

Plot 7-113. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 0) – ANT2



Plot 7-114. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps - Ch. 78) - ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga ZE of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 75 of 137
© 2023 ELEMENT		·	V 11.0 07/06/2023





Plot 7-115. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps – Ch. 0) – ANT2



Plot 7-116. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps - Ch. 78) - ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 76 of 197
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 76 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023





Plot 7-117. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps - Ch. 0) - Dual ANT1



Plot 7-118. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 78) – Dual ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga 77 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 77 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023





Plot 7-119. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – Dual ANT1



Plot 7-120. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – Dual ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 70 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 78 of 137
© 2023 ELEMENT			V 11.0 07/06/2023





Plot 7-121. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 0) – Dual ANT2



Plot 7-122. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps - Ch. 78) - Dual ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 70 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 79 of 137
© 2023 ELEMENT	·	·	V 11.0 07/06/2023





Plot 7-123. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps – Ch. 0) – Dual ANT2



Plot 7-124. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps – Ch. 78) – Dual ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 80 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023



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 C63.10-2013 - 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.

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dava 04 of 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 81 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



Frequency [MHz]	Data Rate [Mbps]	Mod.	Channel No.	Min. Channel Separation [MHz]
2402	1.0	GFSK	0	0.626
2441	1.0	GFSK	39	0.628
2480	1.0	GFSK	78	0.641
2402	2.0	π/4-DQPSK	0	0.903
2441	2.0	π/4-DQPSK	39	0.823
2480	2.0	π/4-DQPSK	78	0.869
2402	3.0	8DPSK	0	0.851
2441	3.0	8DPSK	39	0.877
2480	3.0	8DPSK	78	0.877

Table 7-9. Minimum Channel Separation – ANT1

Frequency [MHz]	Data Rate [Mbps]	Mod.	Channel No.	Min. Channel Separation [MHz]
2402	1.0	GFSK	0	0.628
2441	1.0	GFSK	39	0.630
2480	1.0	GFSK	78	0.626
2402	2.0	π/4-DQPSK	0	0.891
2441	2.0	π/4-DQPSK	39	0.901
2480	2.0	π/4-DQPSK	78	0.877
2402	3.0	8DPSK	0	0.887
2441	3.0	8DPSK	39	0.884
2480	3.0	8DPSK	78	0.891

Table 7-10. Minimum Channel Separation – ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 92 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 82 of 137
© 2022 ELEMENT		•	V 11 0 07/06/2022





Plot 7-125. Channel Spacing Plot (Bluetooth) – ANT1



Plot 7-126. Channel Spacing Plot (Bluetooth) – ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 02 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 83 of 137
© 2023 ELEMENT			V 11.0 07/06/2023



Frequency [MHz]	Data Rate [Mbps]	Mod.	Channel No.	Min. Channel Separation [MHz]
2402	1.0	GFSK	0	0.794
2441	1.0	GFSK	39	0.789
2480	1.0	GFSK	78	0.802
2402	2.0	π/4-DQPSK	0	0.920
2441	2.0	π/4-DQPSK	39	0.923
2480	2.0	π/4-DQPSK	78	0.919
2402	3.0	8DPSK	0	0.913
2441	3.0	8DPSK	39	0.906
2480	3.0	8DPSK	78	0.921

Table 7-11. Minimum Channel Separation – Dual ANT1

Frequency [MHz]	Data Rate [Mbps]	Mod.	Channel No.	Min. Channel Separation [MHz]
2402	1.0	GFSK	0	0.437
2441	1.0	GFSK	39	0.437
2480	1.0	GFSK	78	0.441
2402	1.0	GFSK	0	0.879
2441	1.0	GFSK	39	0.890
2480	1.0	GFSK	78	0.851
2402	2.0	π/4-DQPSK	0	0.864
2441	2.0	π/4-DQPSK	39	0.864
2480	2.0	π/4-DQPSK	78	0.881

 Table 7-12. Minimum Channel Separation – Dual ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 94 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 84 of 137
© 2023 ELEMENT			\/ 11 0 07/06/2023





Plot 7-127. Channel Spacing Plot (Bluetooth) - Dual ANT1



Plot 7-128. Channel Spacing Plot (Bluetooth) –Dual ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 95 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 85 of 137
© 2023 ELEMENT	-		V 11.0 07/06/2023



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 C63.10-2013 - Section 7.8.4

Test Settings

- 1. Span = zero span, centered on a hopping channel
- 2. RBW \leq 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.



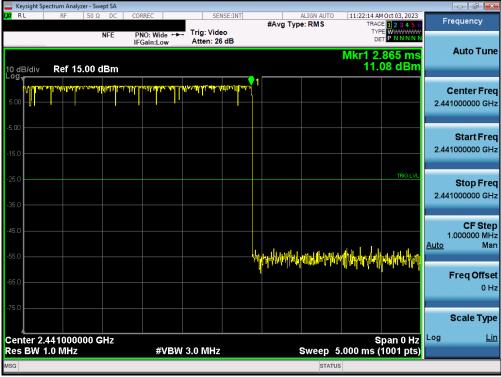
Figure 7-5. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 96 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 86 of 137
© 2023 ELEMENT	•	•	V 11.0 07/06/2023





Plot 7-129. Time of Occupancy Plot (Bluetooth) – ANT1

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

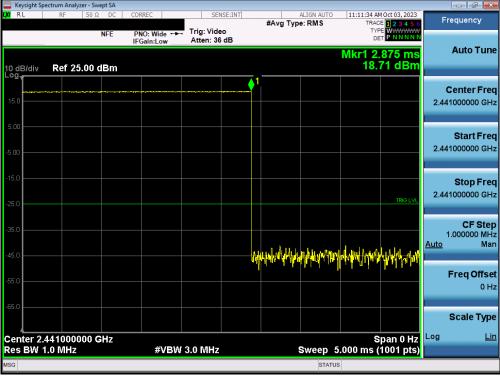
- 400ms x 79 hopping channels = 31.6 sec (Time of Occupancy Limit)
- Worst case BT has 266.67 hops/second (for 1x/EDR modes with DH5 operation)
- 266.67 hops/second / 79 channels = 3.38 hops/second (# of hops/second on one channel)
- 3.38 hops/second/channel x 31.6 seconds = 106.67 hops (# hops over a 31.6 second period)
- 106.67 hops x 2.865ms/channel = 305.61 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)
- o 53.34 hops x 2.865 ms/channel = 152.82 ms (worst case dwell time for one channel in AFH mode)

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 07 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 87 of 137
© 2023 ELEMENT		·	V 11.0 07/06/2023





Plot 7-130. Time of Occupancy Plot (Bluetooth) – ANT2

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

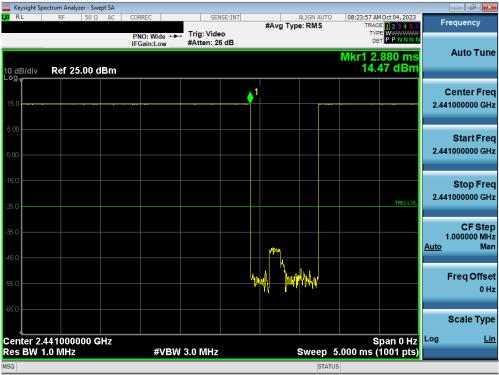
- 400ms x 79 hopping channels = 31.6 sec (Time of Occupancy Limit)
- Worst case BT has 266.67 hops/second (for 1x/EDR modes with DH5 operation)
- 266.67 hops/second / 79 channels = 3.38 hops/second (# of hops/second on one channel)
- 3.38 hops/second/channel x 31.6 seconds = 106.67 hops (# hops over a 31.6 second period)
- 106.67 hops x 2.875ms/channel = 306.68 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)
- o 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)
- o 53.34 hops x 2.875 ms/channel = 153.35 ms (worst case dwell time for one channel in AFH mode)

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dama 00 at 407	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 88 of 137	
© 2023 ELEMENT	•		V 11.0 07/06/2023	





Plot 7-131. Time of Occupancy Plot (Bluetooth) – Dual ANT1

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

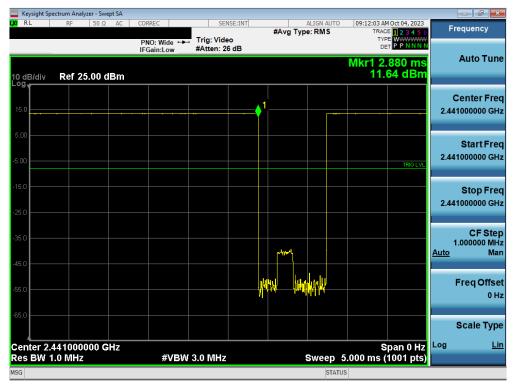
- 400ms x 79 hopping channels = 31.6 sec (Time of Occupancy Limit)
- Worst case BT has 266.67 hops/second (for 1x/EDR modes with DH5 operation)
- 266.67 hops/second / 79 channels = 3.38 hops/second (# of hops/second on one channel)
- 3.38 hops/second/channel x 31.6 seconds = 106.67 hops (# hops over a 31.6 second period)
- 106.67 hops x 2.880 ms/channel = 307.21 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)
- o 53.34 hops x 2.880 ms/channel = 153.62 ms (worst case dwell time for one channel in AFH mode)

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 00 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 89 of 137
© 2023 ELEMENT	-	·	V 11.0 07/06/2023





Plot 7-132. Time of Occupancy Plot (Bluetooth) – ANT1

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 2.880 ms/channel = 307.21 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)
- o 53.34 hops x 2.880 ms/channel = 153.62 ms (worst case dwell time for one channel in AFH mode)

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 00 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 90 of 137
© 2023 ELEMENT	·		V 11.0 07/06/2023



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 C63.10-2013 - 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.



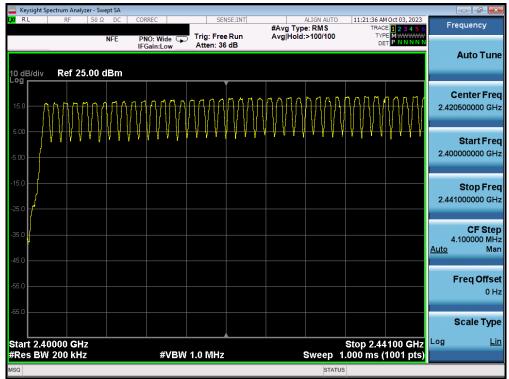
Figure 7-6. Test Instrument & Measurement Setup

Test Notes

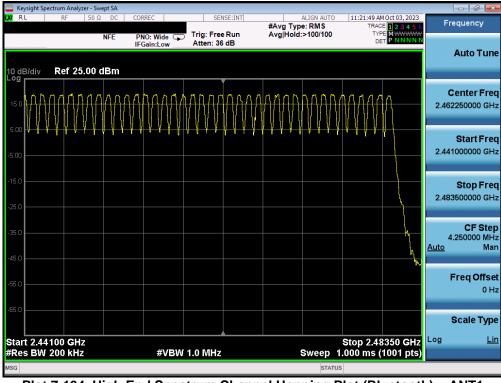
The frequency spectrum was broken up into two sub-ranges to clearly show all the hopping frequencies. In AFH mode, this device operates using 20 channels so the requirement for minimum number of hopping channels is satisfied.

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 04 of 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 91 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023





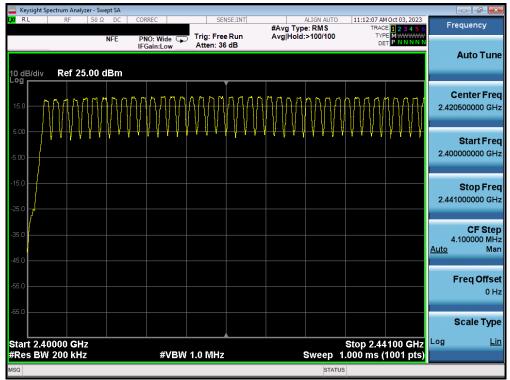
Plot 7-133. Low End Spectrum Channel Hopping Plot (Bluetooth) – ANT1



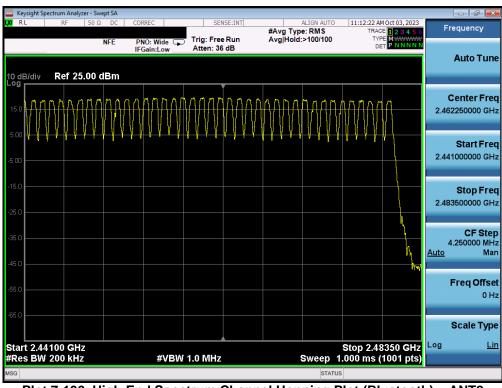
Plot 7-134. High End Spectrum Channel Hopping Plot (Bluetooth) – ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 02 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 92 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023





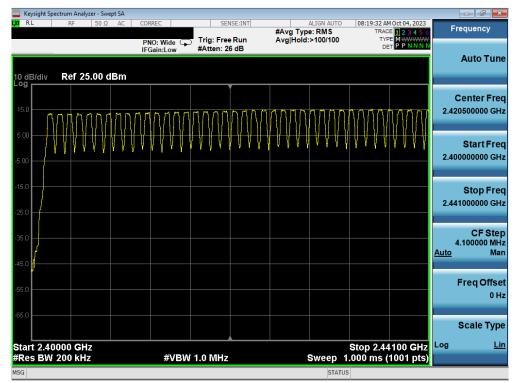
Plot 7-135. Low End Spectrum Channel Hopping Plot (Bluetooth) – ANT2



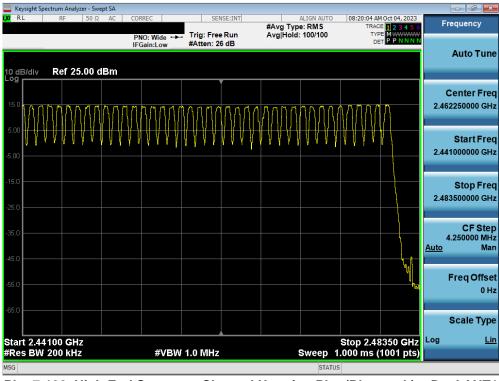
Plot 7-136. High End Spectrum Channel Hopping Plot (Bluetooth) – ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 02 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 93 of 137
© 2023 ELEMENT	-		V 11.0 07/06/2023





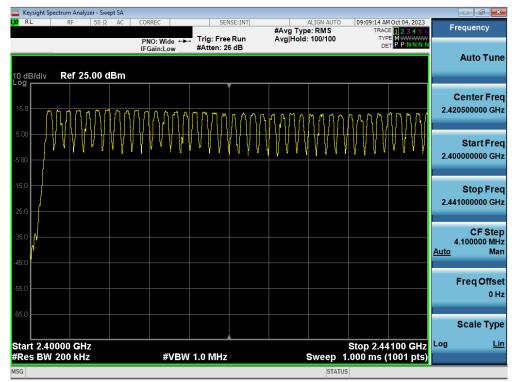




Plot 7-138. High End Spectrum Channel Hopping Plot (Bluetooth) – Dual ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 94 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023





Plot 7-139. Low End Spectrum Channel Hopping Plot (Bluetooth) – Dual ANT2



Plot 7-140. High End Spectrum Channel Hopping Plot (Bluetooth) – Dual ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)				
Test Report S/N:	Test Dates:	EUT Type:	Dage OF of 127			
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 95 of 137			
© 2023 ELEMENT	·		V 11.0 07/06/2023			



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 C63.10-2013 - Section 7.8.8

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

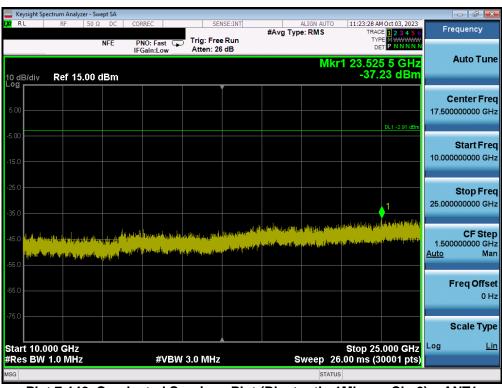
Out-of-band conducted spurious emissions were investigated for all data rates and the worst-case emissions were found with the EUT transmitting at 1Mbps. The display line shown in the following plots is the limit at 20dB below the fundamental emission level measured in a 100kHz bandwidth. However, the 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.

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)					
Test Report S/N:	Test Dates:	EUT Type:					
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 96 of 137				
© 2023 ELEMENT	-		V 11.0 07/06/2023				



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-55.0 Alan 199	and New Ardenese	nus an an th	Nejedinale	. 1 .	na oth s	** ¥ 4 * 10	THE PARTING	rr • •				
-65.0												F req Offse 0 Hz
-75.0												Scale Type
Start 30 N #Res BW				#VBW	3.0 MHz		s	ween	Stop 1	0.000 GHz 30001 pts)	Log	Lin
ISG	ine miliz			W V E V V				STA		oacor piloj		

Plot 7-141. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 0) - ANT1



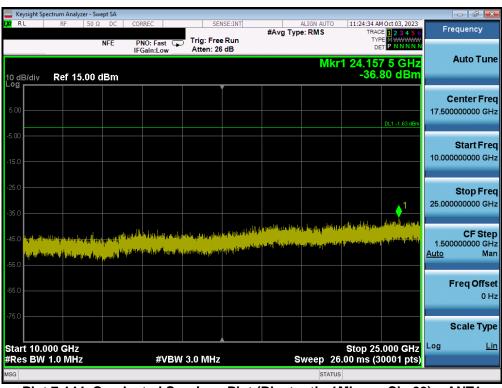
Plot 7-142. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 0) - ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)					
Test Report S/N:	Test Dates:	EUT Type:	Dage 07 of 127				
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 97 of 137				
© 2023 ELEMENT		·	V 11.0 07/06/2023				



		nalyzer - Swe											
u RL	RF	50 Ω	DC NFE	COR	REC		e Run	#Avg Typ	ALIGN AUT e: RMS	TF	0 AM Oct 03, 2023 RACE 1 2 3 4 5 6 TYPE M	Frequ	iency
0 dB/div	Ref	15.00 d		IFG	ain:Low	Atten: 26	6 dB		N	Vlkr1 4.9 -4	79 1 GHz 1.88 dBm	Au	ito Tun
5.00											DL1 -1.63 dBm	Cen 5.01500	i ter Fre 0000 G⊦
15.00													t art Fre 0000 M⊦
25.0												St 10.00000	t op Fre 0000 Gi
45.0	A REAL PROPERTY IN	gan generation en catalogia		erteren på på Andre som forska som	landiga baharinga Matagang baharing	a di <mark>ng kagalari pert</mark> Mangalari pert		^{hla} nning finn '	nya tangan yan Natika di kawa	pender ^{fo} rger Margar Ale retyen J ^{erre} nstellen sociale	pariyyi tiyarayaday pilayi layidayadar	997.000 <u>Auto</u>	CF Ste 0000 MI M
55.0	n a cha Miterandri	, park ar fil di di di										Fre	e q Offs 0 I
75.0	MHz_									Stop	10.000 GHz	Sc: Log	ale Typ L
Res BW		Hz			#VBV	V 3.0 MHz		s	weep	18.00 ms	(30001 pts)		
G									STA	TUS			

Plot 7-143. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 39) - ANT1



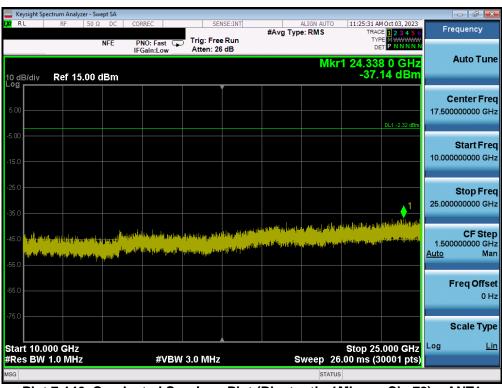
Plot 7-144. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 39) - ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)					
Test Report S/N:	Test Dates:	EUT Type:	Dage 09 of 127				
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 98 of 137				
© 2023 ELEMENT	•	·	V 11.0 07/06/2023				



	ectrum Analyzer										
X/RL	RF	50Ω DC	CORREC		NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRA	M Oct 03, 2023	Freque	ncy
		NFE	PNO: Fast G	Trig: Free Atten: 26	e Run 6 dB			TY D	PE MWWWWW ET PNNNNN		
10 dB/div	Ref 15.0	00 dBm	II GUIILLOW				Μ	lkr1 8.93 -42.	1 5 GHz 27 dBm	Auto	o Tune
5.00									DL1 -2.32 dBm	Cente 5.0150000	e r Freq 000 GHz
-5.00										Sta 30.0000	rt Freq 000 MHz
-25.0									1	Sto 10.0000000	p Freq 000 GHz
-45.0	A REPORTED FOR	Jana and a	eteren en din en priste 19 marie - Paris Angler				ang ti kang ti dapat Kang ti dapat	d ga da kana sa	latelepudeaselept potelaaritespitelep	C 997.0000 <u>Auto</u>	F Step 000 MHz Man
-65.0	_{ha} lan inf ginaligited b	In the second								Freq	Offset 0 Hz
-75.0	ИНZ							Stop 10	.000 GHz	Scal	e Type <u>Lin</u>
#Res BW			#VBV	V 3.0 MHz		S	weep 1	8.00 ms (3	30001 pts)		
MSG							STAT	US			

Plot 7-145. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 78) - ANT1



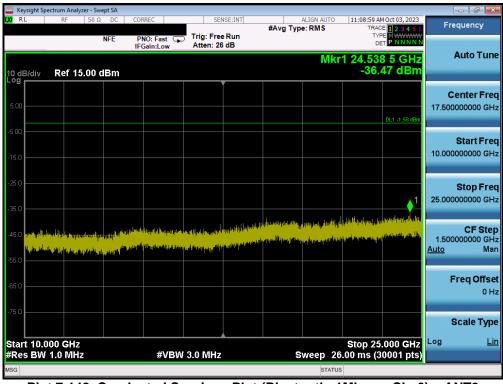
Plot 7-146. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 78) - ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)				
Test Report S/N:	Test Dates:	EUT Type:	Dage 00 of 127			
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 99 of 137			
© 2023 ELEMENT	-		V 11.0 07/06/2023			



	ectrum Analyzer										_	- P X
IXI RL	RF 5	50Ω DC	CORF	REC		NSE:INT	#Avg Typ	ALIGN AUT e: RMS		AM Oct 03, 2023 ACE 1 2 3 4 5 6	Fre	quency
		NFE		0:Fast 🔾 ain:Low	Trig: Free Atten: 26				Т	DET PNNNN		
	B-645.0								/kr1 9.72	29 1 GHz .08 dBm		Auto Tune
10 dB/div ^{Log} r	Ref 15.0	U aBm			, ,	•			-42	.00 abm		
												enter Freq
5.00										DI 4 4 50 dD=	5.015	000000 GHz
-5.00										DL1 -1.58 dBm		
												Start Freq
-15.0											30.0	000000 MHz
-25.0												
-25.0												Stop Freq
-35.0										<u> </u>	10.000	000000 GHz
										∳'		CF Step
-45.0			National	n ₍ , a <mark>fullit</mark> and	THE REAL PROPERTY OF	de l'arriver de la	Witten Start	iner ^{it} ille ^{, i} ngel	anglara (Jang, Anglada	alan ayan a bilar		000000 MHz
-55.0 tako a li	and the second states	1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -		inelisi, fullifi	i ka jila a jilila d	A.A.A.	(han a l	h li ^{nk} udilaa	lite of the other states of		<u>Auto</u>	Man
philliphik	and the second state line	Udite to a									_	
-65.0											F	req Offset 0 Hz
												0112
-75.0											S	cale Type
Start 30 I #Res BW				#VBW	/ 3.0 MHz		8	ween	Stop 1	0.000 GHz 30001 pts)	Log	Lin
MSG									TUS	6666 F p15)		

Plot 7-147. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 0) – ANT2



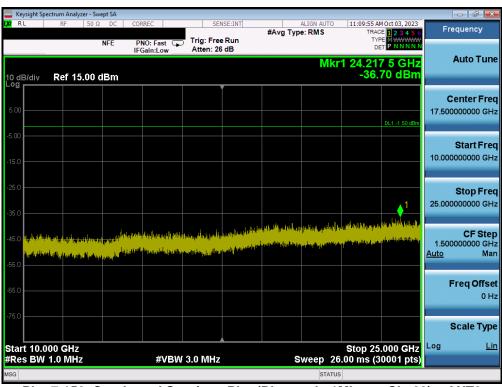
Plot 7-148. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 0) – ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)					
Test Report S/N:	Test Dates:	EUT Type:	Dage 100 of 127				
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 100 of 137				
© 2023 ELEMENT	-	· · · · · · · · · · · · · · · · · · ·	V 11.0 07/06/2023				



		lyzer - Swept										×
X/RL	RF	50 Ω	DC C	ORREC		NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Oct 03, 2023	Frequency	
		N	FE	PNO: Fast 🕞 FGain:Low	Trig: Free Atten: 26				TYI	PE MWWWWW ET PNNNNN		
10 dB/div Log	Ref 1	5.00 dE	3m					Μ	lkr1 8.41 -43.	8 1 GHz 03 dBm	Auto Tu	Jne
5.00										DL1 -1.50 dBm	Center F 5.015000000 0	
-5.00											Start Fi 30.000000 M	
-25.0											Stop Fr 10.000000000 0	
-45.0	Internation of the	and an internal star		an an the second second			and the second	ng ^{di} territorijen Little and territori	1 And the second second Second second	had the task of the state of the second s	CF St 997.000000 M <u>Auto</u> M	
-55.0 <mark> Ward 1</mark> -65.0	and a fill it is a second s	in lut (init initiality)									Freq Off 0	f se f 0 Hz
-75.0									Stop_10	.000 GHz	Scale Ty	ype Lir
#Res BW		lz		#VBV	/ 3.0 MHz		s	weep 1	8.00 ms (3	.000 GH2 0001 pts)		
ISG								STAT	US			

Plot 7-149. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 39) - ANT2



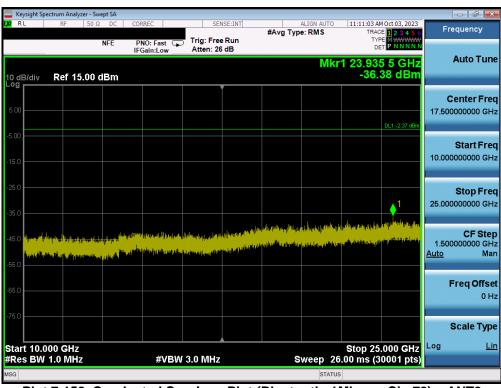
Plot 7-150. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 39) – ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)					
Test Report S/N:	Test Dates:	EUT Type:	Degs 101 of 127				
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 101 of 137				
© 2023 ELEMENT			V 11.0 07/06/2023				



	ectrum Analy		t SA								- # *
KI RL	RF		DC	CORREC	Fast 😱		#Avg Typ	ALIGN AUT e: RMS	TF	D AM Oct 03, 2023 RACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N	Frequency
10 dB/div	Ref 15			IFGain:		Atten: 26			Mkr1 4.9	68 8 GHz 2.83 dBm	Auto Tun
5.00										DL1 -2.37 dBm	Center Fre 5.015000000 GH
15.00											Start Fre 30.000000 M⊦
25.0											Stop Fre 10.000000000 GH
15.0	(marcelone),	low let u	de a Maline Se Maline	l <mark>eternet at tribe</mark> National and the second		and the second second		reep ^{rin} teprintege	er per ^{de} ndelingen og	a da ang ang ang ang ang ang ang ang ang an	CF Ste 997.000000 Mi <u>Auto</u> Ma
6.0 01 6.0	n han de la ser de la La ser de la		<u></u>								Freq Offs 0 I
75.0	MHz								Stop 7	10.000 GHz	Scale Tyr Log <u>L</u>
	1.0 MH	7			#VBW	3.0 MHz	8	ween	18.00 ms	(30001 pts)	

Plot 7-151. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 78) - ANT2



Plot 7-152. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 78) – ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 102 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 102 of 137
© 2023 ELEMENT	-		V 11.0 07/06/2023



	ctrum Analyzer - Swe										
LXI RL	RF 50 Ω	AC	CORREC	SEI	NSE:INT	#Avg Typ	ALIGN AUT e: RMS		M Oct 04, 2023	Fr	equency
			PNO: Fast ↔ IFGain:Low	, Trig: Free #Atten: 2		Avg Hold:	: 100/100	۲۷ ام Mkr1 7.06			Auto Tune
10 dB/div Log	Ref 25.00 d	lBm						-43.3	46 dBm		
15.0											Center Freq 5000000 GHz
5.00									DL1 -6.73 dBm	30	Start Freq .000000 MHz
-15.0										10.00	Stop Freq 0000000 GHz
-25.0							1			997 Auto	CF Step 7.000000 MHz Man
-45.0	n tanan da kabuna kabuna kabuna ka Kabuna kabuna kabuna kabuna kabuna kabuna kabuna kabuna kabuna kabuna kabuna Kabuna kabuna	ang alida ang alidada Ang alidada ang ang ang ang ang ang ang ang ang an									Freq Offset
-55.0	parents in any strategic field and the										0 Hz
-65.0											Scale Type
Start 30 Ⅳ #Res BW			#\/D\A	/ 3.0 MHz			ween	Stop 10 18.00 ms (3	0.000 GHz	Log	<u>Lin</u>
MSG	1.0 10112		# 0 0 0	1 5.0 Winz		3		TB.00 IIIS (J	locor pisj		





Plot 7-154. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 0) - Dual ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 102 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 103 of 137
© 2023 ELEMENT	-		V 11.0 07/06/2023



	ectrum Analyzer - Sw									_	
L <mark>XI</mark> RL	RF 50 S	2 AC	CORREC	SEN	NSE:INT	#Avg Typ	ALIGN AUTO		E 1 2 3 4 5 6	Fr	requency
			PNO:Fast ↔ IFGain:Low	, Trig: Free #Atten: 2		Avg Hold:		TYF			
10 dB/div Log	Ref 25.00	dBm					MI	kr1 5.94 -43.7	9 5 GHz 20 dBm		Auto Tune
15.0											Center Freq 5000000 GHz
5.00										5.01	3000000 GHZ
-5.00									DL1 -5.73 dBm	30	Start Freq 0.000000 MHz
-15.0											
-25.0										10.00	Stop Freq 0000000 GHz
-35.0											CF Step
-45.0						1				997 <u>Auto</u>	7.000000 MHz Man
+5.0						an a					Freq Offset
- in the second											0 Hz
-65.0											Scale Type
Start 30 N #Res BW			#VBV	/ 3.0 MHz		s	weep 18	Stop 10 3.00 ms (3		Log	<u>Lin</u>
MSG							STATU	s			

Plot 7-155. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 39) - Dual ANT1



Plot 7-156. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 39) - Dual ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 104 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 104 of 137
© 2023 ELEMENT			V 11.0 07/06/2023



	ectrum Analyzer - Sv										
LXI RL	RF 50 S	AC	CORREC	SEI	NSE:INT	#Avg Typ	ALIGN AUTO		E 1 2 3 4 5 6	F	requency
			PNO: Fast ↔ IFGain:Low	Trig: Free #Atten: 2		Avg Hold:		TYP			
10 dB/div Log	Ref 25.00	dBm					Μ	43.7 kr1 6	4 0 GHz 75 dBm		Auto Tune
											Center Freq
15.0										5.01	5000000 GHz
5.00											Start Freq
-5.00									DL1 -5.12 dBm	30	0.000000 MHz
-15.0											Stop Freq
-25.0										10.00	0000000 GHz
											CF Step
-35.0							1			99 Auto	7.000000 MHz Man
-45.0	المائل معالم معالمين المائل معالم معالم			atel, agticine i believille	alle gebrie en la litere Maria en la litere Maria en la caracteria de la compositione de la compositione de la compositione de la composi		and the opposite of the second se	No. 1			
-55.0 <mark>40-00-0</mark>	and the second s			and the particular of the state							Freq Offset 0 Hz
-65.0											
											Scale Type
Start 30 M #Res BW	/IHz 1.0 MHz		#VB\	N 3.0 MHz		S	weep 1	Stop 10 8.00 ms (3		Log	<u>Lin</u>
MSG							STATU				

Plot 7-157. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 78) - Dual ANT1



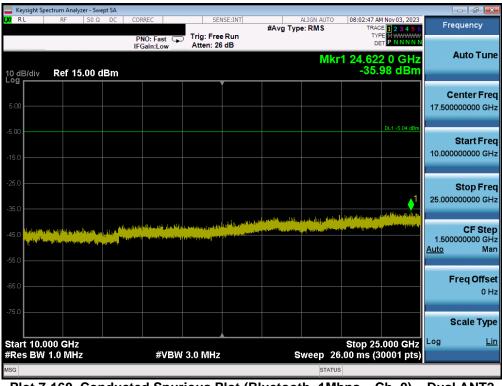
Plot 7-158. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 78) - Dual ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 105 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 105 of 137
© 2023 ELEMENT			V 11.0 07/06/2023



		alyzer - Swep										_	
LXI RL	RF	50 Ω	DC	CORRE	C	SEI	NSE:INT	#Avg Typ	ALIGN AUTO e: RMS		M Nov 03, 2023	Fr	equency
					:Fast 🖵 n:Low	Trig: Free Atten: 26		• //		TYI Di			Auto Tune
10 dB/div Log	Ref 1	15.00 dE	Зm						M	kr1 4.94 -42.	9 9 GHz 11 dBm		Auto Tune
													Center Freq
5.00												5.01	5000000 GHz
-5.00											DL1 -5.04 dBm		Start Freq
-15.0												30	.000000 MHz
-25.0													Stop Freq
-35.0							ļ					10.00	0000000 GHz
-45.0					، شاہ .	-	1	-	alla carata		a an		CF Step
.	, No. King to P	ipperite distant	n failige anna a Staite anna anna anna anna anna anna anna an			A CONTRACTOR OF STREET				أقريب فيريد الخريطان		997 <u>Auto</u>	.000000 MHz Man
-55.0													Freq Offsel
-65.0													0 Hz
-75.0													Scale Type
Start 30 I	VIH7									Stop 10	.000 GHz	Log	Lin
#Res BW		Ηz			#VBW	3.0 MHz		s	weep 1	8.00 ms (3	00001 pts)		
MSG									STATU	s			

Plot 7-159. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 0) – Dual ANT2



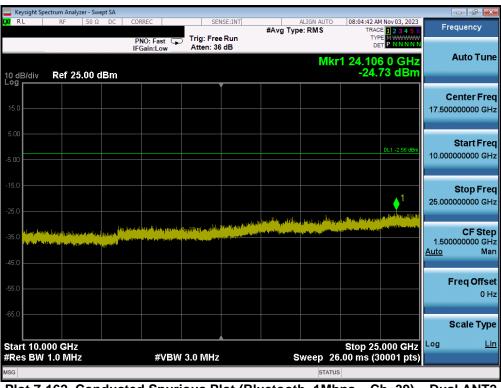
Plot 7-160. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 0) - Dual ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 106 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 106 of 137
© 2023 ELEMENT			V 11.0 07/06/2023



		ctrum Ai	nalyzer - Sw													
l XI RI	L	RF	50 Ω	DC	CC	RREC		SEI	NSE:INT	#Avg Typ	ALIGN AUT	TO 0		Nov 03, 2023	F	requency
						NO: Fas Gain:Lo		Trig: Free Atten: 36					TYP			
10 dE Log i	3/div	Ref	25.00 c	dBm								Mkr1	3.782 -33.9	2 0 GHz 16 dBm		Auto Tune
15.0																Center Freq 5000000 GHz
5.00																Start Freq
-5.00														DL1 -2.56 dBm	30	0.000000 MHz
-15.0															10.00	Stop Freq
-25.0 -35.0					. Uda at casta ta	d thursday in the state	1	ala tata a	and the second	al hope a figure spirit	and succession	Ti, Din madu	- less that the	(per synamic per sent	997	CF Step 7.000000 MHz
-45.0	performations	ullaykur.	a gaa <mark>bayaa bayaa ba</mark> ada		uplicants)			New York and A State of State		(Denstifygggikensif			A summer and first succession		<u>Auto</u>	Man
-55.0																Freq Offset 0 Hz
-65.0																Scale Type
	t 30 N											S	top 10.		Log	<u>Lin</u>
#Res	s BW	1.0 M	Hz			#\	/BW	3.0 MHz		s	weep	18.00	ms (3	0001 pts)		
MSG											ST/	ATUS				





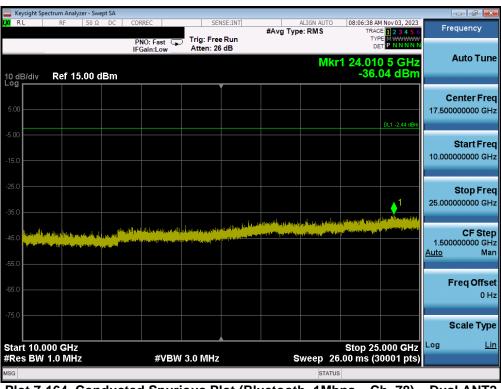
Plot 7-162. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 39) – Dual ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 107 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 107 of 137
© 2023 ELEMENT			V 11.0 07/06/2023



	🔤 Keysight Spectrum Analyzer - Swept SA 🛛 👘 🔂 🔂								- 0					
lxi R	L	RF	<u>50 Ω</u>	DC	COF	RREC		ENSE:INT	#Avg Typ	ALIGN AU [*] e: RMS	TRA	M Nov 03, 2023 CE 1 2 3 4 5 6	Fre	equency
						NO:Fast C Gain:Low	Trig: Fre Atten: 2				נ	PE MWWWW ET PNNNNN		
10 dl Log	B/div	Ref	15.00 c	lBm	1						Mkr1 9.98 -41	1 4 GHz 84 dBm		Auto Tune
5.00												DL1 -2.44 dBm		enter Freq 000000 GHz
													30.	Start Freq 000000 MHz
												1	10.000	Stop Freq 0000000 GHz
-45.0 -55.0	Jeres Jacobil		a a dista da di si sa di si sa di si sa di si sa di si	National de la companya	रहा [।] प्रश्नाह								997. <u>Auto</u>	CF Step 000000 MHz Man
	And States												F	F req Offset 0 Hz
														Scale Type
	t 30 M sBW		1117			#\/D	W 3.0 MH:		-	woop	Stop 10 18.00 ms (3	0.000 GHz	Log	Lin
	SEW	1.0 1				#vB	W 3.0 MIH		5			sooo r pis)		
MSG										ST	ATUS			

Plot 7-163. Conducted Spurious Plot (Bluetooth, 1Mbps - Ch. 78) - Dual ANT2



Plot 7-164. Conducted Spurious Plot (Bluetooth, 1Mbps – Ch. 78) – Dual ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 100 of 127	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 108 of 137	
© 2023 ELEMENT			V 11.0 07/06/2023	



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 C63.10-2013 - Section 6.6.4.3

Test Settings

Average Field Strength Measurements per Section 4.1.4.2.3 of ANSI C63.10-2013

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 1kHz \ge 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 4.1.4.2.2 of ANSI C63.10-2013

- 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

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 100 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 109 of 137
© 2023 ELEMENT	<u>.</u>		V 11.0 07/06/2023



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.

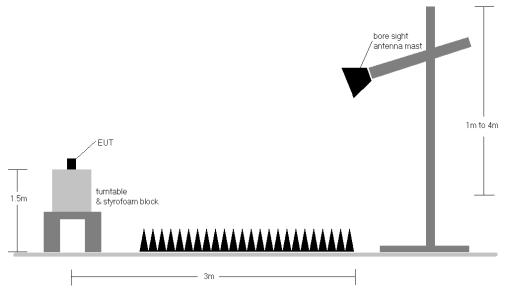


Figure 7-8. Radiated Test Setup >1GHz

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.

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	
Test Report S/N:	Test Dates:	EUT Type:	Dama 440 af 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 110 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



Sample Calculation

- ο Field Strength Level [dBµV/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 $[dB\mu V/m]$

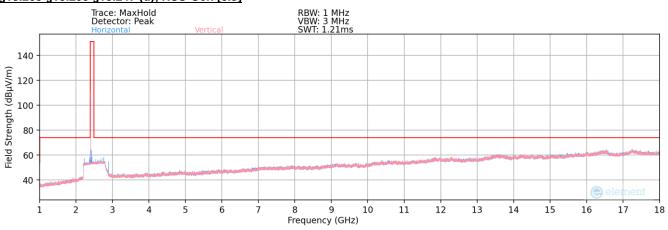
Duty Cycle Correction Factor Calculation

- 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 = 20log₁₀(7.5ms/100ms) = -22.5 dB

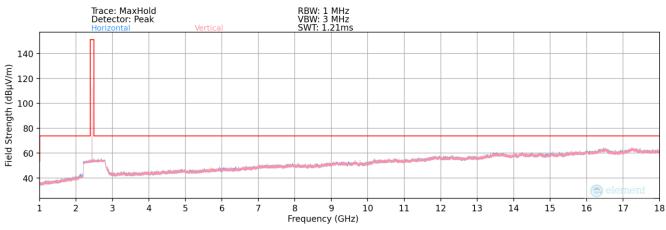
FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dogo 111 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 111 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023

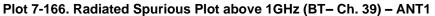


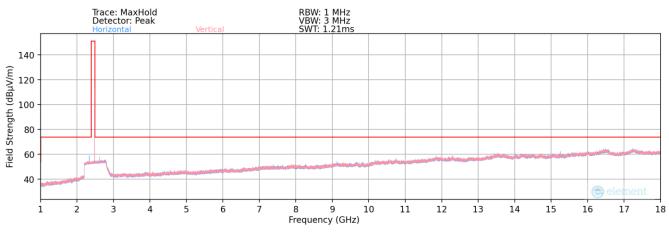
Radiated Spurious Emission Measurements – ANT1 §15.205 §15.209 §15.247 (d); RSS-Gen [8.9]









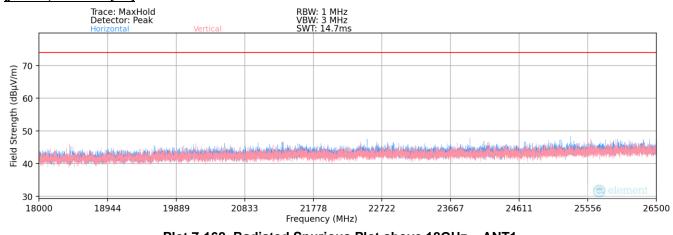


Plot 7-167. Radiated Spurious Plot above 1GHz (BT- Ch. 78) - ANT1

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 112 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 112 of 137
© 2023 ELEMENT		· · · · · · · · · · · · · · · · · · ·	V 11.0 07/06/2023



Radiated Spurious Emissions Measurements (Above 18GHz) – ANT1 §15.209; RSS-Gen [8.9]



Plot 7-168. Radiated Spurious Plot above 18GHz – ANT1

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 112 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 113 of 137
© 2023 ELEMENT	-		V 11.0 07/06/2023



Radiated Spurious Emission Measurements – ANT1 §15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

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	Н	213	333	-79.18	9.22	-22.50	14.54	53.98	-39.44
4804.00	Peak	Н	213	333	-68.26	9.22	0.00	47.96	73.98	-26.02
12010.00	Avg	Н	-	-	-83.82	22.37	0.00	45.55	53.98	-8.43
12010.00	Peak	Н	-	-	-72.12	22.37	0.00	57.25	73.98	-16.73

Table 7-15. Radiated Measurements – ANT1

Worst Case Mode: Worst Case Data Rate: Measurement Distance: Operating Frequency: Channel: Bluetooth 1 Mbps 3 Meters 2441MHz 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	Н	215	329	-79.35	9.56	-22.50	14.71	53.98	-39.27
4882.00	Peak	Н	215	329	-68.20	9.56	0.00	48.36	73.98	-25.62
7323.00	Avg	Н	-	-	-82.71	14.99	0.00	39.28	53.98	-14.70
7323.00	Peak	Н	-	-	-71.00	14.99	0.00	50.99	73.98	-22.99
12205.00	Avg	н	-	-	-84.19	22.76	0.00	45.57	53.98	-8.41
12205.00	Peak	Н	-	-	-72.33	22.76	0.00	57.43	73.98	-16.55

Table 7-16. Radiated Measurements – ANT1

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dego 111 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 114 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



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

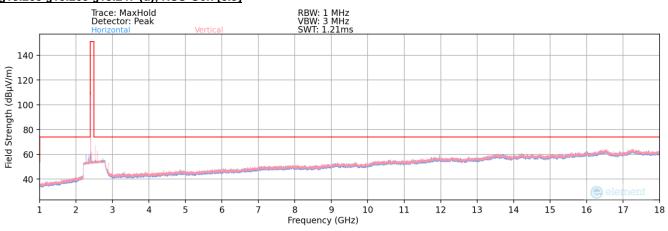
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4960.00	Avg	Н	165	330	-79.64	9.57	-22.50	14.43	53.98	-39.55
4960.00	Peak	Н	165	330	-68.80	9.57	0.00	47.77	73.98	-26.21
7440.00	Avg	н	-	-	-82.98	15.20	0.00	39.22	53.98	-14.76
7440.00	Peak	н	-	-	-71.02	15.20	0.00	51.18	73.98	-22.80
12400.00	Avg	н	-	-	-84.48	23.25	0.00	45.77	53.98	-8.21
12400.00	Peak	Н	-	-	-73.18	23.25	0.00	57.07	73.98	-16.91

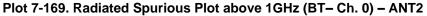
Table 7-17. Radiated Measurements – ANT1

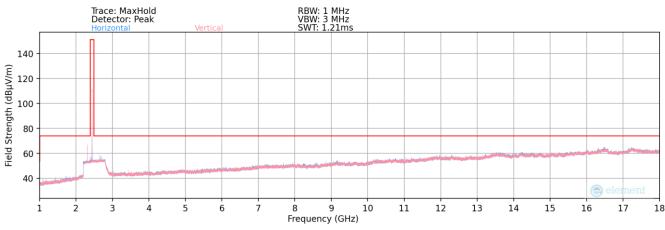
FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 115 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 115 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023

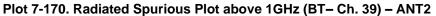


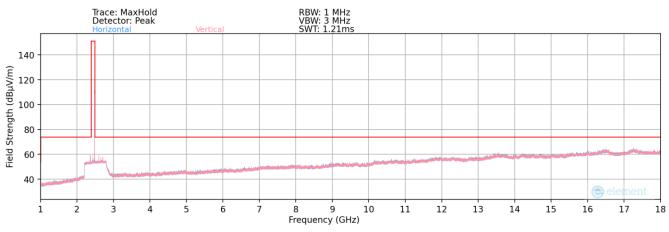
Radiated Spurious Emission Measurements – ANT2 §15.205 §15.209 §15.247 (d); RSS-Gen [8.9]









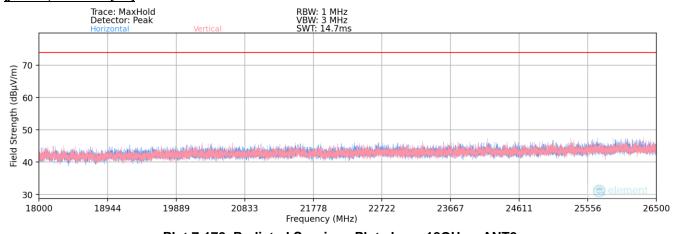


Plot 7-171. Radiated Spurious Plot above 1GHz (BT- Ch. 78) - ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 116 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 116 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



Radiated Spurious Emissions Measurements (Above 18GHz) – ANT2 §15.209; RSS-Gen [8.9]



Plot 7-172. Radiated Spurious Plot above 18GHz – ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dego 117 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 117 of 137
© 2023 ELEMENT	•	•	V 11.0 07/06/2023



Radiated Spurious Emission Measurements – ANT2 §15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

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]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	Н	-	-	-81.16	9.22	35.06	53.98	-18.92
4804.00	Peak	н	-	-	-68.73	9.22	47.49	73.98	-26.49
12010.00	Avg	н	-	-	-83.81	22.37	45.56	53.98	-8.42
12010.00	Peak	Н	-	-	-71.39	22.37	57.98	73.98	-16.00

Table 7-18. Radiated Measurements – ANT2

Worst Case Mode: Worst Case Data Rate: Measurement Distance: Operating Frequency: Channel:

Bluetooth
1 Mbps
3 Meters
2441MHz
39

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]
4882.00	Avg	Н	-	-	-81.16	9.56	35.40	53.98	-18.58
4882.00	Peak	Н	-	-	-68.91	9.56	47.65	73.98	-26.33
7323.00	Avg	н	-	-	-82.78	14.99	39.21	53.98	-14.77
7323.00	Peak	Н	-	-	-70.27	14.99	51.72	73.98	-22.26
12205.00	Avg	Н	-	-	-84.27	22.76	45.49	53.98	-8.49
12205.00	Peak	Н	-	-	-72.62	22.76	57.14	73.98	-16.84

Table 7-19. Radiated Measurements – ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)				
Test Report S/N:	Test Dates:	EUT Type:	Dego 110 of 127			
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 118 of 137			
© 2023 ELEMENT	•		V 11.0 07/06/2023			



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

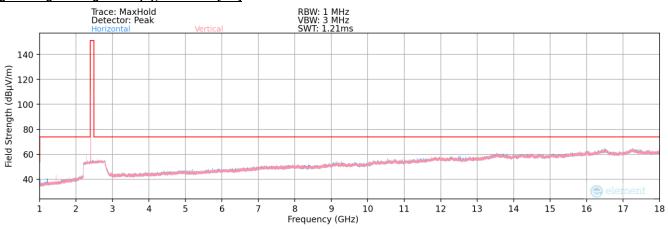
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4960.00	Avg	Н	117	39	-81.01	9.57	-22.50	13.06	53.98	-40.92
4960.00	Peak	Н	117	39	-69.42	9.57	0.00	47.15	73.98	-26.83
7440.00	Avg	н	-	-	-82.82	15.20	0.00	39.38	53.98	-14.60
7440.00	Peak	Н	-	-	-70.97	15.20	0.00	51.23	73.98	-22.75
12400.00	Avg	н	-	-	-84.42	23.25	0.00	45.83	53.98	-8.15
12400.00	Peak	Н	-	-	-72.64	23.25	0.00	57.61	73.98	-16.37

Table 7-20. Radiated Measurements – ANT2

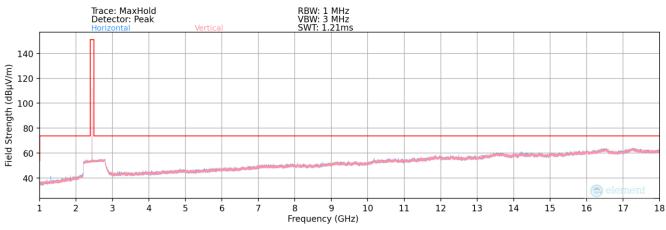
FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)				
Test Report S/N:	Test Dates:	EUT Type:	Dego 110 of 127			
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 119 of 137			
© 2023 ELEMENT	•	•	V 11.0 07/06/2023			

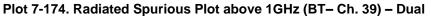


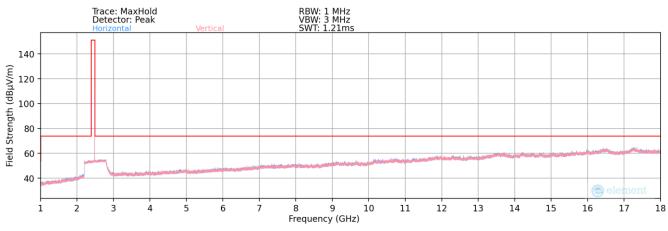
Radiated Spurious Emission Measurements – Dual §15.205 §15.209 §15.247 (d); RSS-Gen [8.9]









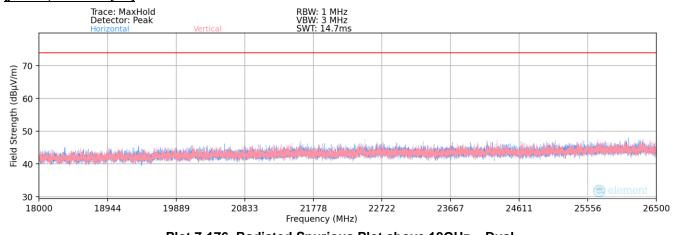


Plot 7-175. Radiated Spurious Plot above 1GHz (BT- Ch. 78) - Dual

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)			
Test Report S/N:	Test Dates:	EUT Type:	Dage 100 of 107		
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 120 of 137		
© 2023 ELEMENT		·	V 11.0 07/06/2023		



Radiated Spurious Emissions Measurements (Above 18GHz) – Dual §15.209; RSS-Gen [8.9]



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

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)				
Test Report S/N:	Test Dates:	EUT Type:	Page 121 of 137			
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 121 01 137			
© 2023 ELEMENT	•		V 11.0 07/06/2023			



Radiated Spurious Emission Measurements – Dual §15.205 §15.209 §15.247 (d); RSS-Gen [8.9]

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]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	Н	-	-	-81.16	9.22	35.06	53.98	-18.92
4804.00	Peak	Н	-	-	-69.10	9.22	47.12	73.98	-26.86
12010.00	Avg	н	-	-	-83.87	22.37	45.50	53.98	-8.48
12010.00	Peak	Н	-	-	-71.81	22.37	57.56	73.98	-16.42

Table 7-21. Radiated Measurements - Dual

Worst Case Mode: Worst Case Data Rate: Measurement Distance: **Operating Frequency:** Channel:

Bluetooth	
1 Mbps	
3 Meters	
2441MHz	
39	

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]
4882.00	Avg	Н	-	-	-81.12	9.56	35.44	53.98	-18.54
4882.00	Peak	н	-	-	-68.53	9.56	48.03	73.98	-25.95
7323.00	Avg	н	-	-	-82.67	14.99	39.32	53.98	-14.66
7323.00	Peak	н	-	-	-70.71	14.99	51.28	73.98	-22.70
12205.00	Avg	Н	-	-	-84.32	22.76	45.44	53.98	-8.54
12205.00	Peak	Н	-	-	-72.58	22.76	57.18	73.98	-16.80

Table 7-22. Radiated Measurements - Dual

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)		
Test Report S/N:	Test Dates:	EUT Type:	Dege 100 of 107	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 122 of 137	
© 2023 ELEMENT	•		V 11.0 07/06/2023	



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	Н	105	12	-79.52	9.57	-22.50	14.55	53.98	-39.43
4960.00	Peak	Н	105	12	-68.52	9.57	0.00	48.05	73.98	-25.93
7440.00	Avg	Н	-	-	-82.96	15.20	0.00	39.24	53.98	-14.74
7440.00	Peak	Н	-	-	-70.50	15.20	0.00	51.70	73.98	-22.28
12400.00	Avg	н	-	-	-84.43	23.25	0.00	45.82	53.98	-8.16
12400.00	Peak	Н	-	-	-72.44	23.25	0.00	57.81	73.98	-16.17

Table 7-23. Radiated Measurements – Dual

Worst Case Mode: Worst Case Data Rate: Measurement Distance: Operating Frequency: Channel:

Bluetooth
1 Mbps
3 Meters
2441MHz
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]
4960.00	Avg	Н	103	34	-81.01	9.57	-22.50	13.06	53.98	-40.92
4960.00	Peak	Н	103	34	-69.30	9.57	0.00	47.27	73.98	-26.71
7440.00	Avg	Н	-	-	-82.97	15.20	0.00	39.23	53.98	-14.75
7440.00	Peak	Н	-	-	-71.26	15.20	0.00	50.94	73.98	-23.04
12400.00	Avg	Н	-	-	-84.52	23.25	0.00	45.73	53.98	-8.25
12400.00	Peak	Н	-	-	-72.89	23.25	0.00	57.36	73.98	-16.62

Table 7-24. Radiated Measurements with WCP – Dual

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dega 102 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 123 of 137
© 2023 ELEMENT			V 11.0 07/06/2023



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 7-25. Radiated Limits

Test Procedure Used

ANSI C63.10-2013 - 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 C63.10-2013 Section 4.1.5.2
- 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

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)		
Test Report S/N:	Test Dates:	EUT Type:	Dogo 104 of 107	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 124 of 137	
© 2023 ELEMENT	•		V 11.0 07/06/2023	



Test Setup

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

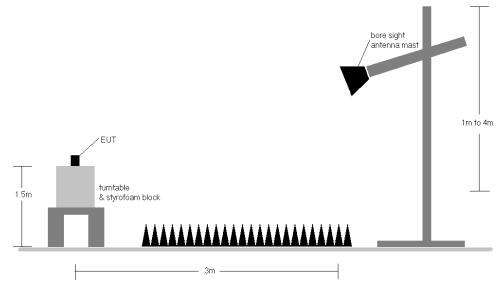


Figure 7-9. Radiated Test Setup >1GHz

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.

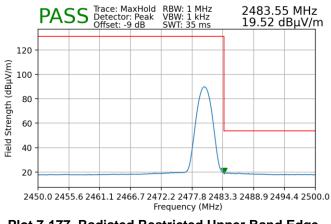
FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	
Test Report S/N:	Test Dates:	EUT Type:	Dega 105 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 125 of 137
© 2023 ELEMENT	·	· · · · · · · · · · · · · · · · · · ·	V 11.0 07/06/2023

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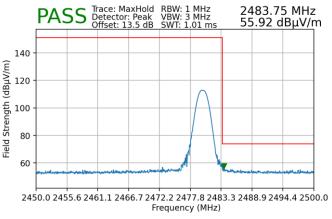


Radiated Band Edge Measurement – ANT1

Worst Case Mode:	Bluetooth
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) – ANT1



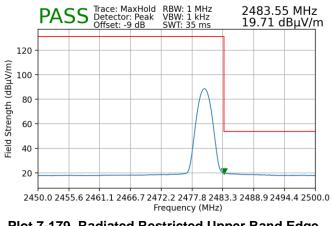
Plot 7-178. Radiated Restricted Upper Band Edge Measurement (Peak) – ANT1

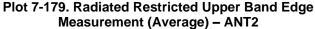
FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 100 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 126 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023

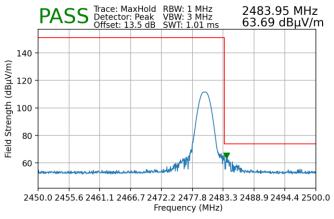


Radiated Band Edge Measurement – ANT2

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







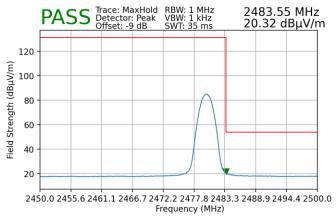
Plot 7-180. Radiated Restricted Upper Band Edge Measurement (Peak) – ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 107 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 127 of 137
© 2023 ELEMENT	·	·	V 11.0 07/06/2023

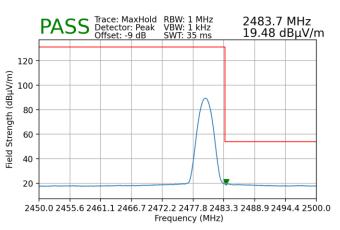


Radiated Band Edge Measurement – Dual

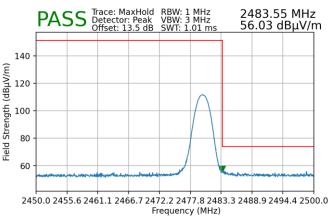
Worst Case Mode:	Bluetooth
Worst Case Data Rate:	3 Mbps
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	78



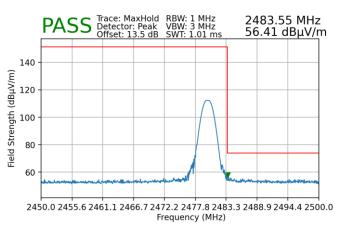
Plot 7-181. Radiated Restricted Upper Band Edge Measurement (Average) – Dual



Plot 7-183. Radiated Restricted Upper Band Edge Measurement (Average) – Dual – WPT



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



Plot 7-184. Radiated Restricted Upper Band Edge Measurement (Peak) – Dual – WPT

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 100 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 128 of 137
© 2023 ELEMENT	-		V 11.0 07/06/2023



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 7-26. Radiated Limits

Test Procedures Used

ANSI C63.10-2013

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

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 100 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 129 of 137
© 2023 ELEMENT		•	V 11.0 07/06/2023

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Test Setup

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

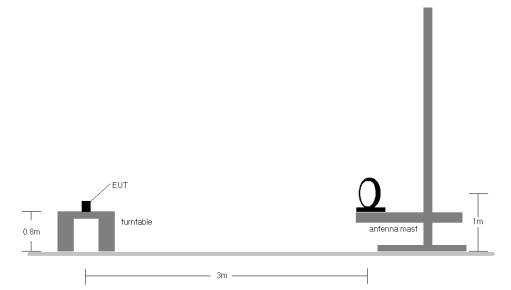
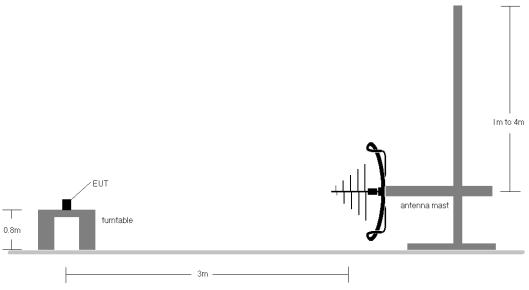
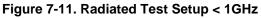


Figure 7-10. Radiated Test Setup < 30Mhz





FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 120 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 130 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



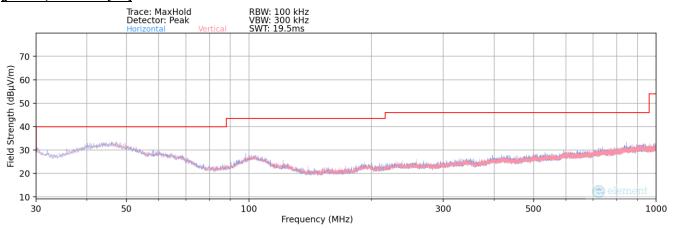
Test Notes

- 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.
- 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.

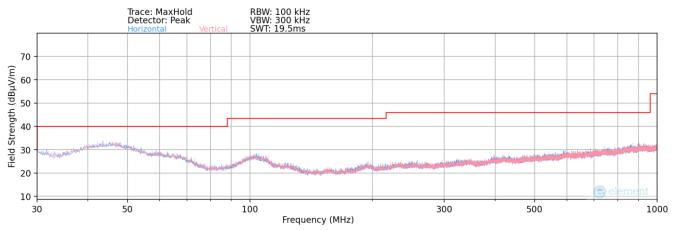
FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 121 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 131 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023



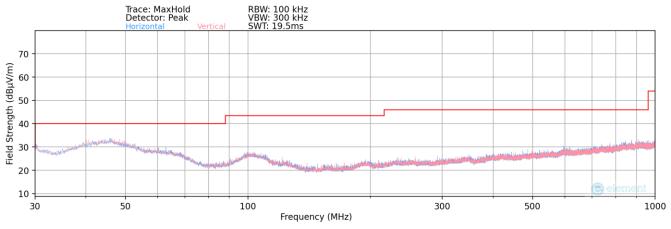
Radiated Spurious Emissions Measurements (Below 1GHz) §15.209; RSS-Gen [8.9]











Plot 7-187. Radiated Spurious Plot below 1GHz – Dual

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 122 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 132 of 137
© 2023 ELEMENT	-	•	V 11.0 07/06/2023



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 7-27. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10-2013, 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

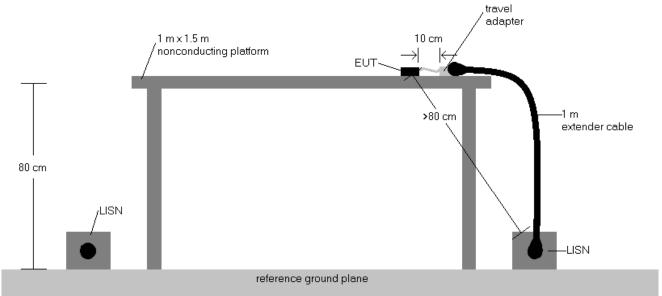
- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = RMS
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 122 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 133 of 137
© 2023 ELEMENT	·		V 11.0 07/06/2023



Test Setup

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



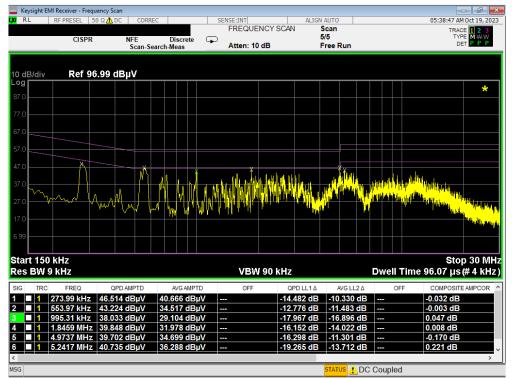


Test Notes

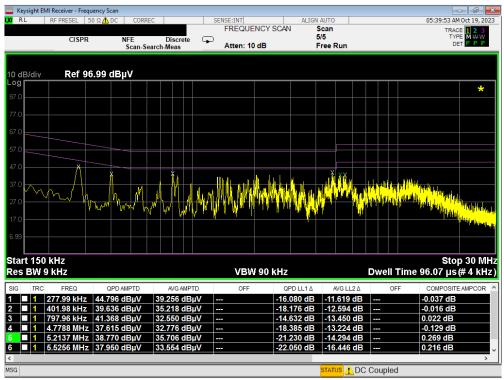
- All modes of operation were investigated, and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
- 2. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207 and RSS-Gen (8.8).
- 3.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

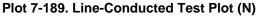
FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 124 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 134 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023





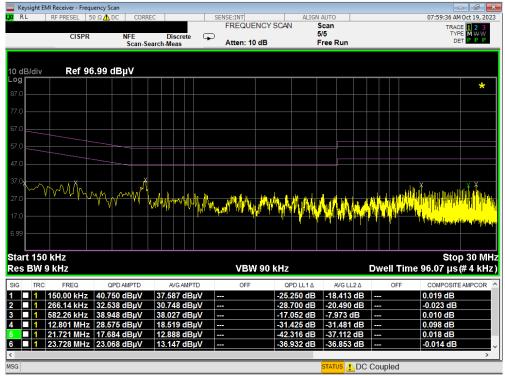
Plot 7-188. Line-Conducted Test Plot (L1)



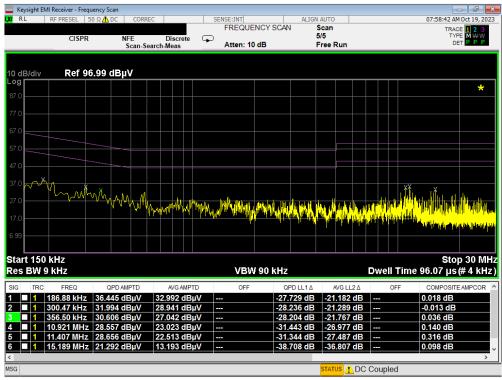


FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 125 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 135 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023





Plot 7-190. Line-Conducted Test Plot (L1) – WPT



Plot 7-191. Line-Conducted Test Plot (N) – WPT

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 136 of 137
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	
© 2023 ELEMENT	•		V 11.0 07/06/2023



8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMS928U** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules.

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 127 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 137 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023