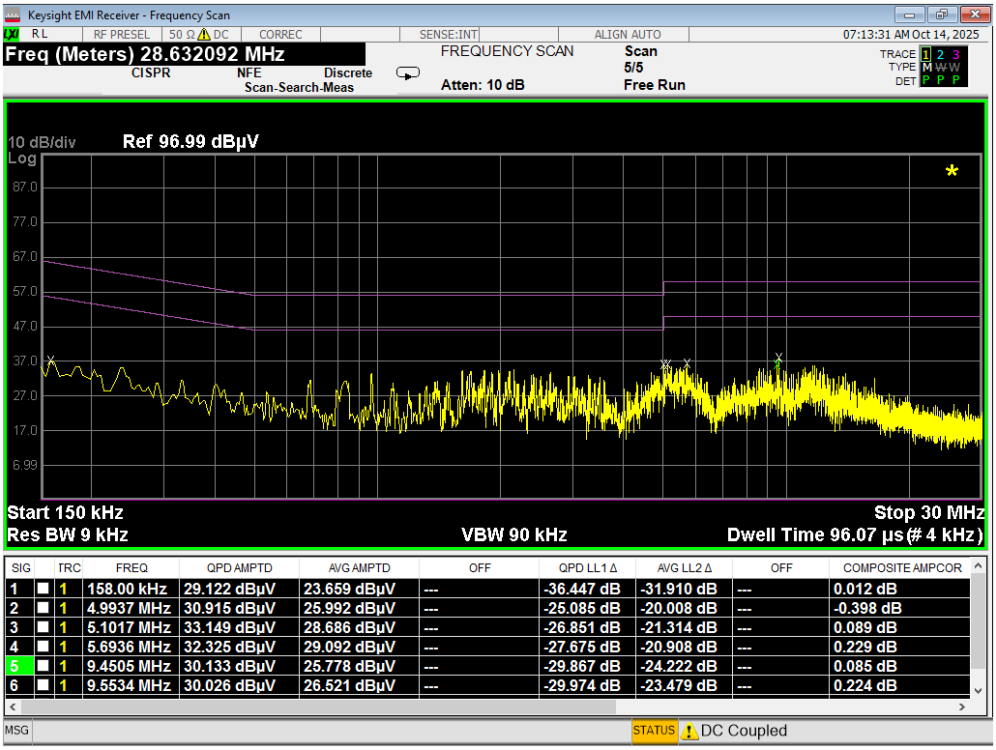


Figure 7-12. Test Instrument & Measurement Setup

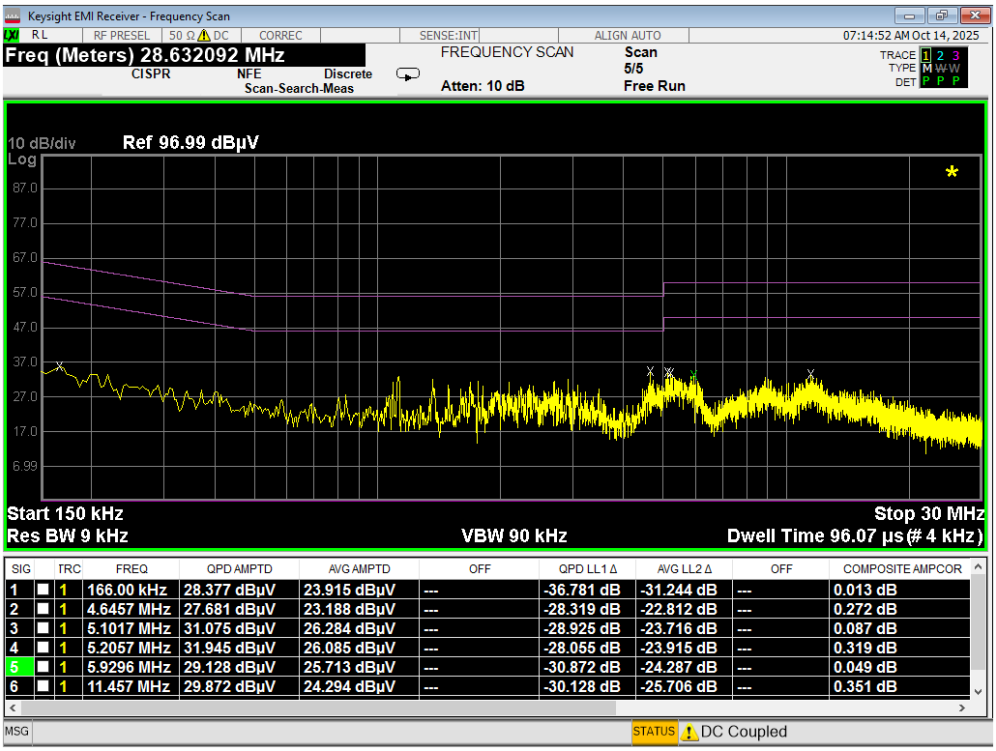
Test Notes

1. All modes of operation were investigated, and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
2. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207 and RSS-Gen (8.8).
3. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
4. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
5. Margin (dB) = QP/AV Limit (dBμV) - QP/AV Level (dBμV)
6. Traces shown in plot are made using a peak detector.
7. Deviations to the Specifications: None.



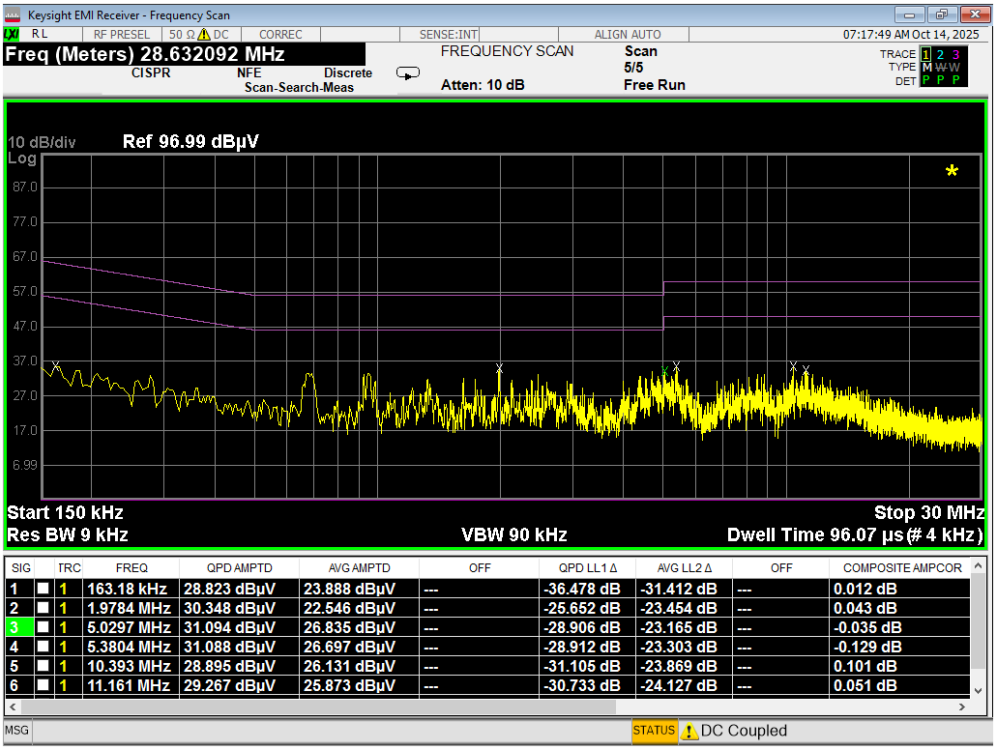
SIG	TRC	FREQ	QPD AMPTD	AVG AMPTD	OFF	QPD LL1 Δ	AVG LL2 Δ	OFF	COMPOSITE AMPCOR
1	1	158.00 kHz	29.122 dBµV	23.659 dBµV	---	-36.447 dB	-31.910 dB	---	0.012 dB
2	1	4.9937 MHz	30.915 dBµV	25.992 dBµV	---	-25.085 dB	-20.008 dB	---	-0.398 dB
3	1	5.1017 MHz	33.149 dBµV	28.686 dBµV	---	-26.851 dB	-21.314 dB	---	0.089 dB
4	1	5.6936 MHz	32.325 dBµV	29.092 dBµV	---	-27.675 dB	-20.908 dB	---	0.229 dB
5	1	9.4505 MHz	30.133 dBµV	25.778 dBµV	---	-29.867 dB	-24.222 dB	---	0.085 dB
6	1	9.5534 MHz	30.026 dBµV	26.521 dBµV	---	-29.974 dB	-23.479 dB	---	0.224 dB

Plot 7-192. Line-Conducted Test Plot (L1)



SIG	TRC	FREQ	QPD AMPTD	AVG AMPTD	OFF	QPD LL1 Δ	AVG LL2 Δ	OFF	COMPOSITE AMPCOR
1	1	166.00 kHz	28.377 dBµV	23.915 dBµV	---	-36.781 dB	-31.244 dB	---	0.013 dB
2	1	4.6457 MHz	27.681 dBµV	23.188 dBµV	---	-28.319 dB	-22.812 dB	---	0.272 dB
3	1	5.1017 MHz	31.075 dBµV	26.284 dBµV	---	-28.925 dB	-23.716 dB	---	0.087 dB
4	1	5.2057 MHz	31.945 dBµV	26.085 dBµV	---	-28.055 dB	-23.915 dB	---	0.319 dB
5	1	5.9296 MHz	29.128 dBµV	25.713 dBµV	---	-30.872 dB	-24.287 dB	---	0.049 dB
6	1	11.457 MHz	29.872 dBµV	24.294 dBµV	---	-30.128 dB	-25.706 dB	---	0.351 dB

Table 7-33. Line-Conducted Test Data (N)



Plot 7-193. Line-Conducted Test Plot (L1) - WCP

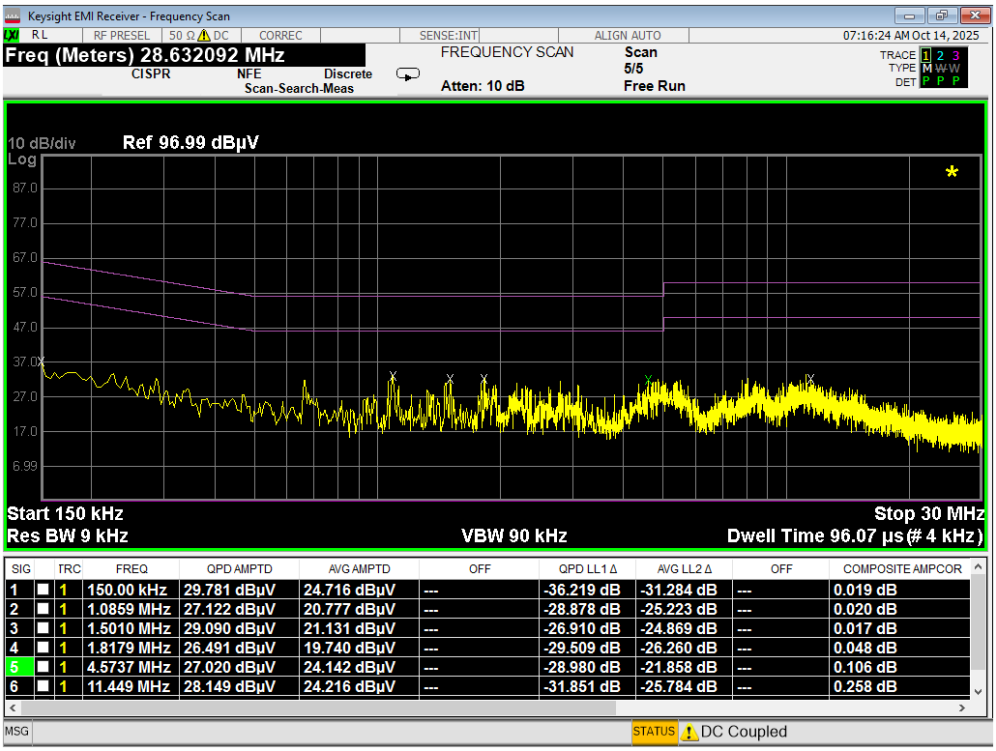


Table 7-34. Line-Conducted Test Data (N) - WCP

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMS942B** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules.

- END OF TEST REPORT -