

**ELEMENT WASHINGTON DC LLC** 

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## MEASUREMENT REPORT FCC PART 15.247 Bluetooth

#### Applicant Name:

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea Date of Testing: 9/6/2023 - 11/06/2023 Test Report Issue Date: 11/06/2023 Test Site/Location: Element lab., Columbia, MD, USA Test Report Serial No.: 1M2308210092-09.A3L

## FCC ID:

#### A3LSMS928U

APPLICANT:

## Samsung Electronics Co., Ltd.

Application Type:	Certification
Model:	SM-S928U
Additional Model(s):	SM-S928U1
EUT Type:	Portable Handset
Max. RF Output Power:	102.565 mW (20.11 dBm) Peak Conducted
Frequency Range:	2402 – 2480MHz
Type of Modulation:	GFSK, $\pi$ /4-DQPSK, 8DPSK
FCC Classification:	FCC Part 15 Spread Spectrum Transmitter (DSS)
Test Procedure(s):	ANSI C63.10-2013, KDB 558074 D01 v05r02, KDB 648474 D03 v01r04

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez Executive Vice President



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



# TABLE OF CONTENTS

1.0	INT	RODUCTION	3
	1.1	Scope	3
	1.2	Element Test Location	3
	1.3	Test Facility / Accreditations	3
2.0	PRO	DDUCT INFORMATION	4
	2.1	Equipment Description	4
	2.2	Device Capabilities	4
	2.3	Antenna Description	4
	2.4	Test Configuration	5
	2.5	Software and Firmware	5
	2.6	EMI Suppression Device(s)/Modifications	5
3.0	DES	SCRIPTION OF TESTS	6
	3.1	Evaluation Procedure	6
	3.2	AC Line Conducted Emissions	6
	3.3	Radiated Emissions	7
	3.4	Environmental Conditions	7
4.0	ANT	ENNA REQUIREMENTS	8
5.0	ME	ASUREMENT UNCERTAINTY	9
6.0	TES	T EQUIPMENT CALIBRATION DATA	10
7.0	TES	T RESULTS	11
	7.1	Summary	11
	7.2	20dB Bandwidth Measurement	12
	7.3	Output Power Measurement	33
	7.4	Band Edge Compliance	72
	7.5	Carrier Frequency Separation	81
	7.6	Time of Occupancy	86
	7.7	Number of Hopping Channels	91
	7.8	Conducted Spurious Emissions	96
	7.9	Radiated Spurious Emission Measurements – Above 1GHz	109
	7.10	Radiated Restricted Band Edge Measurements	124
	7.11	Radiated Spurious Emissions Measurements – Below 1GHz	129
	7.12	Line Conducted Measurement Data	133
8.0	COI	NCLUSION	. 137

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 2 of 137
© 2023 ELEMENT			V 11.0 07/06/2023



## **1.0 INTRODUCTION**

## 1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

## 1.2 Element Test Location

These measurement tests were conducted at the Element laboratory located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

## 1.3 Test Facility / Accreditations

### Measurements were performed at Element lab located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreements (MRAs).

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dege 2 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 3 of 137
© 2023 ELEMENT			V 11.0 07/06/2023

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## 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS928U**. The test data contained in this report pertains only to the emissions due to the EUT's Bluetooth transmitter.

- This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following:
  - A) The hopping sequence is pseudorandom
  - B) All channels are used equally on average
  - C) The receiver input bandwidth equals the transmit bandwidth
  - D) The receiver hops in sequence with the transmit signal
- 15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.
- 15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection/ hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.
- 15.247(h): The EUT employs Adaptive Frequency Hopping (AFH) which identifies sources of interference namely devices
  operating in 802.11 WLAN and excludes them from the list of available channels. The process of re-mapping reduces the
  number of test channels from 79 channels to a minimum number of 20 channels.

Test Device Serial No.: 0876M, 0042M, 6291M

### 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1 and FR2), 802.11b/g/n/ax/be WLAN, 802.11a/n/ac/ax/be UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, UWB

Ch.	Frequency (MHz)
00	2402
:	
39	2441
:	:
78	2480

Table 2-1. Frequency/ Channel Operations

**Note:** This device is capable of operating in hopping and non-hopping mode. The EUT can hop between 79 different channels in the 2400 – 2483.5MHz band.

## 2.3 Antenna Description

The following antenna was used for the testing.

Frequency	Antenna 1 Gain	Antenna 2 Gain	Directional Gain
[MHz]	(dBi)	(dBi)	(dBi)
2400	-1.11	-4.07	0.55

#### Table 2-2. Antenna Peak Gain

**Note:** This device is capable of operating in hopping and non-hopping mode. The EUT can hop between 79 different channels in the 2400 – 2483.5MHz band.

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dere 4 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 4 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



## 2.4 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was also used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, and 7.8 for antenna port conducted emissions test setups.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

## 2.5 Software and Firmware

The test was conducted with software/firmware version S928USQU0AW19 installed on the EUT.

## 2.6 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga 5 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 5 of 137
© 2023 ELEMENT	·	·	V 11.0 07/06/2023



## 3.0 DESCRIPTION OF TESTS

## 3.1 Evaluation Procedure

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) was used in the measurement of the EUT.

Deviation from measurement procedure......None

## 3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz,  $50\Omega/50\mu$ H Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1-meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that the cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst-case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.12. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

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



## 3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3-meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst-case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

## 3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dana 7 af 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 7 of 137
© 2023 ELEMENT	-		V 11.0 07/06/2023



## 4.0 ANTENNA REQUIREMENTS

#### Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antennas of the EUT are permanently attached.
- There are no provisions for connection to an external antenna.

#### Conclusion:

The EUT complies with the requirement of §15.203.

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 9 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 8 of 137
© 2023 ELEMENT	•	•	V 11.0 07/06/2023



## 5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 0 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 9 of 137
© 2023 ELEMENT			V 11.0 07/06/2023



## 6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurement antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	NMLC-2	Line Conducted Emissions Cable (NM)	1/11/2023	Annual	1/11/2024	NMLC-2
-	AP2-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-001
-	AP2-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-002
-	ETS-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-001
-	ETS-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-002
-	MD 1M 18-40	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	MD 1M 18-40
-	LTx1	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx1
-	LTx2	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx2
EMCO	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
EMCO	3116	Horn Antenna (18-40GHz)	7/5/2023	Biennial	7/5/2025	9203-2178
Keysight Technologies	N9030A	PXA Signal Analyzerk	8/7/2023	Annual	8/7/2024	MY54490576
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	3/15/2023	Annual	3/15/2024	MY52350166
Keysight Technologies	N9038A	MXE EMI Receiver	8/30/2023	Annual	8/30/2024	MY51210133
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	1/13/2023	Annual	1/13/2024	101639
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	9/25/2023	Annual	9/25/2024	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/11/2023	Annual	9/11/2024	100348
Rohde & Schwarz	VULB9162	Bilog Antenna	2/21/2023	Biennial	2/21/2025	00301
Sunol Sciences	DRH-118	Horn (Small)	2/14/2022	Biennial	2/14/2024	A102416-2
Sunol Sciences	JB5	Bi-Log Antenna (30M-5GHz)	8/30/2022	Biennial	8/30/2024	A102416-1

 Table 6-1. Annual Test Equipment Calibration Schedule

#### Notes:

- 1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
- 2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 10 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 10 of 137
© 2023 ELEMENT		•	V 11.0 07/06/2023



## 7.0 TEST RESULTS

## 7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
FCC ID:	A3LSMS928U
Method/System:	Frequency Hopping Spread Spectrum (FHSS)
Number of Channels:	<u>79</u>

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(1)(iii)	RSS-247 [5.1(1)]	20dB Bandwidth	N/A		PASS	Section 7.2
15.247(b)(1)	RSS-247 [5.4(2)]	Peak Transmitter Output Power	< 1 Watt if <u>&gt;</u> 75 non- overlapping channels used		PASS	Section 7.3
15.247(a)(1)	RSS-247 [5.1(2)]	Channel Separation	> 2/3 of 20 dB BW for systems with Output Power < 125mW		PASS	Section 7.5
15.247(a)(1)(iii)	RSS-247 [5.1(4)]	Number of Channels	> 15 Channels		PASS	Section 7.7
15.247(a)(1)(iii)	RSS-247 [5.1(4)]	Time of Occupancy	< 0.4 sec in 31.6 sec period		PASS	Section 7.6
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	Conducted > 20dBc		PASS	Section 7.4, Section 7.8
15.205 15.209	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-247 limits)	RADIATED	PASS	Section 7.9, Section 7.10, Section 7.11
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits (RSS-Gen [8.8] limits)	LINE CONDUCTED	PASS	Section 7.12

Table 7-1. Summary of Test Results

#### Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is "BT Auto," Version 3.5.
- 5) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is "Chamber Automation," Version 1.3.1.

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



#### 7.2 20dB Bandwidth Measurement §15.247 (a.1.iii); RSS-247 [5.1(1)]

#### **Test Overview and Limit**

The bandwidth at 20dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

#### Test Procedure Used

ANSI C63.10-2013 – Section 6.9.2

#### **Test Settings**

- 1. The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform the 20dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 20. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5% OBW
- 3. VBW  $\geq$  3 x RBW
- 4. Reference level set to keep signal from exceeding maximum input mixer level for linear operation.
- 5. Detector = Peak
- 6. Trace mode = max hold
- 7. Sweep = auto couple
- 8. The trace was allowed to stabilize

#### **Test Setup**

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



Figure 7-1. 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:	Dega 10 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 12 of 137
© 2023 ELEMENT	·	•	V 11.0 07/06/2023



Frequency [MHz]	Data Rate [Mbps]	Mod.	Channel No.	20dB Bandwidth Test Results [kHz]
2402	1.0	GFSK	0	939.70
2441	1.0	GFSK	39	942.30
2480	1.0	GFSK	78	960.90
2402	2.0	π/4-DQPSK	0	1354.00
2441	2.0	π/4-DQPSK	39	1234.00
2480	2.0	π/4-DQPSK	78	1304.00
2402	3.0	8DPSK	0	1276.00
2441	3.0	8DPSK	39	1316.00
2480	3.0	8DPSK	78	1315.00

Table 7-2. Conducted 20dB Bandwidth Measurements – ANT1



Plot 7-1. 20dB Bandwidth Plot (Bluetooth, 1Mbps - Ch. 0) - ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 40 at 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 13 of 137
© 2023 ELEMENT		·	V 11.0 07/06/2023





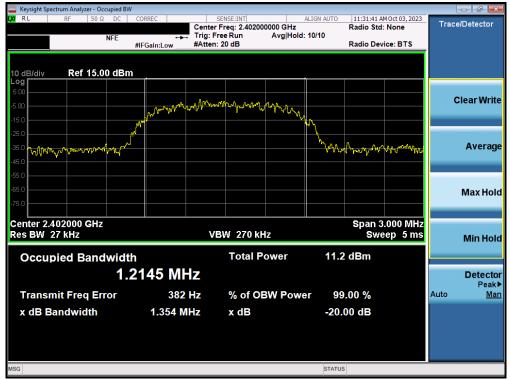
Plot 7-2. 20dB Bandwidth Plot (Bluetooth, 1Mbps - Ch. 39) - ANT1



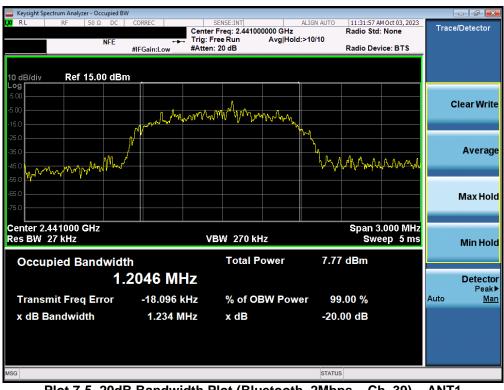
Plot 7-3. 20dB Bandwidth Plot (Bluetooth, 1Mbps - Ch. 78) - ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 14 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 14 of 137
© 2023 ELEMENT		·	V 11.0 07/06/2023





Plot 7-4. 20dB Bandwidth Plot (Bluetooth, 2Mbps - Ch. 0) - ANT1



Plot 7-5. 20dB Bandwidth Plot (Bluetooth, 2Mbps - Ch. 39) - ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dana 45 at 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 15 of 137
© 2023 ELEMENT		•	V 11.0 07/06/2023



Keysight Spectrum Analyzer - Occupied BW	1				-	
KL RF 50Ω DC	CORREC	SENSE:INT r Freg: 2.480000000 GHz	ALIGN AUTO 11:32:11 A Radio Std	M Oct 03, 2023	Tracel	Detector
NFE	Trig: F	Free Run Avg Hole		. None		
	#IFGain:Low #Atten	n: 20 dB	Radio Dev	/ice: BTS		
10 dB/div Ref 15.00 dBm	1					
Log						
5.00					CI	ear Write
-5.00	atfle 10, 1050	Mummun			•	
-15.0	A NT WAR AND	3 & K V & BANK ALL APPORT				
-25.0	- Martin		Mar .			
-35.0	/					Average
-45.0						
-55.0 Manufman			hon why	va. Mar I		
-65.0				Vor th		
						Max Hold
-75.0						_
Center 2.480000 GHz			Span 3	3.000 MHz		
Res BW 27 kHz	v	'BW 270 kHz		eep 5 ms		Min Hold
						Minitiona
Occupied Bandwidt	h	Total Power	4.39 dBm			
1	1946 MHz					Detector
						Peak▶
Transmit Freq Error	-3.449 kHz	% of OBW Pow	ver 99.00 %		Auto	<u>Man</u>
x dB Bandwidth	1.304 MHz	x dB	-20.00 dB			
			1			
MSG			STATUS			

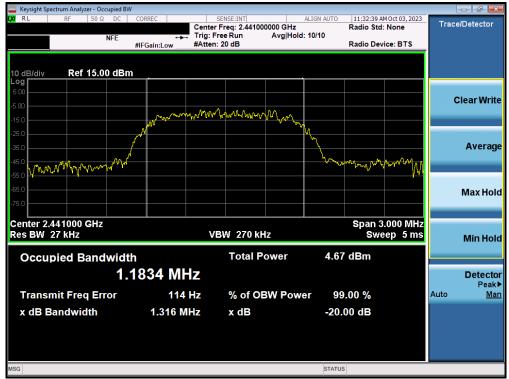
Plot 7-6. 20dB Bandwidth Plot (Bluetooth, 2Mbps - Ch. 78) - ANT1



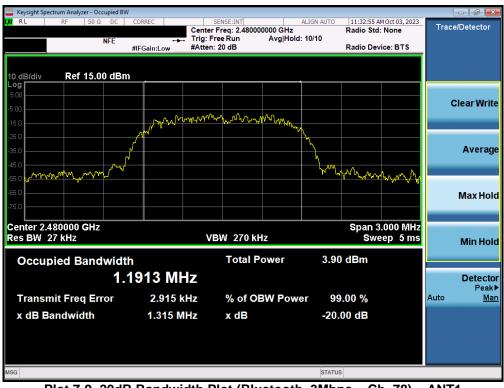
Plot 7-7. 20dB Bandwidth Plot (Bluetooth, 3Mbps - Ch. 0) - ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 16 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 16 of 137
© 2023 ELEMENT			V 11.0 07/06/2023





Plot 7-8. 20dB Bandwidth Plot (Bluetooth, 3Mbps - Ch. 39) - ANT1



Plot 7-9. 20dB Bandwidth Plot (Bluetooth, 3Mbps - Ch. 78) - ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 17 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 17 of 137
© 2023 ELEMENT		·	V 11.0 07/06/2023



Frequency [MHz]	Data Rate [Mbps]	Mod.	Channel No.	20dB Bandwidth Test Results [kHz]
2402	1.0	GFSK	0	941.70
2441	1.0	GFSK	39	944.30
2480	1.0	GFSK	78	939.30
2402	2.0	π/4-DQPSK	0	1331.00
2441	2.0	π/4-DQPSK	39	1344.00
2480	2.0	π/4-DQPSK	78	1332.00
2402	3.0	8DPSK	0	1260.00
2441	3.0	8DPSK	39	1326.00
2480	3.0	8DPSK	78	1337.00

Table 7-3. Conducted 20dB Bandwidth Measurements – ANT2



Plot 7-10. 20dB Bandwidth Plot (Bluetooth, 1Mbps – Ch. 0) – ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 10 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 18 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023





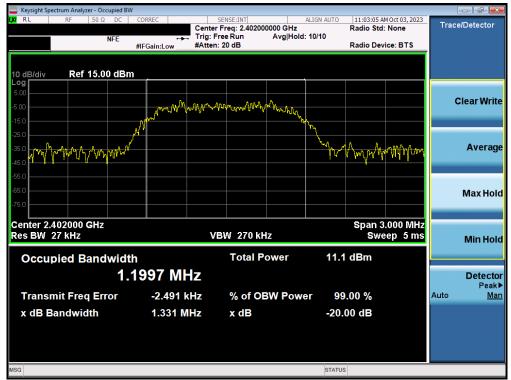
Plot 7-11. 20dB Bandwidth Plot (Bluetooth, 1Mbps - Ch. 39) - ANT2



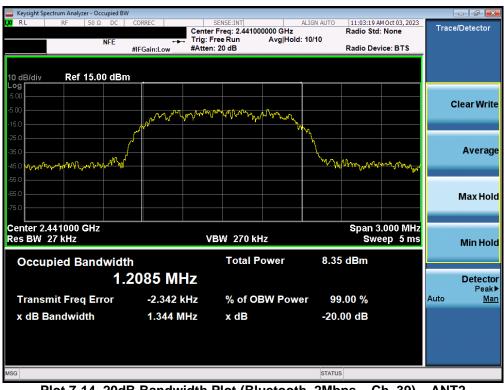
Plot 7-12. 20dB Bandwidth Plot (Bluetooth, 1Mbps – Ch. 78) – ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 40 at 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 19 of 137
© 2023 ELEMENT	-	·	V 11.0 07/06/2023





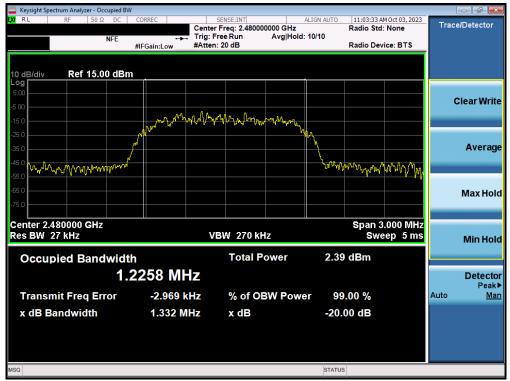
Plot 7-13. 20dB Bandwidth Plot (Bluetooth, 2Mbps - Ch. 0) - ANT2



Plot 7-14. 20dB Bandwidth Plot (Bluetooth, 2Mbps - Ch. 39) - ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 00 at 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 20 of 137
© 2023 ELEMENT		•	V 11.0 07/06/2023





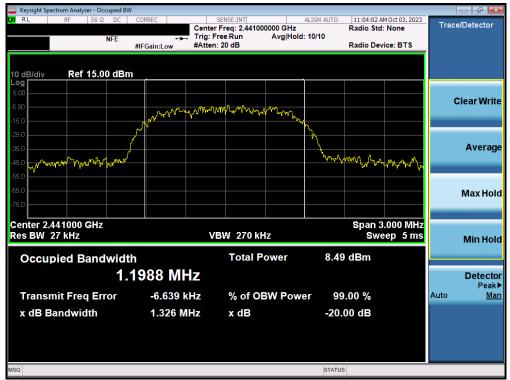
Plot 7-15. 20dB Bandwidth Plot (Bluetooth, 2Mbps - Ch. 78) - ANT2



Plot 7-16. 20dB Bandwidth Plot (Bluetooth, 3Mbps - Ch. 0) - ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 04 at 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 21 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023





Plot 7-17. 20dB Bandwidth Plot (Bluetooth, 3Mbps - Ch. 39) - ANT2



Plot 7-18. 20dB Bandwidth Plot (Bluetooth, 3Mbps - Ch. 78) - ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 00 at 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 22 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



Frequency [MHz]	Data Rate [Mbps]	Mod.	Channel No.	20dB Bandwidth Test Results [kHz]
2402	1.0	GFSK	0	926.30
2441	1.0	GFSK	39	933.60
2480	1.0	GFSK	78	941.30
2402	2.0	π/4-DQPSK	0	1358.00
2441	2.0	π/4-DQPSK	39	1350.00
2480	2.0	π/4-DQPSK	78	1319.00
2402	3.0	8DPSK	0	1279.00
2441	3.0	8DPSK	39	1338.00
2480	3.0	8DPSK	78	1313.00

Table 7-4. Conducted 20dB Bandwidth Measurements - Dual ANT1



Plot 7-19. 20dB Bandwidth 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:	Dogo 22 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 23 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023





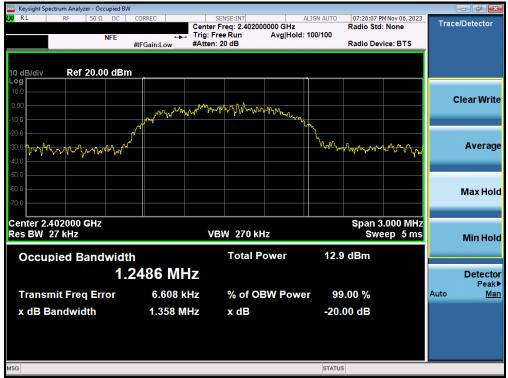
Plot 7-20. 20dB Bandwidth Plot (Bluetooth, 1Mbps - Ch. 39) - Dual ANT1



Plot 7-21. 20dB Bandwidth 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:	Dama 04 at 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 24 of 137
© 2023 ELEMENT		•	V 11.0 07/06/2023





Plot 7-22. 20dB Bandwidth Plot (Bluetooth, 2Mbps - Ch. 0) - Dual ANT1



Plot 7-23. 20dB Bandwidth Plot (Bluetooth, 2Mbps – Ch. 39) – Dual ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 25 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 25 of 137
© 2023 ELEMENT		·	V 11.0 07/06/2023





Plot 7-24. 20dB Bandwidth Plot (Bluetooth, 2Mbps – Ch. 78) – Dual ANT1



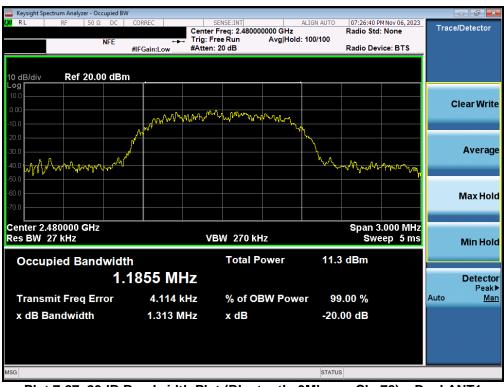
Plot 7-25. 20dB Bandwidth Plot (Bluetooth, 3Mbps – Ch. 0) – Dual ANT1

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dama 00 af 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 26 of 137
© 2023 ELEMENT		·	V 11.0 07/06/2023





Plot 7-26. 20dB Bandwidth Plot (Bluetooth, 3Mbps – Ch. 39) – Dual ANT1



Plot 7-27. 20dB Bandwidth Plot (Bluetooth, 3Mbps – Ch. 78) – Dual ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 07 at 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 27 of 137
© 2023 ELEMENT	•	•	V 11.0 07/06/2023



Frequency [MHz]	Data Rate [Mbps]	Mod.	Channel No.	20dB Bandwidth Test Results [kHz]
2402	1.0	GFSK	0	935.80
2441	1.0	GFSK	39	1013.00
2480	1.0	GFSK	78	970.20
2402	2.0	π/4-DQPSK	0	1306.00
2441	2.0	π/4-DQPSK	39	1320.00
2480	2.0	π/4-DQPSK	78	1345.00
2402	3.0	8DPSK	0	1340.00
2441	3.0	8DPSK	39	1328.00
2480	3.0	8DPSK	78	1312.00

Table 7-5. Conducted 20dB Bandwidth Measurements – Dual ANT2



Plot 7-28. 20dB Bandwidth 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:	Dama 00 of 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 28 of 137
© 2023 ELEMENT	•		V 11 0 07/06/2023









Plot 7-30. 20dB Bandwidth 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:	Dogo 20 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 29 of 137
© 2023 ELEMENT		·	V 11.0 07/06/2023





Plot 7-31. 20dB Bandwidth Plot (Bluetooth, 2Mbps – Ch. 0) – Dual ANT2



Plot 7-32. 20dB Bandwidth Plot (Bluetooth, 2Mbps – Ch. 39) – Dual ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 20 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 30 of 137
© 2023 ELEMENT	•	•	V 11.0 07/06/2023





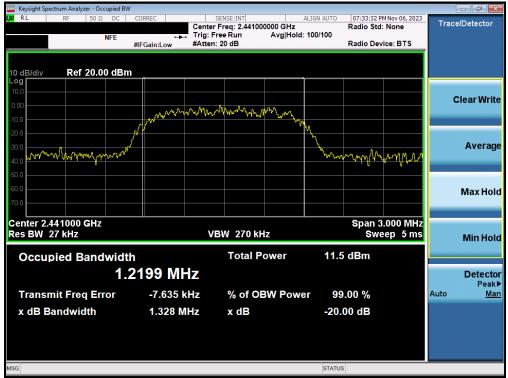
Plot 7-33. 20dB Bandwidth Plot (Bluetooth, 2Mbps – Ch. 78) – Dual ANT2



Plot 7-34. 20dB Bandwidth Plot (Bluetooth, 3Mbps – Ch. 0) – Dual ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 21 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 31 of 137
© 2023 ELEMENT		·	V 11.0 07/06/2023





Plot 7-35. 20dB Bandwidth Plot (Bluetooth, 3Mbps – Ch. 39) – Dual ANT2



Plot 7-36. 20dB Bandwidth Plot (Bluetooth, 3Mbps – Ch. 78) – Dual ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 22 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 32 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



#### 7.3 Output Power Measurement §15.247 (b.1); RSS-247 [5.4(2)]

#### **Test Overview and Limits**

Measurement is made while the EUT is operating in non-hopping transmission mode. The powers shown below were measured using a spectrum analyzer with a Bluetooth signaling test set (Agilent Model: N4010A) used only to maintain a Bluetooth link with the EUT. Average power measurements are performed using the analyzer's "burst power" function with RBW = 3MHz. The burst power function triggers on a single set burst set to maximum power and measures the maximum average power on the on-time.

#### The maximum permissible output power is 1 Watt.

#### **Test Procedure Used**

ANSI C63.10-2013 – Section 7.8.5 ANSI C63.10-2013 – Section 11.9.2.3.2 method AVGPM-G

#### Test Settings

#### Peak Power Measurement

- 1. Span = approximately 5x 20dB bandwidth, centered on hopping channel
- 2. RBW > 20dB bandwidth of emission being measured
- 3. VBW ≥ RBW
- 4. Sweep = auto
- 5. Detector = peak
- 6. Trace mode = max hold
- 7. The trace was allowed to stabilize

#### Test Setup

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



Figure 7-2. Test Instrument & Measurement Setup

#### Note

This unit was tested with all possible data rates and the highest peak power is reported with the unit transmitting at 1Mbps. Final results were obtained using calibrated couplers, attenuators and cables. The following formula was used:

Output Power (dBm) = Raw Analyzer Level (dBm) + Cable Loss (dB) + Loss in Directional Coupler/Insertion Loss (dB)

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 33 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



Frequency	Data Rate	Channel		onducted wer	-	nducted wer
[MHz]	[Mbps]	No.	[dBm]	[mW]	[dBm]	[mW]
2402	1.0	0	18.83	76.366	18.08	64.239
2441	1.0	39	20.11	102.565	19.24	83.946
2480	1.0	78	18.92	77.893	18.38	68.881
2402	2.0	0	18.14	65.223	14.83	30.374
2441	2.0	39	19.39	86.816	15.95	39.319
2480	2.0	78	18.61	72.594	15.09	32.248
2402	3.0	0	18.76	75.093	14.80	30.186
2441	3.0	39	19.56	90.427	15.99	39.719
2480	3.0	78	18.82	76.243	15.36	34.380

Table 7-6. Conducted Output Power Measurements – ANT1



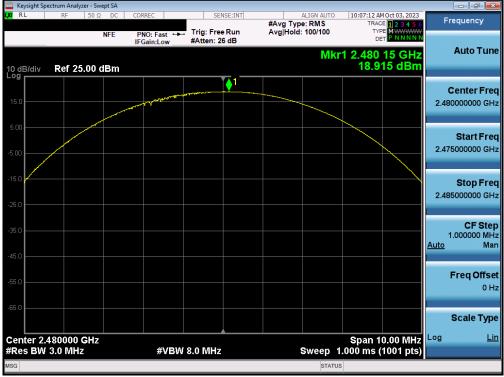
Plot 7-37. Peak Conducted Power (1Mbps - Ch. 0) - ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 24 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 34 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



		wept SA									- 🗗 론
RL	RF 50	Ω DC	CORREC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO		E 1 2 3 4 5 6	Fre	equency
		NFE	PNO: Fast IFGain:Low	Trig: Free #Atten: 26		Avg Hold:	100/100	TYP DE			
0 dB/div	Ref 25.00	dBm					Mkr	1 2.441 20.1	17 GHz 06 dBm		Auto Tun
15.0					<b>≬</b> 1						enter Fre 000000 GH
5.00	~									2.436	<b>Start Fre</b> 000000 G⊦
15.0 <b>1</b>										2.446	<b>Stop Fre</b> 0000000 G⊦
5.0										1. <u>Auto</u>	CF Ste 000000 MI Ma
5.0										F	F <b>req Offs</b> 0 I
5.0											Scale Typ
	41000 GH	z						Span 1	0.00 MHz	Log	L
Res BW 3	3.0 MHz		#VB	W 8.0 MHz			Sweep 1	.000 ms (	1001 pts)		

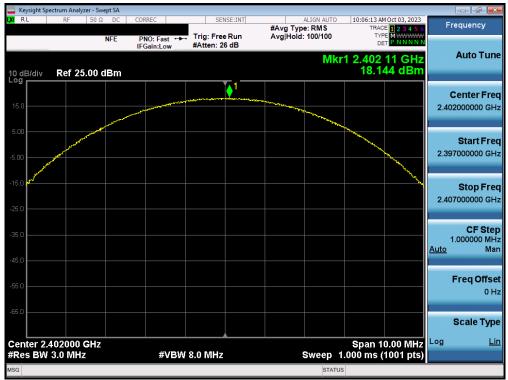
Plot 7-38. Peak Conducted Power (1Mbps – Ch. 39) – ANT1



Plot 7-39. Peak Conducted Power (1Mbps - Ch. 78) - ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 25 of 127	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 35 of 137	
© 2023 ELEMENT		·	V 11.0 07/06/2023	





Plot 7-40. Peak Conducted Power (2Mbps - Ch. 0) - ANT1



Plot 7-41. Peak Conducted Power (2Mbps - Ch. 39) - ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 26 of 127	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 36 of 137	
© 2023 ELEMENT	·	·	V 11.0 07/06/2023	





Plot 7-42. Peak Conducted Power (2Mbps - Ch. 78) - ANT1



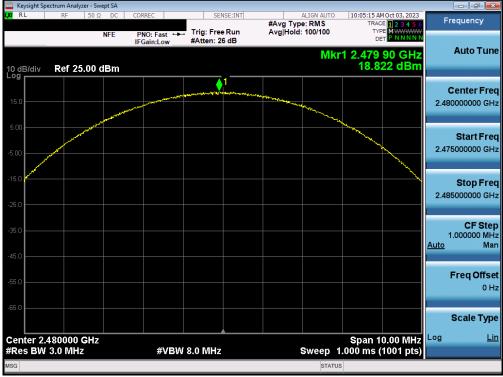
Plot 7-43. Peak Conducted Power (3Mbps - Ch. 0) - ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)			
Test Report S/N:	Test Dates:	EUT Type:	Dogo 27 of 127		
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 37 of 137		
© 2023 ELEMENT	-		V 11.0 07/06/2023		





Plot 7-44. Peak Conducted Power (3Mbps – Ch. 39) – ANT1



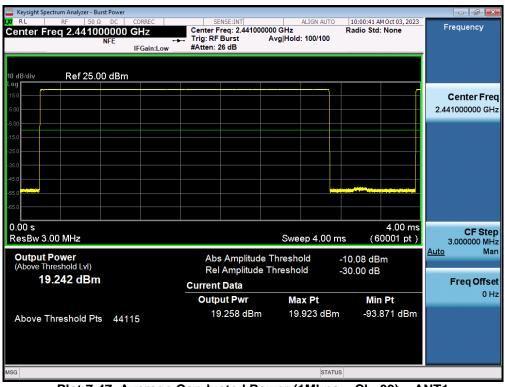
Plot 7-45. Peak Conducted Power (3Mbps - Ch. 78) - ANT1

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 20 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 38 of 137
© 2023 ELEMENT			V 11.0 07/06/2023



	pectrum Analyz												_	
LXU RL	RF		FE	CORREC	• • • • •			00000 GHz Avg Hold	ALIGN AUT	Ra	0:00:05 AM	1 Oct 03, 2023 None		Frequency
10 dB/div Log	Ref	25.00	dBm											
15.0 5.00													2	Center Freq 402000000 GHz
-5.00														
-35.0														
-55.0														
0.00 s ResBw 3	3.00 MHz							Swe	ep 4.00	) ms	(60	4.00 ms 0001 pt)		<b>CF Step</b> 3.000000 MHz o Man
(Above T	Power hreshold L 8.078 d					Rel	Amplitud	le Thresho e Thresho			.18 dBı .00 dB	m	Aut	Freq Offset
					_	Current Outp	Data ut Pwr	Ма	ix Pt		Min	Pt		0 Hz
Above	Threshol	l Pts	4412	3			.079 dBn		.818 dE	ßm		.12 dBm		
MSG									ST/	ATUS				

Plot 7-46. Average Conducted Power (1Mbps - Ch. 0) - ANT1



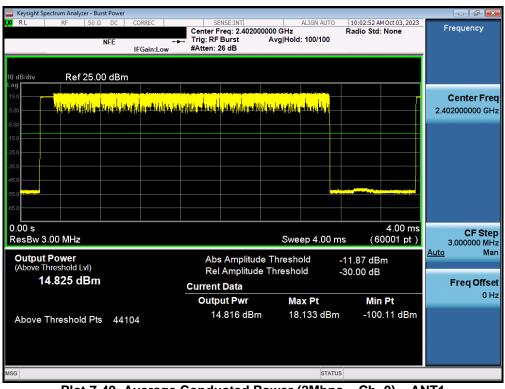
Plot 7-47. Average Conducted Power (1Mbps - Ch. 39) - ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)			
Test Report S/N:	Test Dates:	EUT Type:	Dama 20 of 427		
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 39 of 137		
© 2023 ELEMENT	•	•	V 11.0 07/06/2023		



	trum Analyzer - Bu									
Center Fre		00000 (	CORREC GHZ IFGain:Low	+++ Trig: F	SENSE:INT r Freq: 2.4800 RF Burst n: 26 dB		ALIGN AUTO	10:00:59 A Radio Std	M Oct 03, 2023 : None	Frequency
10 dB/div Log	Ref 25.0	0 dBm					1			
5.00						,,				Center Free 2.480000000 GH
-5.00										
-35.0										
-65.0										
0.00 s ResBw 3.0	0 MHz					Swe	ep 4.00 r	ns (6	4.00 ms 0001 pt)	CF Step 3.000000 MH
Output P (Above Thr	eshold Lvl)				bs Amplitud el Amplitud			-10.88 dB -30.00 dB		<u>Auto</u> Mai
18.381 dBm					nt Data					Freq Offse
Above Th	nreshold Pts	6 4412	8		<b>tput Pwr</b> 18.372 dBn		i <b>x Pt</b> .117 dBn		1 Pt 2.38 dBm	
MSG							STATU	JS		

Plot 7-48. Average Conducted Power (1Mbps – Ch. 78) – ANT1



Plot 7-49. Average Conducted Power (2Mbps – Ch. 0) – ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)			
Test Report S/N:	Test Dates:	EUT Type:	Dage 40 of 127		
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 40 of 137		
© 2023 ELEMENT		·	V 11.0 07/06/2023		



Keysight Spectrum Analyzer - Burst Power				
OM RL RF 50 Ω DC CORREC NFE - IFGain:Low	SENSE:INT Center Freq: 2.441000000 GHz Trig: RF Burst Avg Hole #Atten: 26 dB		5 AM Oct 03, 2023 itd: None	Frequency
10 dB/div Ref 25.00 dBm				
15.0 5.00 5.00	<mark>a popul o marana da, kia popul o matala lan na popul o</mark>	ı <mark>malika sızıldı. İ</mark>		Center Freq 2.441000000 GHz
-15.0				
-35.0				
-65.0				
0.00 s ResBw 3.00 MHz	Swe	eep 4.00 ms	4.00 ms (60001 pt )	CF Step 3.000000 MHz Auto Man
Output Power (Above Threshold Lvl) 15.946 dBm	Abs Amplitude Thresh Rel Amplitude Thresh Current Data		IBm	Freq Offset
Above Threshold Pts 44103	Output Pwr Ma		lin Pt 6.031 dBm	0 Hz
MSG		STATUS		

Plot 7-50. Average Conducted Power (2Mbps – Ch. 39) – ANT1



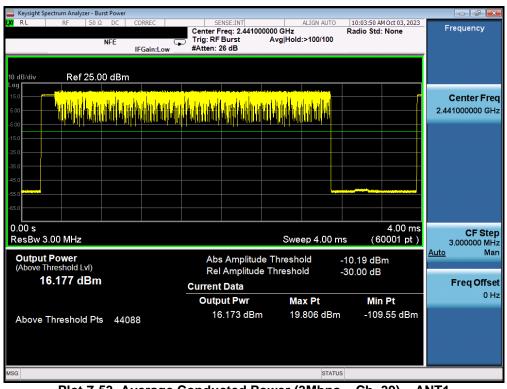
Plot 7-51. Average Conducted Power (2Mbps – Ch. 78) – ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)			
Test Report S/N:	Test Dates:	EUT Type:	Dogo 41 of 127		
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 41 of 137		
© 2023 ELEMENT			V 11.0 07/06/2023		



Eviloper - Burst Power			- <b></b>
RL RF 50 Ω DC CORREC      NFE IFGain:Low	Center Freq: 2.402000000 GHz	LIGN AUTO 10:03:25 AM Oct 03, 2023 Radio Std: None >100/100	Frequency
10 dB/div Ref 25.00 dBm			-
			Center Freq 2.402000000 GHz
-500			
-35.0			
-55.0			
0.00 s ResBw 3.00 MHz	Swee	4.00 ms p 4.00 ms (60001 pt )	3.000000 MHz
Output Power (Above Threshold Lvl) 14.798 dBm	Abs Amplitude Threshol Rel Amplitude Threshold Current Data	Auto Man Freq Offset	
Above Threshold Pts 44070	Output Pwr Max 14.793 dBm 18.6	<b>(Pt Min Pt</b> 857 dBm -95.670 dBm	0 Hz
MSG		STATUS	

Plot 7-52. Average Conducted Power (3Mbps - Ch. 0) - ANT1



Plot 7-53. Average Conducted Power (3Mbps - Ch. 39) - ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)			
Test Report S/N:	Test Dates:	EUT Type:	Dogo 42 of 127		
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 42 of 137		
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Keysight Spectrum Analyzer - Burst Power			
D2 RL RF 50Ω DC CORREC NFE → IFGain:Low	Center Freq: 2.480000000 GHz	IGN AUTO 10:04:11 AM Oct 03, 2023 Radio Std: None 100/100	Frequency
10 dB/div Ref 25.00 dBm			
			Center Freq 2.48000000 GHz
-250			
-35.0			
-65.0			
0.00 s ResBw 3.00 MHz	Sweep	4.00 ms 0 4.00 ms (60001 pt)	CF Step 3.000000 MHz Auto Man
Output Power (Above Threshold Lvl) 15.363 dBm	Abs Amplitude Threshold Rel Amplitude Threshold Current Data		Freq Offset
	Output Pwr Max		0 Hz
Above Threshold Pts 44090	15.365 dBm 19.12	27 dBm -102.38 dBm	
MSG		STATUS	

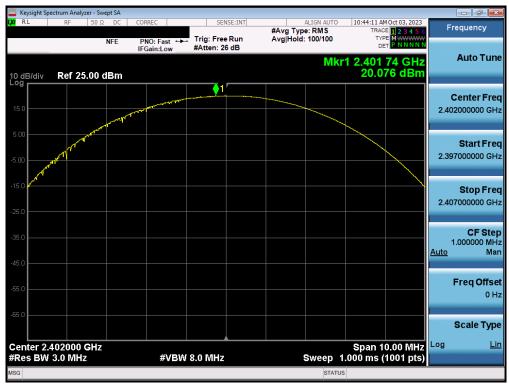
Plot 7-54. Average Conducted Power (3Mbps - Ch. 78) - ANT1

Frequency	Frequency Rate		hannel Peak Conducted			Avg Conducted Power	
[MHz]	[Mbps]	No.	[dBm]	[mW]	[dBm]	[mW]	
2402	1.0	0	19.97	99.334	19.29	84.898	
2441	1.0	39	20.08	101.765	19.24	83.849	
2480	1.0	78	19.39	86.936	18.79	75.701	
2402	2.0	0	18.89	77.428	15.95	39.364	
2441	2.0	39	19.09	81.115	15.86	38.521	
2480	2.0	78	18.40	69.135	15.48	35.326	
2402	3.0	0	19.68	92.939	15.74	37.454	
2441	3.0	39	19.57	90.594	15.85	38.450	
2480	3.0	78	19.17	82.509	15.50	35.481	

 Table 7-7. Conducted Output Power Measurements – ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 42 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 43 of 137
© 2023 ELEMENT	·	·	V 11.0 07/06/2023





Plot 7-55. Peak Conducted Power (1Mbps - Ch. 0) - ANT2

RL RF 5	0Ω DC NFE	CORREC PNO: Fast ↔ IFGain:Low	SENSE:INT → Trig: Free Run #Atten: 26 dB	ALIGN AUTO #Avg Type: RMS Avg Hold: 100/100	10:44:32 AM Oct 03, 2023 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNN	Frequency
dB/div Ref 25.0	0 dBm			Mk	r1 2.441 09 GHz 19.971 dBm	Auto Tun
5.0						Center Free 2.441000000 GH
.00						<b>Start Fre</b> 2.436000000 GH
5.0						<b>Stop Fre</b> 2.446000000 GH
5.0						<b>CF Stej</b> 1.000000 MH <u>Auto</u> Ma
5.0						Freq Offse 0 H
5.0						Scale Typ
enter 2.441000 GH Res BW 3.0 MHz	lz	#VBV	V 8.0 MHz	Sweep	Span 10.00 MHz I.000 ms (1001 pts)	Log <u>Li</u>
		#VDV	¥ 8.0 WINZ	SWCCP		

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dege 44 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 44 of 137
© 2023 ELEMENT	-		V 11.0 07/06/2023





# Plot 7-56. Peak Conducted Power (1Mbps – Ch. 39) – ANT2





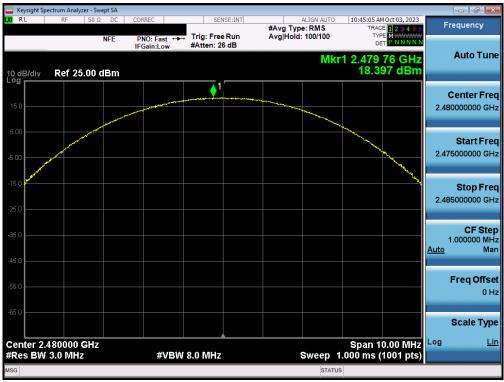
Plot 7-58. Peak Conducted Power (2Mbps – Ch. 0) – ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)		
Test Report S/N:	Test Dates:	EUT Type:	Dama 45 at 107	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 45 of 137	
© 2023 ELEMENT	•		V 11 0 07/06/2023	





Plot 7-59. Peak Conducted Power (2Mbps - Ch. 39) - ANT2



Plot 7-60. Peak Conducted Power (2Mbps – Ch. 78) – ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dogo 46 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 46 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023





Plot 7-61. Peak Conducted Power (3Mbps - Ch. 0) - ANT2



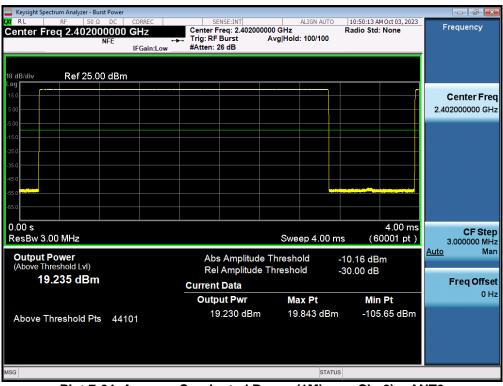
Plot 7-62. Peak Conducted Power (3Mbps – Ch. 39) – ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Daga 47 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 47 of 137
© 2023 ELEMENT			V 11.0 07/06/2023





Plot 7-63. Peak Conducted Power (3Mbps - Ch. 78) - ANT2



Plot 7-64. Average Conducted Power (1Mbps – Ch. 0) – ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dogo 49 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 48 of 137
© 2023 ELEMENT		·	V 11.0 07/06/2023



	trum Analyzer - Bu										×
Center Fro	RF 50 Ω eq 2.4410	00000 G	Gain:Low	Center F			ALIGN AUTO	0  10:50:00 / Radio Std	M Oct 03, 2023 : None	Frequency	
10 dB/div Log	Ref 25.0	0 dBm									
15.0 5.00										Center F 2.441000000	
-15.0											
-35.0 -45.0 -55.0											
-65.0											
0.00 s ResBw 3.0	0 MHz					Swe	ep 4.00	ms (6	4.00 ms 60001 pt)	CF S 3.000000 I	MHz
Output P (Above Thr 19.					Amplitude	le Thresho e Thresho		-10.13 dE -30.00 dE		Auto Freq Off	Man fset
					ut Pwr	Ма	x Pt	Mi	n Pt		0 Hz
Above Tr	nreshold Pt	5 44101			0.279 dBm		870 dB		532 dBm		
MSG							STA	TUS			

Plot 7-65. Average Conducted Power (1Mbps – Ch. 39) – ANT2



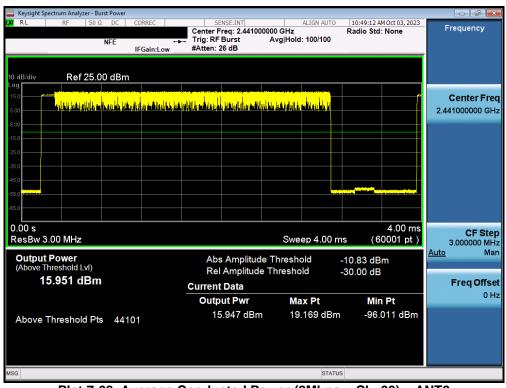
Plot 7-66. Average Conducted Power (1Mbps – Ch. 78) – ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dama 40 of 407	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 49 of 137	
© 2023 ELEMENT V 11.0 0				



Keysight Spectrum Analyzer - Burst Power			- ē <del>×</del>
(₩ RL RF 50Ω DC CORREC NFE → IFGain:Low	SENSE:INT Center Freq: 2.402000000 GHz Trig: RF Burst Avg Hold #Atten: 26 dB	ALIGN AUTO 10:48:54 AM Oct 0 Radio Std: Non 1: 100/100	
10 dB/div Ref 25.00 dBm			
15.0 5.00 5.00	<mark>, polybil, is surface on the product of the surface on the local polybil, is surface on the local polybil, is s</mark>	naha ay ha a	Center Freq 2.402000000 GHz
-150			
-35 0			
650 0.00 s			0 ms
ResBw 3.00 MHz	Swe	4.00ep 4.00 ms (60001	pt ) 3.000000 MHz
Output Power (Above Threshold Lvl) 15.857 dBm	Abs Amplitude Thresho Rel Amplitude Thresho Current Data		Auto Man Freq Offset
Above Threshold Pts 44102	Output Pwr Ma	ax Pt Min Pt .127 dBm -112.64	0 Hz
MSG		STATUS	

Plot 7-67. Average Conducted Power (2Mbps – Ch. 0) – ANT2



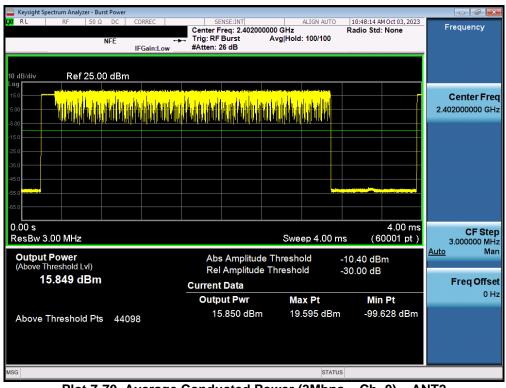
Plot 7-68. Average Conducted Power (2Mbps – Ch. 39) – ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dama 50 at 407	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 50 of 137	
© 2023 ELEMENT V 11.0 07				



Keysight Spectrum Analyzer - Burst Power				- <b></b>
CM2 RL RF 50Ω DC CORREC NFE → IFGain:Low	SENSE:INT Center Freq: 2.480000000 GHz → Trig: RF Burst Avg Ho #Atten: 26 dB		:49:30 AM Oct 03, 2023 dio Std: None	Frequency
10 dB/dīv Ref 25.00 dBm				
15.0 5.00 -5.00	<mark>ir felle a basa da kanalalan a burdan banyin</mark> d	<mark>, han dar an lah ja</mark>		Center Freq 2.480000000 GHz
-15.0				
-35 0				
-65.0			4.00	
0.00 s ResBw 3.00 MHz	Sw	eep 4.00 ms	4.00 ms (60001 pt )	CF Step 3.000000 MHz
Output Power (Above Threshold Lvi) 15.481 dBm	Abs Amplitude Thres Rel Amplitude Thresh Current Data		38 dBm 00 dB	<u>Auto</u> Man Freq Offset
Above Threshold Pts 44102	Output Pwr M	lax Pt 8.616 dBm	<b>Min Pt</b> -102.36 dBm	0 Hz
MSG		STATUS		

Plot 7-69. Average Conducted Power (2Mbps - Ch. 78) - ANT2



Plot 7-70. Average Conducted Power (3Mbps – Ch. 0) – ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 54 -6407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 51 of 137
© 2023 ELEMENT		•	V 11.0 07/06/2023



Keysight Spectrum Analyzer - Burst Power				
Ω2 RL RF 50Ω DC CORREC NFE → IFGain:Low	SENSE:INT Center Freq: 2.441000000 0 → Trig: RF Burst Avg #Atten: 26 dB		0:47:57 AM Oct 03, 2023 dio Std: None	Frequency
10 dB/div Ref 25.00 dBm				
				Center Freq 2.441000000 GHz
-35.0 -45.0 -55.0				
-65.0			1.00	
0.00 s ResBw 3.00 MHz		Sweep 4.00 ms	4.00 ms (60001 pt)	CF Step 3.000000 MHz
Output Power (Above Threshold Lvl) 15.735 dBm	Abs Amplitude Th Rel Amplitude Thr Current Data		52 dBm 00 dB	<u>Auto</u> Man Freq Offset
	Output Pwr	Max Pt	Min Pt	0 Hz
Above Threshold Pts 44099	15.744 dBm	19.478 dBm	-98.563 dBm	
MSG		STATUS		

Plot 7-71. Average Conducted Power (3Mbps – Ch. 39) – ANT2



Plot 7-72. Average Conducted Power (3Mbps – Ch. 78) – ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	
Test Report S/N:	Test Dates:	EUT Type:	Dava 50 at 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 52 of 137
© 2023 ELEMENT	•		V 11.0 07/06/2023



Frequency	Data Rate	Channel	Ant1 Pea Pov	ak Cond. wer	Ant1. Av Pov	rg Cond. wer		ak Cond. wer	Ant2. Av Pov	vg Cond. wer	Dual Pea Pov			g Cond. wer
[MHz]	[Mbps]	No.	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]
2402	1.0	0	13.66	23.238	13.21	20.946	14.55	28.484	14.37	27.328	17.14	51.722	16.84	48.273
2441	1.0	39	15.01	31.718	14.24	26.540	13.53	22.522	13.32	21.493	17.34	54.239	16.82	48.033
2480	1.0	78	14.79	30.123	13.81	24.016	13.28	21.281	13.07	20.286	17.11	51.405	16.46	44.302
2402	2.0	0	13.38	21.757	10.35	10.847	13.86	24.305	11.23	13.271	16.63	46.062	13.82	24.118
2441	2.0	39	14.43	27.714	11.70	14.805	12.74	18.802	9.92	9.820	16.68	46.516	13.91	24.625
2480	2.0	78	14.56	28.576	11.11	12.924	12.41	17.430	9.88	9.721	16.63	46.006	13.55	22.645
2402	3.0	0	13.40	21.888	10.32	10.775	14.04	25.357	11.22	13.237	16.74	47.245	13.80	24.012
2441	3.0	39	14.91	30.939	11.44	13.916	12.87	19.378	9.90	9.765	17.02	50.316	13.74	23.681
2480	3.0	78	14.96	31.340	11.10	12.882	12.54	17.956	9.85	9.671	16.93	49.296	13.53	22.553

Table 7-8. Conducted Output Power Measurements – Dual

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 52 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 53 of 137
© 2023 ELEMENT	•	•	V 11.0 07/06/2023





Plot 7-73. Peak Conducted Power (1Mbps - Ch. 0) - ANT1



Plot 7-74. Peak Conducted Power (1Mbps - Ch. 39) - ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga 54 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 54 of 137
© 2023 ELEMENT			V 11.0 07/06/2023





Plot 7-75. Peak Conducted Power (1Mbps - Ch. 78) - ANT1



Plot 7-76. Peak Conducted Power (2Mbps – Ch. 0) – ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage FE of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 55 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023





Plot 7-77. Peak Conducted Power (2Mbps - Ch. 39) - ANT1



Plot 7-78. Peak Conducted Power (2Mbps – Ch. 78) – ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage FC of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 56 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023





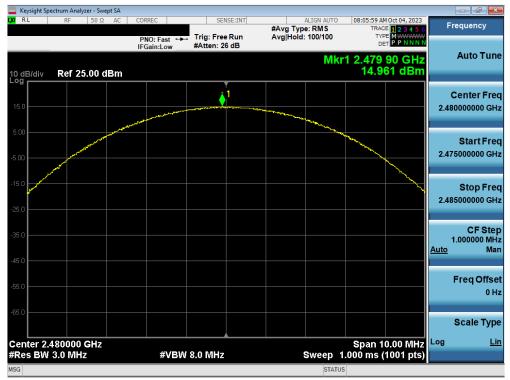
Plot 7-79. Peak Conducted Power (3Mbps - Ch. 0) - ANT1



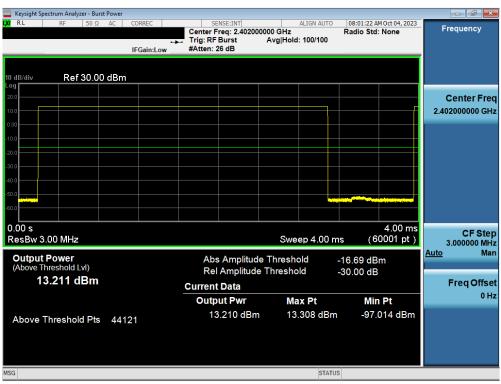
Plot 7-80. Peak Conducted Power (3Mbps - Ch. 39) - ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga 57 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 57 of 137
© 2023 ELEMENT			V 11.0 07/06/2023





Plot 7-81. Peak Conducted Power (3Mbps - Ch. 78) - ANT1



Plot 7-82. Average Conducted Power (1Mbps – Ch. 0) – ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Daga 50 of 107	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 58 of 137	
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🔤 Keysight Spectrum Analyzer - Burst Pov	ver				
<b>100 RL</b> RF 50Ω AC	CORREC CORREC →	SENSE:INT Center Freq: 2.44100 Trig: RF Burst #Atten: 26 dB	ALIGN AUTO	08:01:06 AM Oct 04, 2023 Radio Std: None	Frequency
10 dB/div Ref 30.00 dB	3m				
20.0					Center Freq 2.441000000 GHz
-10.0					
-30.0					
-60.0					
0.00 s ResBw 3.00 MHz			Sweep 4.00 m	4.00 ms ns (60001 pt)	CF Step 3.000000 MHz
Output Power (Above Threshold Lvl) 14.239 dBm		Abs Amplitude Rel Amplitude		-15.62 dBm -30.00 dB	<u>Auto</u> Man
14.259 UBIII		Current Data			Freq Offset 0 Hz
Above Threshold Pts 4	4120	Output Pwr 14.288 dBm	<b>Max Pt</b> 14.379 dBm	<b>Min Pt</b> -99.067 dBm	
MSG			STATU	S	

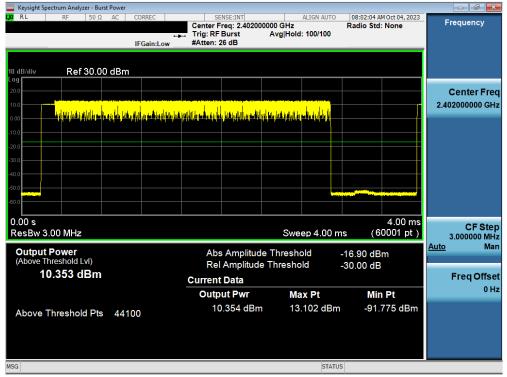
Plot 7-83. Average Conducted Power (1Mbps - Ch. 39) - ANT1



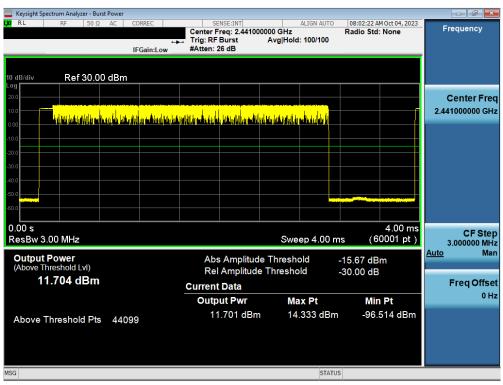
Plot 7-84. Average Conducted Power (1Mbps - Ch. 78) - ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)	
Test Report S/N:	Test Dates:	EUT Type:	Dava 50 of 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 59 of 137
© 2023 ELEMENT	·		V 11.0 07/06/2023





Plot 7-85. Average Conducted Power (2Mbps - Ch. 0) - ANT1



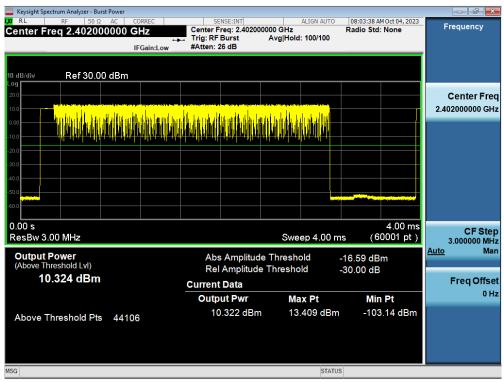
Plot 7-86. Average Conducted Power (2Mbps - Ch. 39) - ANT1

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dogo 60 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 60 of 137
© 2023 ELEMENT	·	•	V 11.0 07/06/2023



Keysight Spectrum Analyzer - Burst Power			
IZI RL RF 50Ω AC CORREC IFGain:Low	SENSE:INT ALIGN AU Center Freq: 2.480000000 GHz , Trig: RF Burst Avg Hold: 100/100 #Atten: 26 dB	Radio Std: None Freq	uency
10 dB/div Ref 30.00 dBm			
20.0 10.0 0.00	politican de escale, securitado en del secondario de escales d	2 48000	nter Freq 00000 GHz
-100 -200			
-30.0			
0.00 s		4.00 ms	
ResBw 3.00 MHz Output Power	Sweep 4.00 Abs Amplitude Threshold	00001 -+ >	CF Step 00000 MHz Man
(Above Threshold Lvl) 11.114 dBm	Rel Amplitude Threshold Current Data	-30.00 dB	eq Offset
Above Threshold Pts 44096	Output Pwr Max Pt 11.114 dBm 14.253 dł	Min Pt 3m -104.13 dBm	0 Hz
MSG	ST	ATUS	

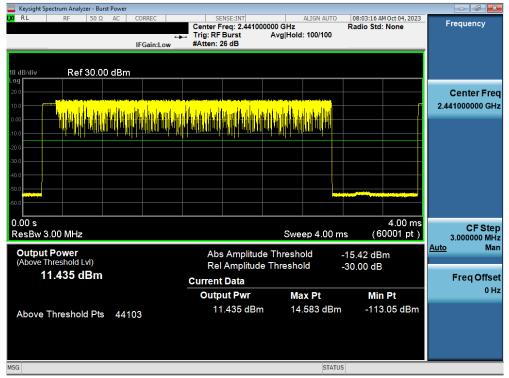
Plot 7-87. Average Conducted Power (2Mbps - Ch. 78) - ANT1



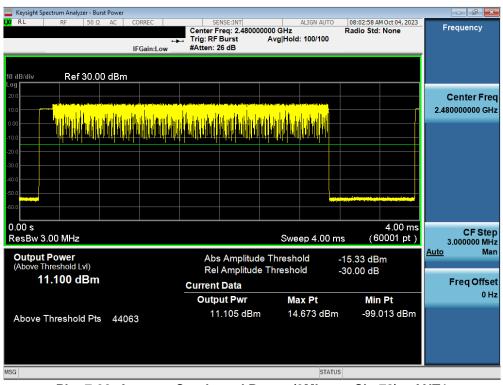
Plot 7-88. Average Conducted Power (3Mbps – Ch. 0) – ANT1

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)				
Test Report S/N:	Test Dates:	EUT Type:	Dama 04 af 407			
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 61 of 137			
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Plot 7-89. Average Conducted Power (3Mbps - Ch. 39) - ANT1



Plot 7-90. Average Conducted Power (3Mbps - Ch. 78) - ANT1

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dogo 62 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 62 of 137
© 2023 ELEMENT	·	•	V 11.0 07/06/2023



🔤 Keysight Spectrum Analyz								_	- • ×
LXI RL RF	50 Ω AC	CORREC	SENSE	AL	IGN AUTO		1 Oct 04, 2023	Fr	equency
		PNO: Fast ↔ IFGain:Low	. Trig: Free R #Atten: 26 c	rg∣Hoĺḋ: 1		TYP DE			Auto Tune
10 dB/div Ref 25	.00 dBm					14.5	46 dBm		_
			<b>▲</b> 1						enter Freq
15.0			<b>_</b>	 				2.40	2000000 GHz
5.00					~~~~~				Start Freq
-5.00								2.39	7000000 GHz
-15.0									Stop Freq
-25.0								2.40	7000000 GHz
20.0									CF Step
-35.0								1 Auto	.000000 MHz Man
-45.0									Inali
-55.0								I	Freq Offset
									0 Hz
-65.0									Scale Type
Center 2.402000 (	GHz					Span 1	0.00 MHz	Log	<u>Lin</u>
#Res BW 3.0 MHz		#VBW	8.0 MHz	S	weep 1.	000 ms (	1001 pts)		
MSG					STATUS				

Plot 7-91. Peak Conducted Power (1Mbps - Ch. 0) - ANT2



Plot 7-92. Peak Conducted Power (1Mbps – Ch. 39) – ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 62 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 63 of 137
© 2023 ELEMENT			V 11.0 07/06/2023





Plot 7-93. Peak Conducted Power (1Mbps - Ch. 78) - ANT2



Plot 7-94. Peak Conducted Power (2Mbps - Ch. 0) - ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 64 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023





Plot 7-95. Peak Conducted Power (2Mbps - Ch. 39) - ANT2



Plot 7-96. Peak Conducted Power (2Mbps – Ch. 78) – ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)			
Test Report S/N:	Test Dates:	EUT Type:	Dage (E of 127		
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 65 of 137		
© 2023 ELEMENT			V 11.0 07/06/2023		





Plot 7-97. Peak Conducted Power (3Mbps - Ch. 0) - ANT2



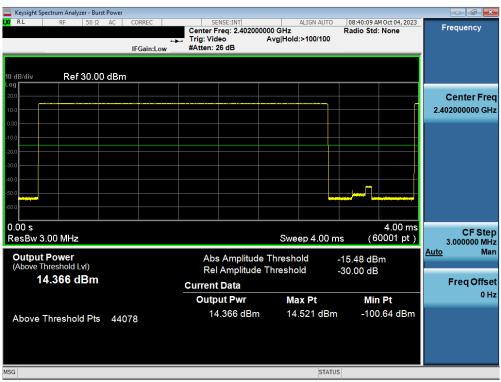
Plot 7-98. Peak Conducted Power (3Mbps - Ch. 39) - ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 66 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023





Plot 7-99. Peak Conducted Power (3Mbps - Ch. 78) - ANT2



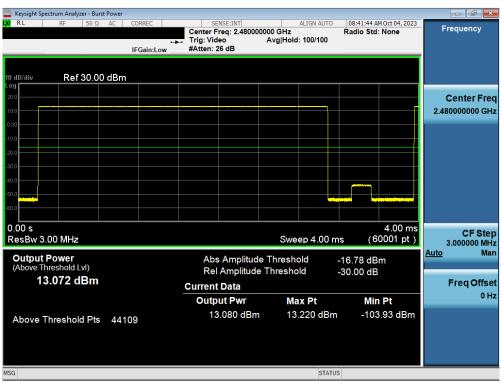
Plot 7-100. Average Conducted Power (1Mbps - Ch. 0) - ANT2

FCC ID: A3LSMS928U		MEASUREMENT REPORT (CERTIFICATION)				
Test Report S/N:	Test Dates:	EUT Type:	Dama 07 of 407			
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 67 of 137			
© 2023 ELEMENT		•	V 11.0 07/06/2023			



	pectrum Analyz		st Power											- 6 ×
()X// RL	RF	50 Ω	AC	CORREC	Low	, Trig:	SENSE:INT er Freq: 2.441 Video en: 26 dB		ALIGN AUT d: 100/100	Rad	41:12 Af io Std:	1 Oct 04, 2023 None	Fre	quency
10 dB/div Log 20.0	Ref	30.00	) dBm											enter Freg
10.0				<u> </u>										000000 GHz
-10.0														
-20.0														
-40.0														
- <sup>60.0</sup>												4.00 ms		CF Step
Output	3.00 MHz Power hreshold L	vI)					Abs Amplitu	ide Thresh		-16.5	4 dB		3.0 <u>Auto</u>	000000 MHz Man
	3.323 d					Curre	Rel Amplitue ent Data			-30.0			F	req Offset 0 Hz
Above	Threshold	d Pts	441	05		O	u <b>tput Pwr</b> 13.325 dB		<b>ax Pt</b> 3.462 dE	ßm	Min -105	Pt .86 dBm		0112
MSG									STA	ATUS				

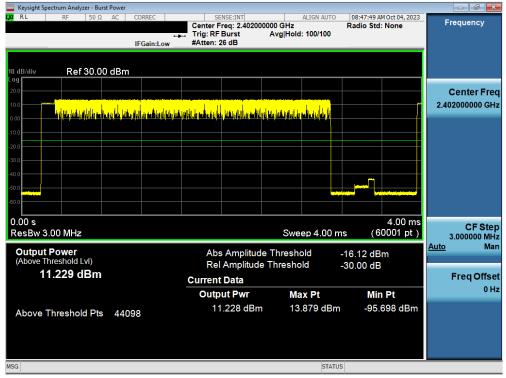
Plot 7-101. Average Conducted Power (1Mbps - Ch. 39) - ANT2



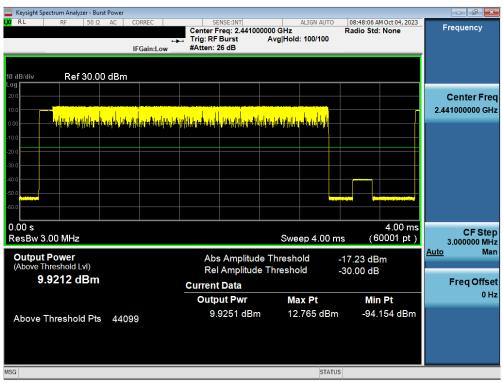
Plot 7-102. Average Conducted Power (1Mbps – Ch. 78) – ANT2

FCC ID: A3LSMS928U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dege 69 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 68 of 137
© 2023 ELEMENT			V 11.0 07/06/2023





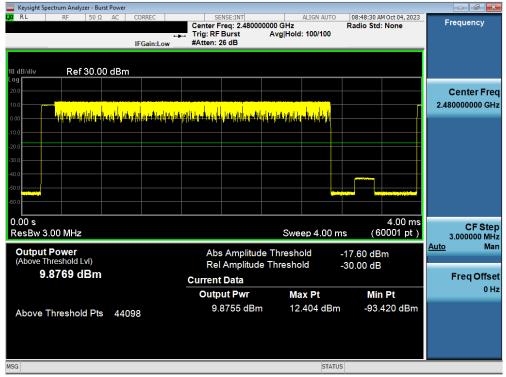




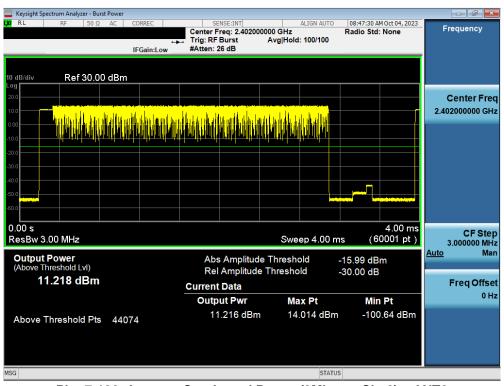
Plot 7-104. Average Conducted Power (2Mbps – Ch. 39) – ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 60 at 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 69 of 137
© 2023 ELEMENT		•	V 11.0 07/06/2023





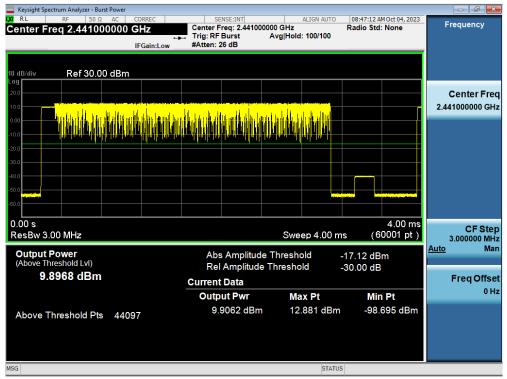
Plot 7-105. Average Conducted Power (2Mbps - Ch. 78) - ANT2



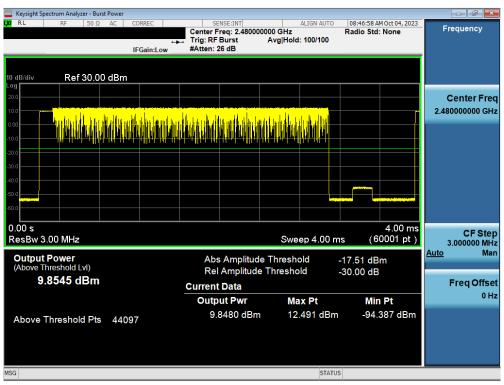
Plot 7-106. Average Conducted Power (3Mbps - Ch. 0) - ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 70 of 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 70 of 137
© 2023 ELEMENT		•	V 11.0 07/06/2023





Plot 7-107. Average Conducted Power (3Mbps - Ch. 39) - ANT2



Plot 7-108. Average Conducted Power (3Mbps – Ch. 78) – ANT2

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dana 74 at 407
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 71 of 137
© 2023 ELEMENT	·	·	V 11.0 07/06/2023



# 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 C63.10-2013 – 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  $\geq 2 \times \text{Span/RBW}$
- 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

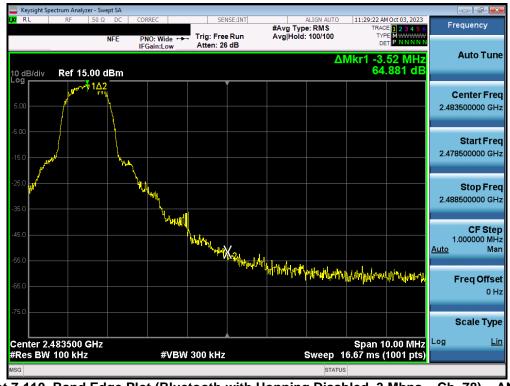
Out of band conducted spurious emissions at the band edge were investigated for all data rates in hopping and non-hopping modes. The worst case emissions were found with the EUT transmitting at 3 Mbps. Band edge emissions were also investigated with the EUT transmitting in all data rates. Plots of the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

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dega 72 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 72 of 137
© 2023 ELEMENT		•	V 11.0 07/06/2023





Plot 7-109. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps – Ch. 0) – ANT1



Plot 7-110. Band Edge Plot (Bluetooth with Hopping Disabled, 3 Mbps - Ch. 78) - ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga 72 of 127
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 73 of 137
© 2023 ELEMENT	•	·	V 11.0 07/06/2023









Plot 7-112. Band Edge Plot (Bluetooth with Hopping Enabled, 3 Mbps) – ANT1

FCC ID: A3LSMS928U	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga 74 of 107
1M2308210092-09.A3L	9/6/2023 - 11/06/2023	Portable Handset	Page 74 of 137
© 2023 ELEMENT			V 11.0 07/06/2023