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MEASUREMENT REPORT FCC PART 15.247 Bluetooth (Low Energy)

Applicant Name:

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea

Date of Testing: 4/14/2021 - 5/18/2021 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M2104070032-10.A3L

FCC ID:

APPLICANT:

A3LSMF711U

Samsung Electronics Co., Ltd.

Application Type: Model: Additional Model(s): EUT Type: Max. RF Output Power: Frequency Range: FCC Classification: FCC Rule Part(s): Test Procedure(s): Certification SM-F711U SM-F711U1 Portable Handset 3.714 mW (5.70dBm) Peak Conducted 2402 – 2480MHz Digital Transmission System (DTS) Part 15 Subpart C (15.247) 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 and KDB 558074 D01 v05r02. 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.

Randy Ortanez President



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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 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility 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 PCTEST located in Columbia, MD 21046, U.S.A.

- PCTEST 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.
- PCTEST 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).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMF711U**. The data found in this test report was taken with the EUT operating in Bluetooth low energy mode. While in low energy mode, the Bluetooth transmitter hops pseudo-randomly between 40 channels, three of which are "advertising channels". When the transmitter is hopping only between the three advertising channels, the EUT does not fall under the category of a "hopper" as defined in 15.247(a)(iii) which states that a "frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels." As operation on only the advertising channels does not qualify the EUT as a hopper, the EUT is certified as a DTS device in this mode. The data found in this report is representative of the device when it transmits on its advertising channels. Typical Bluetooth operation is covered under the DSS report found with this application.

Test Device Serial No.: 0129M, 0135M, 0189M, 0545M, 0059S, 0585S, 1600S

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (n71, n12, n5, n66, n2, n25, n30, n41, n77, n260, n261), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer

Ch.	Frequency (MHz)
0	2402
:	:
19	2440
:	:
39	2480

Table 2-1. Frequency / Channel Operations

2.3 Antenna Description

Following antenna was used for the testing.

Frequency [GHz]	Antenna Gain (dBi)
2.4	-6.1

Table 2-2.	Antenna	Peak	Gain
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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.

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2.4 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013 and KDB 558074 D01 v05r02. ANSI C63.10-2013 was 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, and 7.6 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) 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.

This device supports two configurations: one is with screen open, and one is with screen closed. Both configurations are tested, and the worst case radiated emissions data is shown in this report.

2.5 Software and Firmware

The test was conducted with firmware version F711USQU0AUEF installed on the EUT.

2.6 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 558074 D01 v05r02 were 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 that 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 7.9. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

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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 474788 D01.

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).

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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 antenna(s) 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.

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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
Line Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements 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
-	WL25-1	Conducted Cable Set (25GHz)	7/2/2020	Annual	7/2/2021	WL25-1
Agilent	N9038A	MXE EMI Receiver	7/17/2019	Annual	8/11/2021	MY51210133
Agilent	N9030A	PXA Signal Analyzer (44GHz)	7/17/2020	Annual	7/17/2021	MY49430494
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	7/9/2020	Biennial	7/9/2022	114451
Keysight Technologies	N9030A	PXA Signal Analyzer (3Hz-26.5GHz)	9/13/209	Annual	10/16/2021	MY54490576
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	10/1/2019	Biennial	10/1/2021	310233
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307

Table 6-1. Annual Test Equipment Calibration Schedule

Note:

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.

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7.0 TEST RESULTS

7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
FCC ID:	A3LSMF711U
FCC Classification:	Digital Transmission System (DTS)
Number of Channels:	<u>40</u>

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth	> 500kHz		PASS	Section 7.2
15.247(b)(3)	RSS-247 [5.4(4)]	Transmitter Output Power	< 1 Watt		PASS	Sections 7.3
15.247(e)	RSS-247 [5.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz Band	CONDUCTED	PASS	Section 7.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	≥ 20dBc		PASS	Sections 7.5, 7.6
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-Gen [8.9])	RADIATED	PASS	Sections 7.7, 7.8
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits (RSS-Gen[8.8])	LINE CONDUCTED	PASS	Section 7.9

Table 7-1. Summary of Test Results

Notes:

- 1. All modes of operation 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 and attenuators used as part of the system to connect the EUT to the analyzer 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 and attenuators.
- 4. 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 PCTEST "Bluetooth LE Automation," Version 3.6.
- 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 PCTEST "Chamber Automation," Version 1.3.1.

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7.2 6dB Bandwidth Measurement – Bluetooth (LE) §15.247(a.2); RSS-247 [5.2]

Test Overview and Limit

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the transmitter antenna terminal of the EUT while the EUT is operating at maximum power and at the appropriate frequencies. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible 6dB bandwidth is 500 kHz.

Test Procedure Used

ANSI C63.10-2013 – Section 11.8.2 Option 2 KDB 558074 D01 v05r02 – Section 8.2

Test Settings

- The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 100kHz
- 3. VBW \geq 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = 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.





Test Notes

None

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Frequency [MHz]	Data Rate	Channel No.	Bluetooth Mode	Measured Bandwidth [kHz]	Minimum Bandwidth [kHz]	Pass / Fail
2402	125 kbps	0	LE	625.0	500	Pass
2440	125 kbps	19	LE	622.9	500	Pass
2480	125 kbps	39	LE	622.9	500	Pass
2402	500 kbps	0	LE	699.2	500	Pass
2440	500 kbps	19	LE	698.0	500	Pass
2480	500 kbps	39	LE	697.3	500	Pass
2402	1 Mbps	0	LE	664.5	500	Pass
2440	1 Mbps	19	LE	662.6	500	Pass
2480	1 Mbps	39	LE	664.1	500	Pass
2402	2 Mbps	0	LE	613.2	500	Pass
2440	2 Mbps	19	LE	607.8	500	Pass
2480	2 Mbps	39	LE	614.8	500	Pass

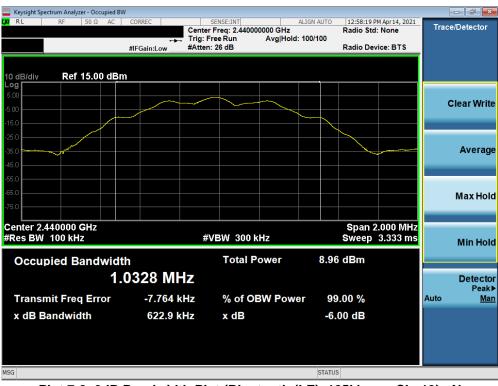
Table 7-2. Conducted Bandwidth Measurements - N

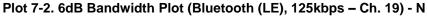
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Plot 7-1. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps - Ch. 0) - N





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Plot 7-3. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps - Ch. 39) - N



Plot 7-4. 6dB Bandwidth Plot (Bluetooth (LE), 500kbps - Ch. 0) - N

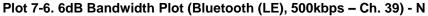
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Keysight Spectrum Analyzer - Occupied BW						-	- 6
RL RF 50 Ω AC	🛶 Trig: I	SENSE:INT r Freq: 2.440000000 GH Free Run Avg H n: 26 dB	ALIGN AUTO z old: 100/100	01:46:09 Pl Radio Std: Radio Dev		Trace/	Detector
) dB/div Ref 15.00 dBm							
00						C	lear Wri
				- All and a second s			Avera
0 0 0							Max Ho
enter 2.440000 GHz Res BW 100 kHz	#	VBW 300 kHz			.000 MHz 3.333 ms		Min Ho
Occupied Bandwidt	^h 0352 MHz	Total Power	10.8	dBm		-	Detect
Transmit Freq Error	-4.827 kHz	% of OBW Po	wer 99	.00 %		Auto	Pea <u>M</u>
x dB Bandwidth	698.0 kHz	x dB	-6.	00 dB			
			STATU	5		_	_

Plot 7-5. 6dB Bandwidth Plot (Bluetooth (LE), 500kbps - Ch. 19) - N





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X RF 50 Ω AC CORREC SENSE:INT ALIGN AUTO 11:23:48 AM Apr14, 2021 Center Freq: 2.402000000 GHz Radio Std: None	
	Trace/Detector
Trig: Free Run Avg Hold: 100/100	
#IFGain:Low #Atten: 26 dB Radio Device: BTS	
10 dB/div Ref 15.00 dBm	
	Clear Write
5.00	
-15.0	
-25.0	
-35.0	Average
-45.0	
-55.0	
-65.0	Max Hold
.75.0	
Center 2.402000 GHz Span 2.000 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 3.333 ms	
#Res BW 100 KH2 #VBW 300 KH2 Sweep 3.333 HIS	Min Hold
Occupied Bandwidth Total Power 10.7 dBm	
1.0579 MHz	
	Detector Peak▶
Transmit Freq Error 571 Hz % of OBW Power 99.00 %	
x dB Bandwidth 664.5 kHz x dB -6.00 dB	
MSG STATUS	

Plot 7-7. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps - Ch. 0) - N



Plot 7-8. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps - Ch. 19) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupied BW RL RE 50.0 AC						_	
RL RF 50 Ω AC	🛶 Trig: I	SENSE:INT r Freq: 2.480000000 GHz Free Run Avg Hol n: 26 dB	ALIGN AUTO	Radio Std Radio Dev		Trace	/Detector
) dB/div Ref 15.00 dBn	1						
00						с	lear Wri
							Avera
0							Max Ho
enter 2.480000 GHz Res BW 100 kHz	#	VBW 300 kHz			2.000 MHz 3.333 ms		Min Ho
Occupied Bandwidt	_h 0580 MHz	Total Power	9.70) dBm			Detect Peal
Transmit Freq Error x dB Bandwidth	-1.898 kHz 664.1 kHz	% of OBW Pow x dB		0.00 % 00 dB		Auto	Ma Ma
à			STATUS				

Plot 7-9. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps - Ch. 39) - N



Plot 7-10. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps - Ch. 0) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 07
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Plot 7-11. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps - Ch. 19) - N



Plot 7-12. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps - Ch. 39) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Frequency [MHz]	Data Rate	Channel No.	Bluetooth Mode	Measured Bandwidth [kHz]	Minimum Bandwidth [kHz]	Pass / Fail
2402	125 kbps	0	LE	620.3	500	Pass
2440	125 kbps	19	LE	623.0	500	Pass
2480	125 kbps	39	LE	619.3	500	Pass
2402	500 kbps	0	LE	661.3	500	Pass
2440	500 kbps	19	LE	661.5	500	Pass
2480	500 kbps	39	LE	660.3	500	Pass
2402	1 Mbps	0	LE	669.5	500	Pass
2440	1 Mbps	19	LE	670.5	500	Pass
2480	1 Mbps	39	LE	667.3	500	Pass
2402	2 Mbps	0	LE	1139.0	500	Pass
2440	2 Mbps	19	LE	1137.0	500	Pass
2480	2 Mbps	39	LE	1140.0	500	Pass

Table 7-3. Conducted Bandwidth Me	easurements - Q
-----------------------------------	-----------------

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-13. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps - Ch. 0) - Q



Plot 7-14. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps - Ch. 19) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 97
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Plot 7-15. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps - Ch. 39) - Q



Plot 7-16. 6dB Bandwidth Plot (Bluetooth (LE), 500kbps - Ch. 0) - Q

FCC ID: A3LSMF711U	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 22 of 97
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Plot 7-17. 6dB Bandwidth Plot (Bluetooth (LE), 500kbps - Ch. 19) - Q



Plot 7-18. 6dB Bandwidth Plot (Bluetooth (LE), 500kbps – Ch. 39) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	
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Plot 7-19. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps - Ch. 0) - Q



Plot 7-20. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps - Ch. 19) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:			
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Plot 7-21. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps - Ch. 39) - Q



Plot 7-22. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps - Ch. 0) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 97	
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Plot 7-23. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps - Ch. 19) - Q



Plot 7-24. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps - Ch. 39) - Q

FCC ID: A3LSMF711U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:			
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7.3 Output Power Measurement – Bluetooth (LE) §15.247(b.3); RSS-247 [5.4(4)]

Test Overview and Limits

The transmitter antenna terminal of the EUT is connected to the input of a spectrum analyzer. Measurements are made while the EUT is operating at maximum power and at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

Test Procedure Used

ANSI C63.10-2013 – Section 11.9.1.1 KDB 558074 D01 v05r02 – Section 8.3.1.1

Test Settings

- 1. RBW = 3MHz
- 2. VBW = 50MHz
- 3. Span \ge 3 x RBW
- 4. Sweep = auto couple
- 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

Test Notes

None

FCC ID: A3LSMF711U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Frequency	Frequency Data Rate Channe		nel Bluetooth (N)			Peak Conducted Power (Q)	
[MHz]	[MHz] [Mbps]	No.	Mode	[dBm]	[mW]	[dBm]	[mW]
2402	125 kbps	0	LE	5.04	3.192	5.06	3.206
2440	125 kbps	19	LE	4.77	2.999	5.45	3.507
2480	125 kbps	39	LE	4.12	2.582	4.07	2.550
2402	500 kbps	0	LE	5.07	3.214	5.10	3.237
2440	500 kbps	19	LE	4.80	3.020	5.57	3.604
2480	500 kbps	39	LE	4.19	2.624	4.32	2.701
2402	1 Mbps	0	LE	5.09	3.228	5.11	3.246
2440	1 Mbps	19	LE	4.84	3.048	5.56	3.598
2480	1 Mbps	39	LE	4.18	2.618	4.33	2.712
2402	2 Mbps	0	LE	5.23	3.334	5.25	3.348
2440	2 Mbps	19	LE	4.98	3.148	5.70	3.714
2480	2 Mbps	39	LE	4.33	2.710	4.46	2.794

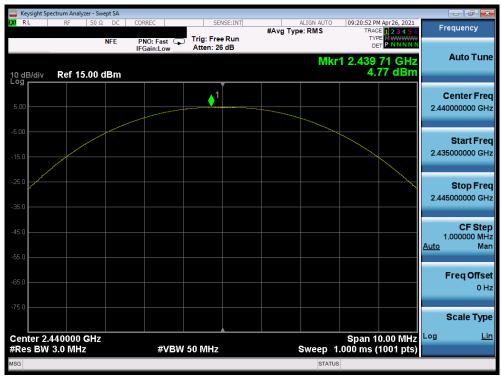
Table 7-4. Conducted Output Power Measurements (Bluetooth (LE))

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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Keysight Spectru								
K/RL	RF 50 \$	DC DC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS		r 26, 2021 2 3 4 5 6	Frequency
		NFE	PNO: Fast C IFGain:Low	Trig: Free Run Atten: 26 dB	#Avg Type. Kills	TYPE		
10 dB/div R	Ref 15.00	dBm			Mk	r1 2.402 19 5.04	dBm	Auto Tune
5.00				↓ ¹				Center Free 2.402000000 GH
5.00								2.4020000000
15.0								Start Fre 2.397000000 GH
35.0								Stop Fre 2.407000000 GH
								CF Ste
45.0							E	1.000000 MH
55.0								Ere a Offe
65.0								FreqOffso 0 ⊦
75.0								Scale Typ
center 2.40						Span 10.0		.og <u>Li</u>
Res BW 3.	0 MHz		#VB	A/ 50 MHz	Sweep	1.000 ms (10	01 pts)	
SG					STAT			

Plot 7-25. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 0) - N



Plot 7-26. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 19) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 20 of 97	
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	Spectrum Analyzer -						
🗶 RL	RF 50	DΩ DC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	09:21:26 PM Apr 26, 2021 TRACE 1 2 3 4 5	
		NFE	PNO: Fast 🕞 IFGain:Low	Trig: Free Run Atten: 26 dB		DET PNNNN	N Auto Tomo
10 dB/div Log	Ref 15.00	0 dBm			Mkı	1 2.479 77 GH 4.12 dBn	
5.00				↓1			Center Freq 2.480000000 GHz
-5.00							Start Free 2.475000000 GHz
-25.0							Stop Fred 2.485000000 GHz
-45.0							CF Step 1.000000 MH <u>Auto</u> Mar
-65.0							Freq Offse 0 H
-75.0							Scale Type
	2.480000 GH V 3.0 MHz	z	#VBW	50 MHz	Sweep 1	Span 10.00 MH I.000 ms (1001 pts	z Log <u>Lir</u>)
MSG					STATU	s	

Plot 7-27. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 39) - N



Plot 7-28. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 0) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 20 of 97	
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Keysight Spectrum A						
KIRL RF	50 Ω DC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	09:22:15 PM Apr 26, 2021 TRACE 1 2 3 4 5 6	Frequency
	NFE	PNO: Fast G	Trig: Free Run Atten: 26 dB	"g .)periode		
10 dB/div Ref	15.00 dBm	1		Mkr	1 2.440 26 GHz 4.80 dBm	Auto Tune
5.00			↓ 1			Center Fre 2.440050000 GH
5.00						Start Fre 2.435050000 G⊦
35.0						Stop Fre 2.445050000 G⊢
15.0 						CF Ste 1.000000 MH <u>Auto</u> Ma
65.0						Freq Offs 0 H
75.0						Scale Typ
enter 2.44005 Res BW 3.0 N		#VBW	/ 50 MHz	Sweep 1	Span 10.00 MHz .000 ms (1001 pts)	Log <u>Li</u>
SG				STATUS		

Plot 7-29. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 19) - N



Plot 7-30. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 39) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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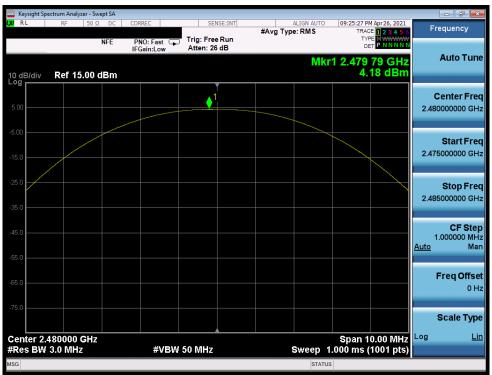
Plot 7-31. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 0) - N



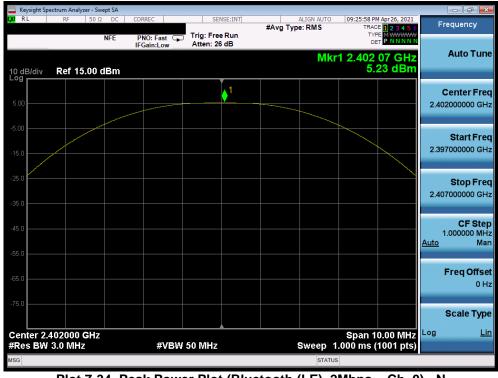
Plot 7-32. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 19) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 22 of 97
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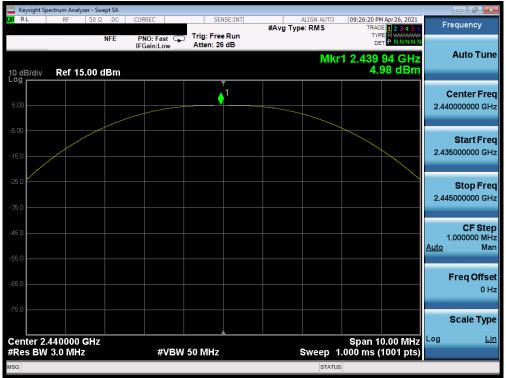
Plot 7-33. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 39) - N



Plot 7-34. Peak Power Plot (Bluetooth (LE), 2Mbps - Ch. 0) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-35. Peak Power Plot (Bluetooth (LE), 2Mbps - Ch. 19) - N



Plot 7-36. Peak Power Plot (Bluetooth (LE), 2Mbps - Ch. 39) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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	pectrum Analyze						
L <mark>XI</mark> RL	RF	50 Ω DC	CORREC	Trig: Free Run	ALIGN AUTO #Avg Type: RMS	08:10:00 PM Apr 26, 2 TRACE 1 2 3 4 TYPE M WWW	5 6 Frequency
10 dB/div Log	Ref 15.0	NFE	PNO: Fast 🕞 IFGain:Low	Atten: 26 dB	Mk	r1 2.401 96 G 5.06 dE	Hz Auto Tune
5.00				1			Center Freq 2.402000000 GHz
-5.00							Start Freq 2.397000000 GHz
-25.0							Stop Freq 2.407000000 GHz
-45.0							CF Step 1.000000 MH: <u>Auto</u> Mar
-65.0							Freq Offse 0 H:
-75.0							Scale Type
	.402000 G / 3.0 MHz	Hz	#VBW	/ 50 MHz	Sweep	Span 10.00 M 1.000 ms (1001 p	Hz ^{Log <u>Lin</u> ts)}
MSG					STATU	IS	

Plot 7-37. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 0) - Q



Plot 7-38. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 19) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-39. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 39) - Q



Plot 7-40. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 0) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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	trum Analyzer - S	wept SA								- đ ×
LXI RL	RF 50	ΩDC	CORREC	SENSE	 #Avg Typ	ALIGN AUTO e: RMS	TRAC	Apr 26, 2021 E 1 2 3 4 5 6 E M WWWWW	F	requency
10 dB/div	Ref 15.00	NFE dBm	PNO: Fast IFGain:Low	Atten: 26 d		Mkr	DE 1 2.439	83 GHz 57 dBm		Auto Tune
5.00				∳ ¹	 					Center Freq 40000000 GHz
-5.00									2.43	Start Freq 35000000 GHz
-25.0									2.44	Stop Freq 45000000 GHz
-45.0									<u>Auto</u>	CF Step 1.000000 MH Mar
-65.0										Freq Offse 0 Hi
	10000 0								Log	Scale Type
Center 2.4 #Res BW 3		2	#VBW	50 MHz		Sweep 1	span 1 .000 ms (0.00 MHz 1001 pts)	Log	<u></u>
MSG						STATUS				

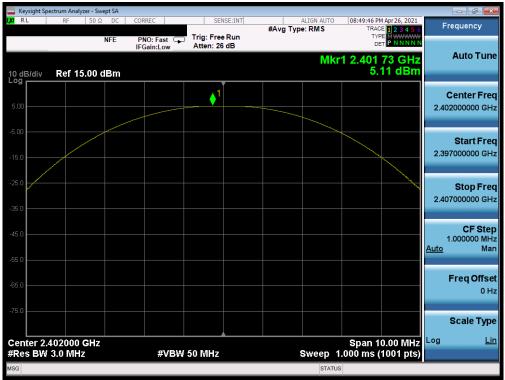
Plot 7-41. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 19) - Q



Plot 7-42. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 39) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-43. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 0) - Q



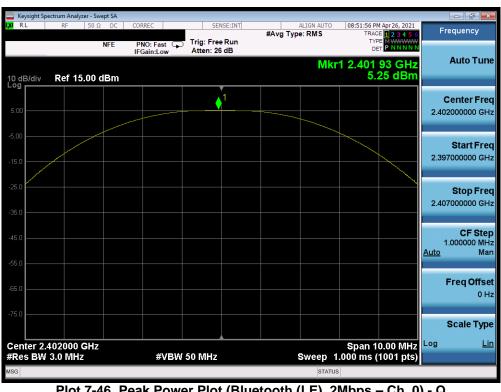
Plot 7-44. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 19) - Q

FCC ID: A3LSMF711U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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	ectrum Analyzer -	Swept SA					
(X/ RL	RF 5	0Ω DC	CORREC	SENSE:INT	#Avg Type: RMS	08:51:16 PM Apr 26, 2021 TRACE 1 2 3 4 5 6 TYPE M	Frequency
10 dB/div Log	Ref 15.0		IFGain:Low	Atten: 26 dB	Mk	r1 2.479 71 GHz 4.33 dBm	Auto Tune
5.00				↓ 1			Center Freq 2.480000000 GHz
-5.00							Start Freq 2.475000000 GHz
-25.0							Stop Freq 2.485000000 GHz
-45.0							CF Step 1.000000 MHz <u>Auto</u> Man
-65.0							Freq Offset 0 Hz
-75.0							Scale Type
Center 2. #Res BW	480000 GH 3.0 MHz	lz	#VBW	50 MHz	Sweep	Span 10.00 MHz 1.000 ms (1001 pts)	Log <u>Lin</u>
MSG					STATU	IS	

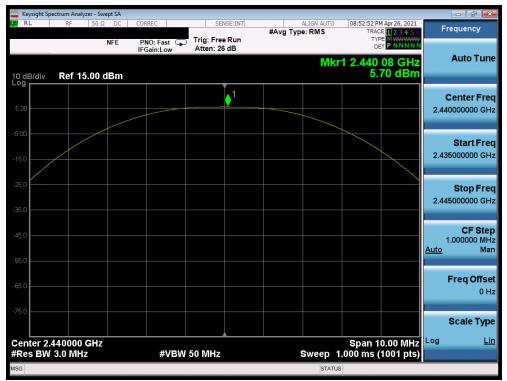
Plot 7-45. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 39) - Q



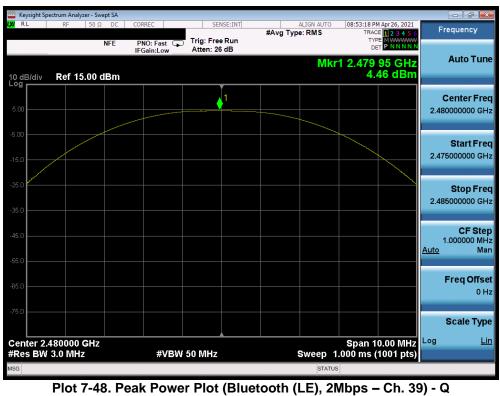
Plot 7-46. Peak Power Plot (Bluetooth (LE), 2Mbps - Ch. 0) - Q

FCC ID: A3LSMF711U	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-47. Peak Power Plot (Bluetooth (LE), 2Mbps - Ch. 19) - Q



FCC ID: A3LSMF711U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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7.4 Power Spectral Density – Bluetooth (LE) §15.247(e); RSS-247 [5.2]

Test Overview and Limit

The peak power density is measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power and at the appropriate frequencies.

The maximum permissible power spectral density is 8 dBm in any 3 kHz band.

Test Procedure Used

ANSI C63.10-2013 – Section 11.10.2 Method PKPSD KDB 558074 D01 v05r02 – Section 8.4 DTS Maximum Power Spectral Density level in the fundamental emission

Test Settings

- 1. Analyzer was set to the center frequency of the DTS channel under investigation
- 2. Span = 1.5 times the DTS channel bandwidth
- 3. RBW = 3kHz
- 4. VBW = 1MHz
- 5. Detector = peak
- 6. Sweep time = auto couple
- 7. Trace mode = max hold
- 8. 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

None

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Frequency [MHz]	Data Rate [Mbps]	Channel No.	Bluetooth Mode	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]
2402	125 kbps	0	LE	-1.18	8.0	-9.18
2440	125 kbps	19	LE	-1.21	8.0	-9.21
2480	125 kbps	39	LE	-2.24	8.0	-10.24
2402	500 kbps	0	LE	3.47	8.0	-4.53
2440	500 kbps	19	LE	3.44	8.0	-4.56
2480	500 kbps	39	LE	2.39	8.0	-5.61
2402	1 Mbps	0	LE	3.82	8.0	-4.18
2440	1 Mbps	19	LE	3.84	8.0	-4.16
2480	1 Mbps	39	LE	2.79	8.0	-5.21
2402	2 Mbps	0	LE	0.57	8.0	-7.43
2440	2 Mbps	19	LE	0.58	8.0	-7.42
2480	2 Mbps	39	LE	-0.55	8.0	-8.55

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-49. Power Spectral Density Plot (Bluetooth (LE), 125kbps - Ch. 0) - N

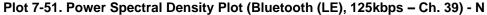


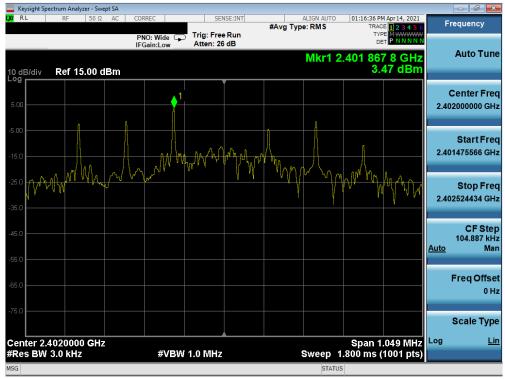
Plot 7-50. Power Spectral Density Plot (Bluetooth (LE), 125kbps - Ch. 19) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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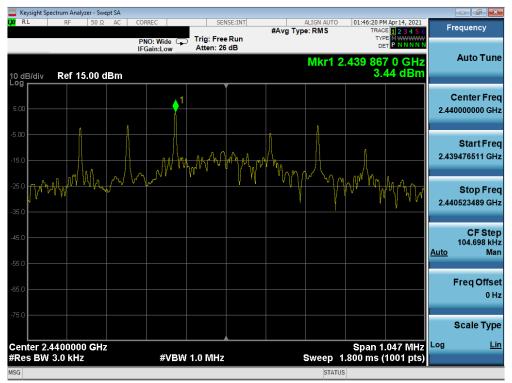




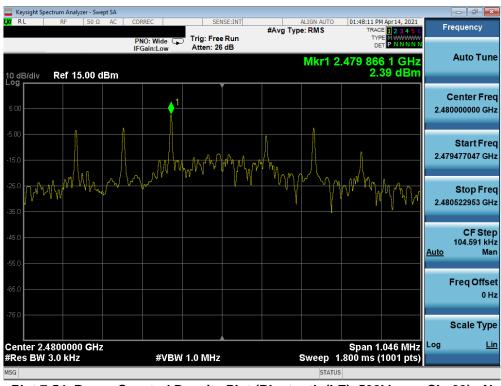
Plot 7-52. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 0) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-53. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 19) - N



Plot 7-54. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 39) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 45 of 97
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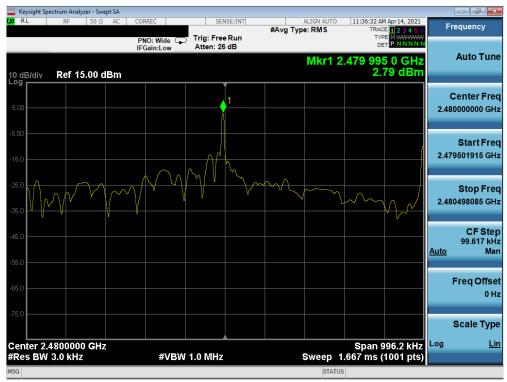
Plot 7-55. Power Spectral Density Plot (Bluetooth (LE), 1Mbps - Ch. 0) - N



Plot 7-56. Power Spectral Density Plot (Bluetooth (LE), 1Mbps - Ch. 19) - N

FCC ID: A3LSMF711U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 46 of 97
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Plot 7-58. Power Spectral Density Plot (Bluetooth (LE), 2Mbps - Ch. 0) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 47 of 97
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	Spectrum Ana												
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) dB/div	Ref 1	l5.00 d		IFGain:L		Atten: 26	dB		Mkr1	2.439 99	01 8 GHz .58 dBm		Auto Tur
.00							1						Center Fre
5.0						m. M	ฬ					2.43	Start Fr 39544181 G
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5.0												<u>Auto</u>	CF Ste 91.164 k M
5.0													Freq Offs 0
5.0													Scale Typ
	2.440000 N 3.0 kH			#	VBW	1.0 MHz			Sweep	Span 1.533 ms	911.6 kHz (1001 pts)	Log	L





Plot 7-60. Power Spectral Density Plot (Bluetooth (LE), 2Mbps - Ch. 39) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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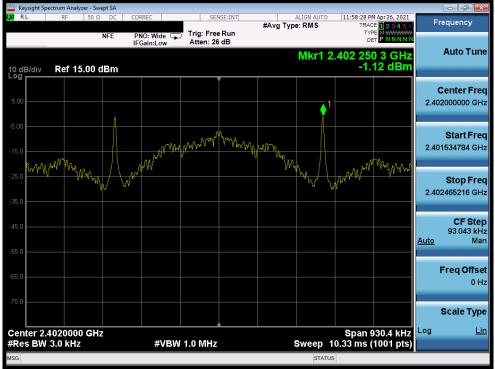


Frequency [MHz]	Data Rate [Mbps]	Channel No.	Bluetooth Mode	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]
2402	125 kbps	0	LE	-1.12	8.0	-9.12
2440	125 kbps	19	LE	-0.63	8.0	-8.63
2480	125 kbps	39	LE	-1.72	8.0	-9.72
2402	500 kbps	0	LE	-1.26	8.0	-9.26
2440	500 kbps	19	LE	-0.80	8.0	-8.80
2480	500 kbps	39	LE	-1.94	8.0	-9.94
2402	1 Mbps	0	LE	-9.82	8.0	-17.82
2440	1 Mbps	19	LE	-9.28	8.0	-17.28
2480	1 Mbps	39	LE	-10.50	8.0	-18.50
2402	2 Mbps	0	LE	-12.75	8.0	-20.75
2440	2 Mbps	19	LE	-12.57	8.0	-20.57
2480	2 Mbps	39	LE	-13.54	8.0	-21.54

Table 7-6. Conducted Power Density I	Measurements - Q
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FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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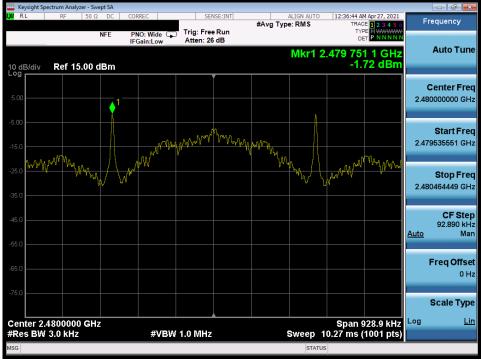
Plot 7-61. Power Spectral Density Plot (Bluetooth (LE), 125kbps - Ch. 0) - Q



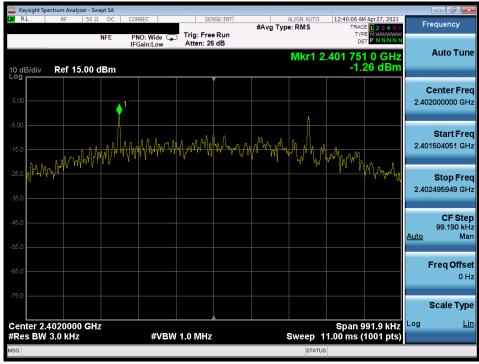
Plot 7-62. Power Spectral Density Plot (Bluetooth (LE), 125kbps - Ch. 19) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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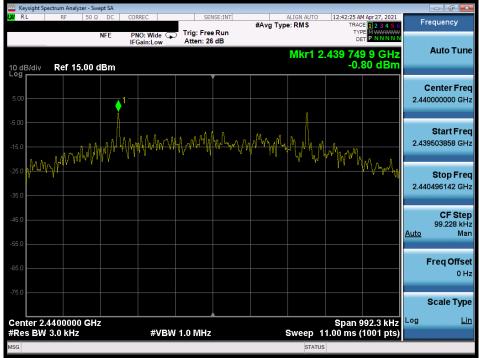
Plot 7-63. Power Spectral Density Plot (Bluetooth (LE), 125kbps - Ch. 39) - Q



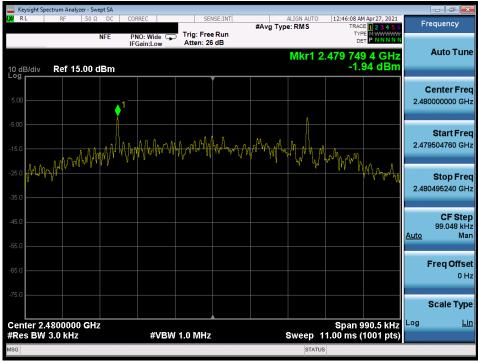
Plot 7-64. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 0) - Q

FCC ID: A3LSMF711U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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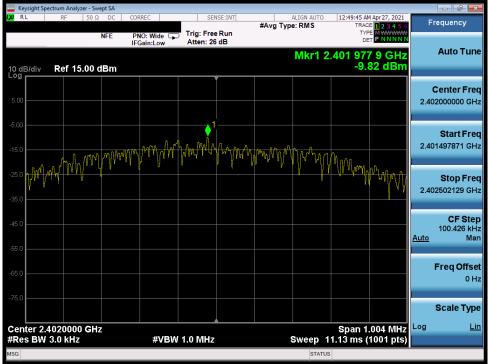
Plot 7-65. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 19) - Q



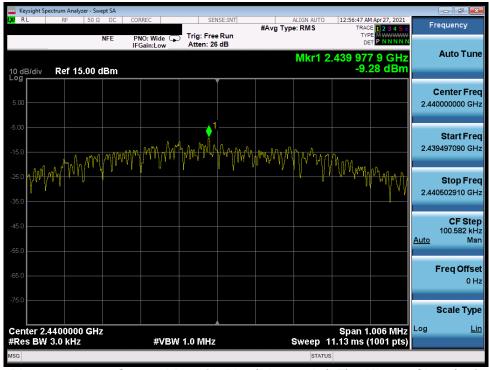
Plot 7-66. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 39) - Q

FCC ID: A3LSMF711U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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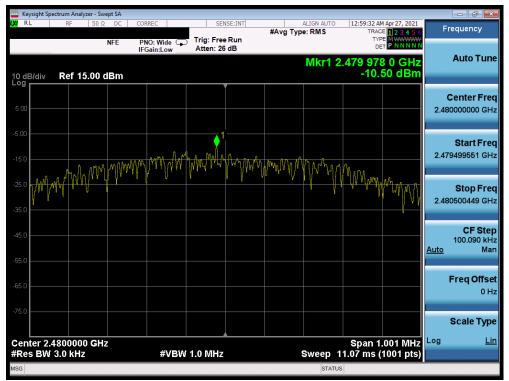
Plot 7-67. Power Spectral Density Plot (Bluetooth (LE), 1Mbps – Ch. 0) - Q



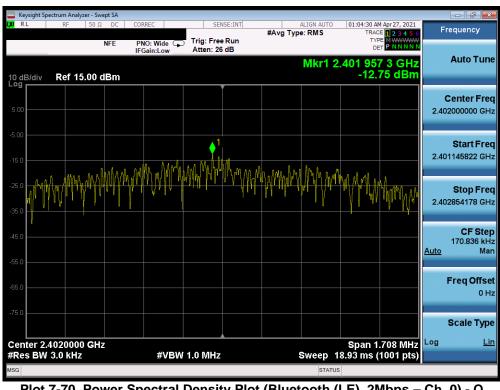
Plot 7-68. Power Spectral Density Plot (Bluetooth (LE), 1Mbps - Ch. 19) - Q

FCC ID: A3LSMF711U	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 52 of 97
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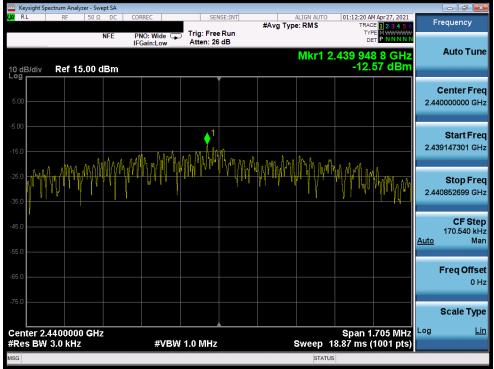
Plot 7-69. Power Spectral Density Plot (Bluetooth (LE), 1Mbps - Ch. 39) - Q



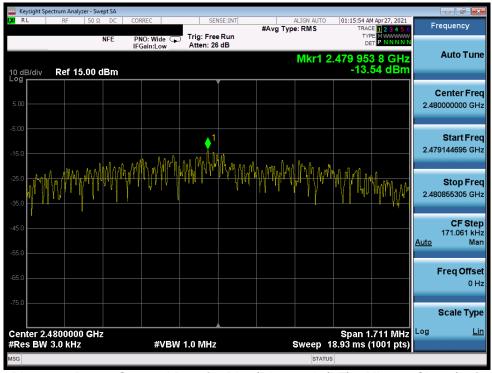
Plot 7-70. Power Spectral Density Plot (Bluetooth (LE), 2Mbps - Ch. 0) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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Plot 7-71. Power Spectral Density Plot (Bluetooth (LE), 2Mbps – Ch. 19) - Q



Plot 7-72. Power Spectral Density Plot (Bluetooth (LE), 2Mbps – Ch. 39) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 55 of 97
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7.5 Conducted Emissions at the Band Edge §15.247(d); RSS-247 [5.5]

Test Overview and Limit

For the following out of band conducted spurious emissions plots at the band edge, the EUT was set to transmit at maximum power with the largest packet size available. These settings produced the worst-case emissions.

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth.

Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3 KDB 558074 D01 v05r02 – Section 8.7.2

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.



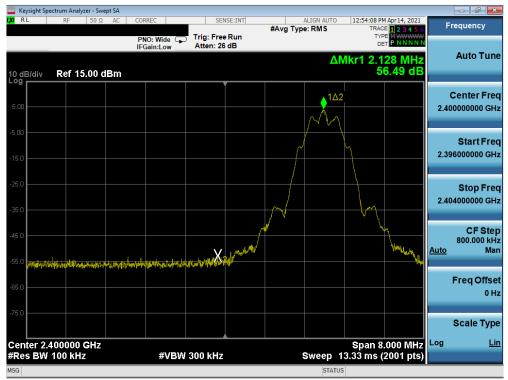
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

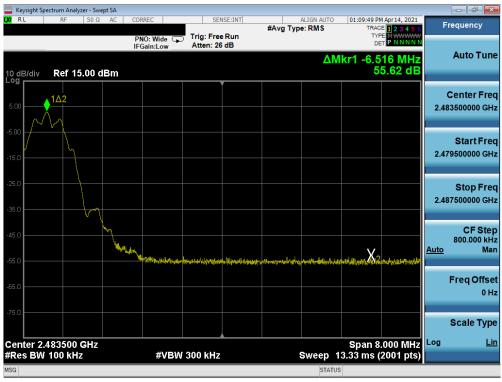
None

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-73. Band Edge Plot (Bluetooth (LE), 125kbps - Ch. 0) - N



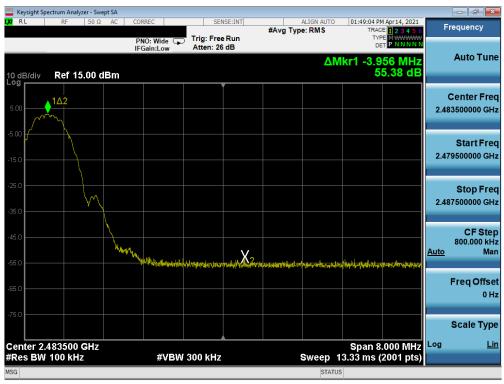
Plot 7-74. Band Edge Plot (Bluetooth (LE), 125kbps - Ch. 39) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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	ectrum Analy		t SA										
(IRL	RF	<u>50 Ω</u>		ORREC		SEN		#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Apr 14, 2021 DE 1 2 3 4 5 6 PE M	F	requency
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5.00									1Δ2				Center Free 00000000 GH
15.00												2.39	Start Free 6000000 GH
35.0								$\overline{\mathcal{A}}$		M		2.40	Stop Free 04000000 GH
45.0	and the second second	و بار الد و بو		يمرير ومراولت	ute at at at	American Street	A State Work was				Land Landing	<u>Auto</u>	CF Ste 800.000 kH Ma
65.0													Freq Offse 0 H
75.0 Center 2.4	400000	CH7								Snan 9	.000 MHz	Log	Scale Type
Res BW				#	VBW	300 kHz			Sweep 1	3.33 ms ((2001 pts)		
ISG									STATU	5		_	

Plot 7-75. Band Edge Plot (Bluetooth (LE), 500kbps - Ch. 0) - N



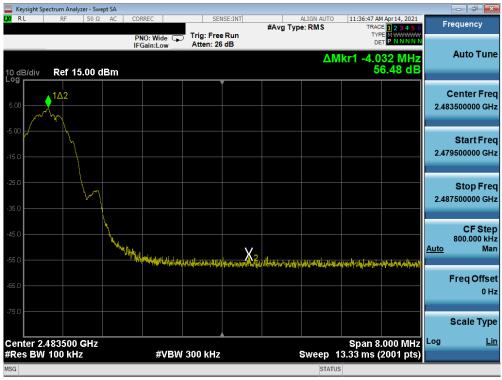
Plot 7-76. Band Edge Plot (Bluetooth (LE), 500kbps - Ch. 39) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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	ectrum Analy												
XI RL	RF	50 Ω	AC	CORREC		SEN	Run	#Avg Typ	ALIGN AUTO e: RMS	TRAC	Apr 14, 2021 E 1 2 3 4 5 6 PE M T P N N N N N	Fr	requency
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5.00									1 <u>1</u> 22				Center Freq 0000000 GHz
-5.00									/ 1			2.39	Start Freq 6000000 GHz
-25.0								M				2.40	Stop Freq 4000000 GHz
-45.0						X2	ister the start				Marting of the line	<u>Auto</u>	CF Step 800.000 kHz Man
-55.0	k de plikken de terr	an lity way	i ng catalay, k	ryketny (* 10 det)	e-pertuikiegen	linne en							Freq Offset 0 Hz
-75.0	400000	CH2								Snan 9	.000 MHz		Scale Type
#Res BW				\$	¢VB₩	300 kHz			Sweep 1	3.33 ms (2001 pts)	9	
ISG									STATUS				

Plot 7-77. Band Edge Plot (Bluetooth (LE), 1Mbps - Ch. 0) - N



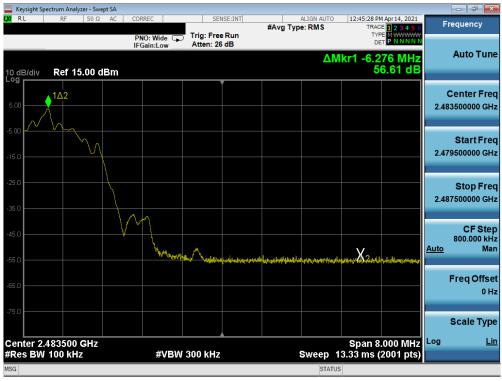
Plot 7-78. Band Edge Plot (Bluetooth (LE), 1Mbps - Ch. 39) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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	ectrum Analy		SA										- 🖻 🗙
X/RL	RF	50 Ω		ORREC			NSE:INT	#Avg Typ	ALIGN AUTO	TRAC	1 Apr 14, 2021 E <mark>1 2 3 4 5</mark> 6	F	equency
10 dB/div	Ref 15	i.00 dB		PNO: Wi IFGain:L	de 😱 ow	Trig: Fre Atten: 2			ΔΝ	DE //kr1 2.0	12 MHz 1.83 dB		Auto Tune
5.00													Center Frec 0000000 GH2
-5.00										M		2.39	Start Fred 6000000 GH2
25.0 35.0							X2m					2.40	Stop Free 4000000 GH;
45.0	adar Jadis tiko	w What dill	uladiamh.	a da anti-	<u>_^</u>	torritient	9 ~				¥	<u>Auto</u>	CF Step 800.000 kH Mar
65.0	INT A BABBA	1011111111111											Freq Offse 0 Hi
Center 2.4 #Res BW						300 kHz			Sweep 1	Span 8			Scale Type <u>Lir</u>
ARES DW				#	4.044	500 KHZ			status		2001 pts)		

Plot 7-79. Band Edge Plot (Bluetooth (LE), 2Mbps - Ch. 0) - N



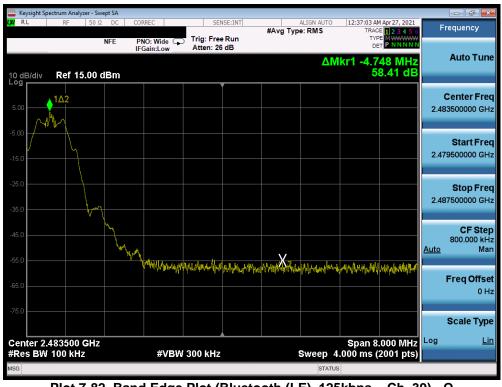
Plot 7-80. Band Edge Plot (Bluetooth (LE), 2Mbps - Ch. 39) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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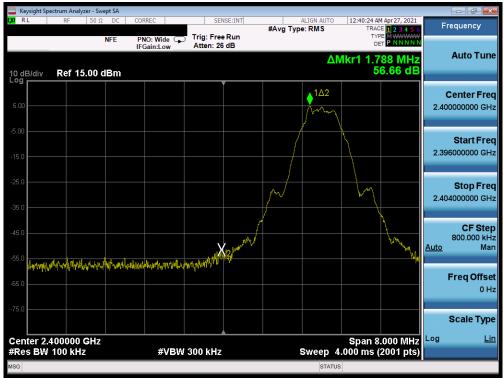
Plot 7-81. Band Edge Plot (Bluetooth (LE), 125kbps - Ch. 0) - Q



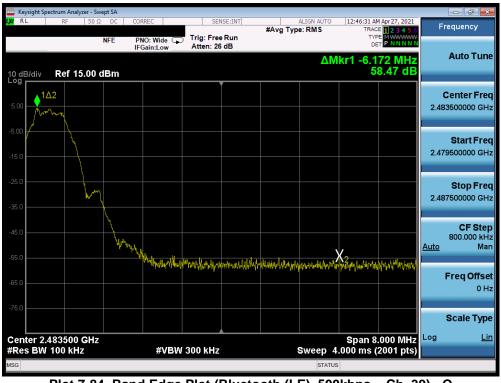
Plot 7-82. Band Edge Plot (Bluetooth (LE), 125kbps - Ch. 39) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		
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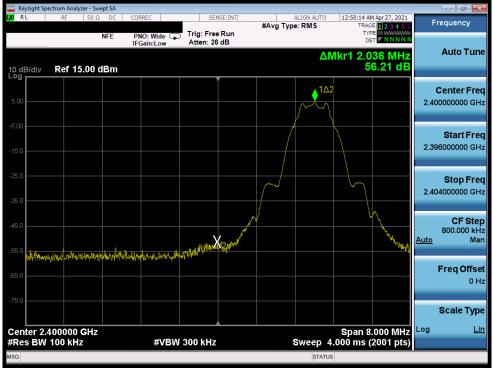
Plot 7-83. Band Edge Plot (Bluetooth (LE), 500kbps - Ch. 0) - Q



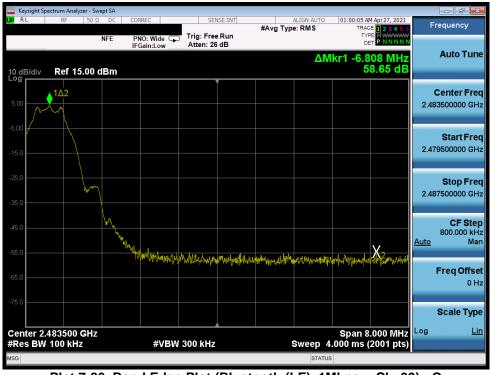
Plot 7-84. Band Edge Plot (Bluetooth (LE), 500kbps - Ch. 39) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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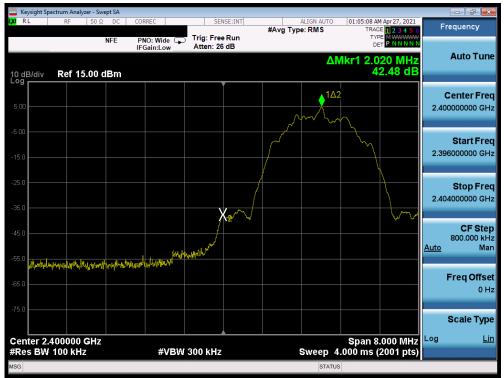
Plot 7-85. Band Edge Plot (Bluetooth (LE), 1Mbps - Ch. 0) - Q



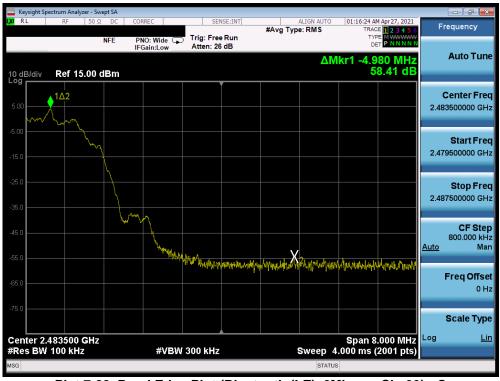
Plot 7-86. Band Edge Plot (Bluetooth (LE), 1Mbps - Ch. 39) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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Plot 7-87. Band Edge Plot (Bluetooth (LE), 2Mbps - Ch. 0) - Q



Plot 7-88. Band Edge Plot (Bluetooth (LE), 2Mbps - Ch. 39) - Q

FCC ID: A3LSMF711U	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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7.6 Conducted Spurious Emissions §15.247(d); RSS-247 [5.5]

Test Overview and Limit

For the following out of band conducted spurious emissions plots, the EUT was set to transmit at maximum power with the largest packet size available. The worst case spurious emissions were found in this configuration.

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the procedure in Section 8.5 of KDB 558074 D01 v05r02 and Section 11.11.3 of ANSI C63.10-2013.

Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3 KDB 558074 D01 v05r02 – Section 8.5

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
- 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 7-5. Test Instrument & Measurement Setup

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Test Report S/N:	Test Dates:	EUT Type:		Dage CE of 07	
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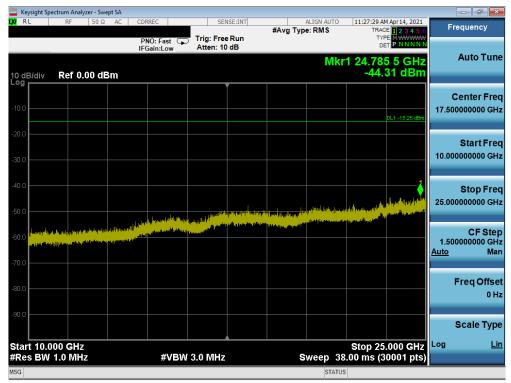
Test Notes

- 1. RBW was set to 1MHz rather than 100kHz in order to increase the measurement speed.
- 2. The display line shown in the following plots denotes the limit at 20dB below the fundamental emission level measured in a 100kHz bandwidth. However, since the traces in the following plots are measured with a 1MHz RBW, the display line may not necessarily appear to be 20dB below the level of the fundamental in a 1MHz bandwidth.
- 3. For plots showing conducted spurious emissions near the limit, the frequencies were investigated with a reduced RBW to ensure that no emissions were present.

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	pectrum A														
RL	RF	<u>50 Ω</u>	AC	CO	RREC		SEI	NSE:INT	#Avg Ty	ALIGN AU	TO 11:		pr 14, 2021 1 2 3 4 5 6	Fr	equency
				P IF	NO: Fas Gain:Lo	at ⊊⊃ w	Trig: Free Atten: 26					TYPE	MWWWWW PNNNNN		
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															Center Fr
5.00														5.01	5000000 GI
5.00			\vdash												Start Fr
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tart 30 Res BM		Hz			#\	VBW	3.0 MHz			Sweep	Sto 18.00 r	op 10.0 ns (30)	00 GHz 001 pts)	Log	<u> </u>
G											ATUS				



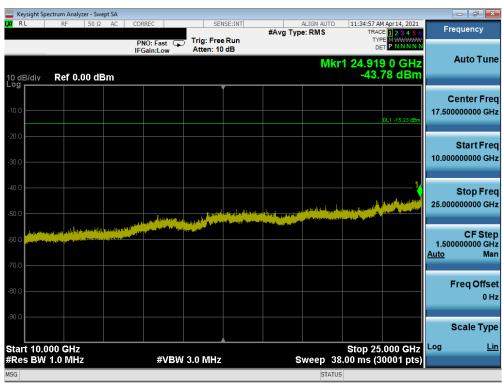
Plot 7-90. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 0) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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	pectrum Analy	yzer - Swep	ot SA										- 🗗 🗙
(RL	RF	50 Ω	AC	CORREC			ISE:INT	#Avg Typ	ALIGN AUT	т	5 AM Apr14, 2021 RACE 1 2 3 4 5 6	Fre	quency
0 dB/div	Ref 1	5.00 di	Bm	PNO: Fa IFGain:L		Trig: Free Atten: 26			N	/kr1 3.2	76 6 GHz 9.61 dBm		Auto Tune
- og 5.00						,							enter Fred 000000 GH:
5.00											DL1 -15.23 dBm		Start Free
25.0													Stop Free
(Annal Party)							an a	a fiyosochiyyda yafdd	l di Astro Alfred		Name of Contract o	997.0 <u>Auto</u>	CF Stej 000000 MH Ma
55.0 65.0 												F	req Offse 0 H
75.0	BALL-											S	cale Typ
Start 30 #Res BW	IVIHZ / 1.0 MH	z		#	VBW	3.0 MHz		s	weep		10.000 GHz (30001 pts)	_	
	nts change		2005 0							TUS			

Plot 7-91. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 19) - N



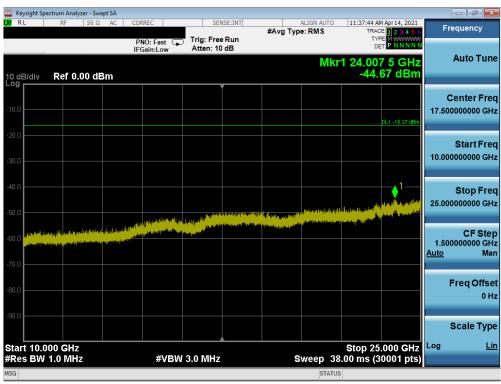
Plot 7-92. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 19) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		
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	Spectrum Analyz		ot SA										- 0
X/RL	RF	50 Ω	AC	CORREC	Fast 🔍		NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRA	M Apr 14, 2021 CE 1 2 3 4 5 6 PE M WWWWW	Fr	equency
I0 dB/div _og	Ref 15	.00 di	Bm	IFGain		Atten: 2			N	lkr1 3.13	2 3 GHz 87 dBm		Auto Tune
5.00													Center Free 5000000 GH
15.00											_DL1_16:27-dBm	30	Start Fre
25.0												10.00	Stop Fre 0000000 GH
				Part (b) site		fer yn far yn ferferiad Yn yn far yn ferferiad Yn y ferferiad yn yn ferferiad	an pa <mark>lana se bitana</mark>	da yan ya ƙwasa ƙwasa ƙ			A TRADIERO ARADA PARAN	997 <u>Auto</u>	CF Ste 000000 MH Ma
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/5.0													Scale Typ
Start 30 Res BV	MHz V 1.0 MHz				#VBW	3.0 MHz	2	s	weep ′	Stop 10 18.00 ms (3		Log	Li

Plot 7-93. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 39) - N



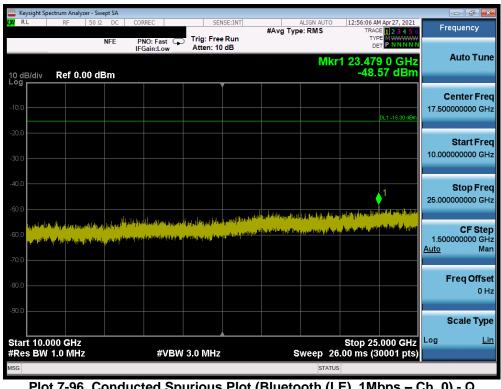
Plot 7-94. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 39) - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage C0 of 07
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www.com analysight Spectrum Analysis						
LXI R L RF	50 Ω DC CC	DRREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	12:55:32 AM Apr 27, 2021 TRACE 1 2 3 4 5 6	Frequency
			Free Run n: 26 dB		TYPE MWWWW DET PNNNN	Auto Tune
10 dB/div Ref 1	5.00 dBm			MI	kr1 4.027 3 GHz -38.13 dBm	
5.00			Ĭ			Center Freq 5.015000000 GHz
-5.00						5.01500000 GHz
-15.0					DL1 -15.30 dBm	Start Freq 30.000000 MHz
-15.0						
-35.0		1				Stop Freq 10.000000000 GHz
	يو جامعة بالبارين					CF Step
-45.0	and the second se					997.000000 MHz <u>Auto</u> Man
						Freq Offset
-65.0						0 Hz
-75.0						Scale Type
Start 30 MHz #Res BW 1.0 MH	Z	#VBW 3.0 N	IHz	Sweep 1	Stop 10.000 GHz 3.00 ms (30001 pts)	Log <u>Lin</u>
MSG				STATU	S	

Plot 7-95. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 0) - Q



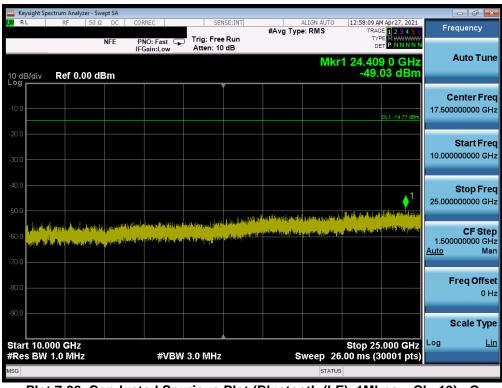
Plot 7-96. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 0) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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	t Spectrum Ai	nalyzer - Swe	ot SA									- # ×
L <mark>XI</mark> RL	RF	50 Ω	DC	CORREC		NSE:INT	#Avg Typ	ALIGN AUTO	TRAC	Apr 27, 2021	Free	quency
			IFE	PNO: Fast IFGain:Low	Trig: Fre Atten: 2			M	cr1 6.04		ļ	luto Tune
10 dB/di Log	v Ref	15.00 d	Bm			•			-39.	08 dBm		
5.00												enter Fred 1000000 GH2
-5.00										DL1 -14.77 dBm		Start Fred 000000 MH:
-25.0							1					Stop Fred 000000 GH:
-45.0	ng n	a lipegian terti Alay di bata terti	and the second second	(hala) ^{selli} te _{hal} a ^{ha}	llallandan panasah Nghingan salahan	a haraa laha Alban kura	al nated attern	daaliin aan ah	alisa kiran da anda Grandi cada anita	, behaven havet Hopen van Bener ken verste heren	997.0 <u>Auto</u>	CF Stej 000000 MH Mai
-65.0											F	r eq Offse 0 H
-75.0											S	cale Type
Start 30 #Res B	0 MHz W 1.0 M	IHz		#VE	3W 3.0 MHz		s	weep 18	Stop 10 3.00 ms (3	.000 GHz 0001 pts)	Log	Lir
MSG								STATUS	3			

Plot 7-97. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 19) - Q



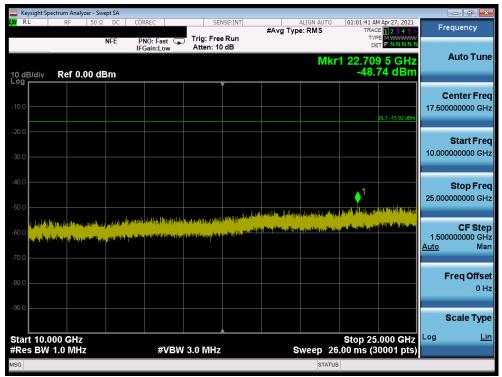
Plot 7-98. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 19) - Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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🛄 Keysight Sp	oectrum Analyzer -	Swept SA										
L <mark>XI</mark> RL	RF 51	0Ω DC	COR	REC	SEI	NSE:INT	#Avg Typ	ALIGN AUTO		M Apr 27, 2021	Freque	ency
		NFE		O: Fast 😱 ain:Low	Trig: Free Atten: 26		#Avg Typ		TYF DE			
10 dB/div Log	Ref 15.0	0 dBm						Mk	(r1 8.22) -39.	8 0 GHz 60 dBm	Au	to Tune
5.00											Cent 5.015000	t er Freq 000 GHz
-5.00										DL115.92 dBm		a rt Freq 000 MHz
-25.0									11		Ste 10.000000	o p Freq 000 GHz
-45.0	n yean da yean yean yean yean yean yean yean yea	ante Mittalia	dellanasyar Kabibishin ^{jin}	a dadaga shi kar Milaya ya kuta shi kar	n _{Sala} Regaritettaste N _{ala} etxas deseast	dennel y Mys Africa Magnetice	"Ally of spin types" [ajulian genetation]	, hydd yn ach yn dwraeg Cyndias yn gan y Milith	tan Bangabayak Anaritan pinan K	lystryson pyrifiae Artistycon a dillar		C F Step 000 MHz Man
-65.0											Free	q Offset 0 Hz
-75.0 Start 30 I	MHz								Stop 10	.000 GHz	Sca Log	le Type <u>Lin</u>
#Res BW				#VBW	3.0 MHz		s	weep 18	.00 ms (3	0001 pts)		
MSG								STATUS	3			

Plot 7-99. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 39) - Q



Plot 7-100. Conducted Spurious Plot (Bluetooth (LE), 1Mbps – Ch. 39) - Q

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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 in Table 7-7 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 7-7. Radiated Limits

Test Procedures Used

ANSI C63.10-2013 – Section 6.6.4.3

KDB 558074 D01 v05r02 - Section 8.6, 8.7

Test Settings

Average Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 3kHz > 1/T
- 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 run for at least 50 times (1/duty cycle) traces

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Peak Field Strength Measurements

- 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 7-8 below
- 3. VBW = 3MHz
- 4. Detector = peak
- 5. Sweep time = auto couple
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize

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

Table 7-8. RBW as a Function of Frequency

Test Setup

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

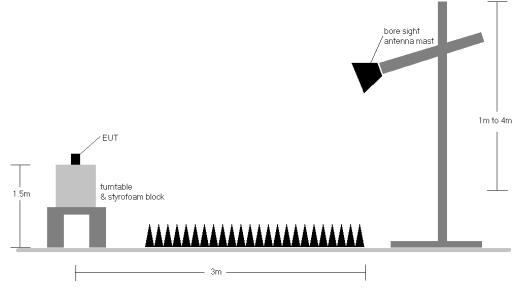


Figure 7-6. Radiated Test Setup >1GHz

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Test Notes

- The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 D01 v05r02 were not used to evaluate this device for compliance to radiated limits. All radiated spurious emissions levels were measured in a radiated test setup.
- 2. All emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-7.
- 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 of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
- Average measurements were recorded using a VBW of 3kHz, per Section 4.1.4.2.3 of ANSI C63.10-2013, since 1/T is equal to just under 3kHz. This method was used because the EUT could not be configured to operate with a duty cycle > 98%. Both average and peak measurements were made using a peak detector
- 7. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 8. No significant radiated band edge emissions were found in the 2310 2390MHz restricted band.
- 9. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculations

Determining Spurious Emissions Levels

- Field Strength Level $[dB_{\mu}V/m]$ = Analyzer Level [dBm] + 107 + AFCL [dB/m]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB]
- $\circ \quad \text{Margin}_{[dB]} = \text{Field Strength Level}_{[dB\mu V/m]} \text{Limit}_{[dB\mu V/m]}$

Radiated Band Edge Measurement Offset

• The amplitude offset shown in the radiated restricted band edge plots in Section 7.8 was calculated using the formula:

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

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Bluetooth Mode:	LE
Distance of Measurements:	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	174	124	-76.01	3.24	34.23	53.98	-19.75
4804.00	Peak	Н	174	124	-65.23	3.24	45.01	73.98	-28.97
12010.00	Avg	Н	-	-	-78.86	14.94	43.08	53.98	-10.90
12010.00	Peak	Н	-	-	-68.11	14.94	53.83	73.98	-20.15

Table 7-9. Radiated Measurements @ 3 meters- N

Bluetooth Mode:	LE
Distance of Measurements:	3 Meters
Operating Frequency:	2440MHz
Channel:	19

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]
4880.00	Avg	Н	129	114	-76.84	3.66	33.82	53.98	-20.16
4880.00	Peak	Н	129	114	-64.85	3.66	45.81	73.98	-28.17
7320.00	Avg	Н	-	-	-78.17	9.12	37.95	53.98	-16.03
7320.00	Peak	Н	-	-	-67.27	9.12	48.85	73.98	-25.13
12200.00	Avg	Н	-	-	-79.01	13.66	41.65	53.98	-12.33
12200.00	Peak	Н	-	-	-68.45	13.66	52.21	73.98	-21.77

Table 7-10. Radiated Measurements @ 3 meters - N

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Bluetooth Mode:	LE
Distance of Measurements:	3 Meters
Operating Frequency:	2480MHz
Channel:	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]
4960.00	Avg	Н	-	-	-77.32	4.40	34.08	53.98	-19.90
4960.00	Peak	н	-	-	-66.06	4.40	45.34	73.98	-28.64
7440.00	Avg	н	-	-	-78.03	8.90	37.87	53.98	-16.11
7440.00	Peak	н	-	-	-66.96	8.90	48.94	73.98	-25.04
12400.00	Avg	н	-	-	-82.18	13.41	38.23	53.98	-15.75
12400.00	Peak	н	-	-	-68.54	13.41	51.87	73.98	-22.11

Table 7-11. Radiated Measurements @ 3 meters- N

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Bluetooth Mode:	LE
Distance of Measurements:	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	V	-	-	-83.25	9.56	33.31	53.98	-20.67
4804.00	Peak	V	-	-	-69.13	9.56	47.43	73.98	-26.55
12010.00	Avg	V	-	-	-86.01	24.11	45.10	53.98	-8.88
12010.00	Peak	V	-	-	-72.83	24.11	58.28	73.98	-15.70

Table 7-12. Radiated Measurements @ 3 meters - Q

Bluetooth Mode:LEDistance of Measurements:3 MeOperating Frequency:2440Channel:19

3 Meters 2440MHz 19

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]
4880.00	Avg	V	-	-	-83.63	9.45	32.82	53.98	-21.16
4880.00	Peak	V	-	-	-69.79	9.45	46.66	73.98	-27.32
7320.00	Avg	V	-	-	-85.38	15.78	37.40	53.98	-16.58
7320.00	Peak	V	-	-	-70.59	15.78	52.19	73.98	-21.79
12200.00	Avg	V	-	-	-84.32	23.75	46.43	53.98	-7.55
12200.00	Peak	V	-	-	-72.60	23.75	58.15	73.98	-15.83

Table 7-13. Radiated Measurements @ 3 meters- Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Bluetooth Mode:	LE
Distance of Measurements:	3 Meters
Operating Frequency:	2480MHz
Channel:	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]
4960.00	Avg	V	-	-	-80.72	9.87	36.15	53.98	-17.83
4960.00	Peak	V	-	-	-69.90	9.87	46.97	73.98	-27.01
7440.00	Avg	V	-	-	-82.64	16.09	40.45	53.98	-13.53
7440.00	Peak	V	-	-	-71.66	16.09	51.43	73.98	-22.55
12400.00	Avg	V	-	-	-84.00	23.86	46.86	53.98	-7.12
12400.00	Peak	V	-	-	-72.27	23.86	58.59	73.98	-15.39

Table 7-14. Radiated Measurements @ 3 meters- Q

FCC ID: A3LSMF711U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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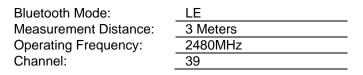


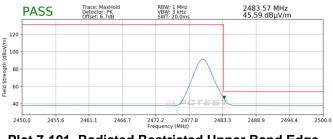
7.8 Radiated Restricted Band Edge Measurements §15.209; RSS-Gen [8.9]

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

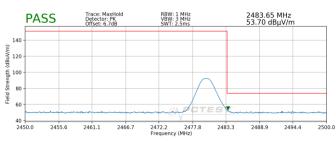
The amplitude offset shown in the following plots for average measurements was calculated using the formula:

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

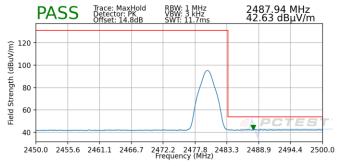




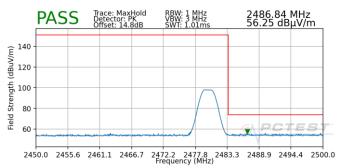
Plot 7-101. Radiated Restricted Upper Band Edge Measurement (Average) - N



Plot 7-102. Radiated Restricted Upper Band Edge Measurement (Peak) - N



Plot 7-103. Radiated Restricted Upper Band Edge Measurement (Average) - Q



Plot 7-104. Radiated Restricted Upper Band Edge Measurement (Peak) - Q

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7.9 Line-Conducted Test 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 7-15. 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

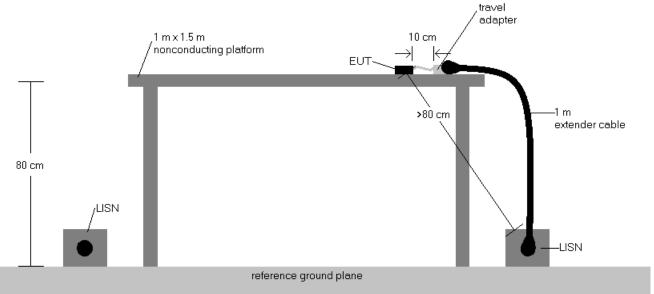
- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = RMS
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

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Test Setup

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



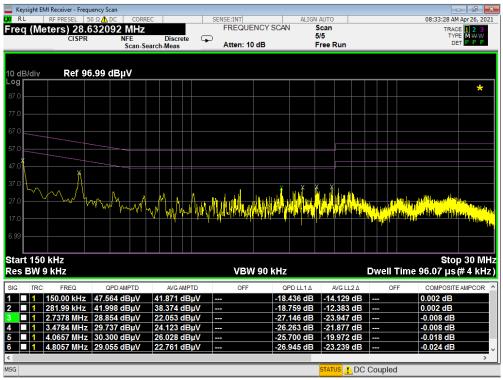


Test Notes

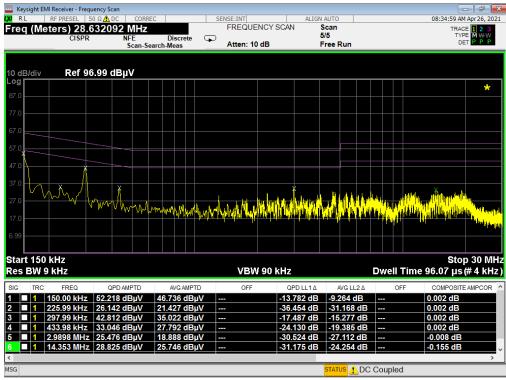
- All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
- 2. The limit for an intentional radiator from 150kHz to 30MHz are specified in Part 15.207 and RSS-Gen (8.8).
- 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.

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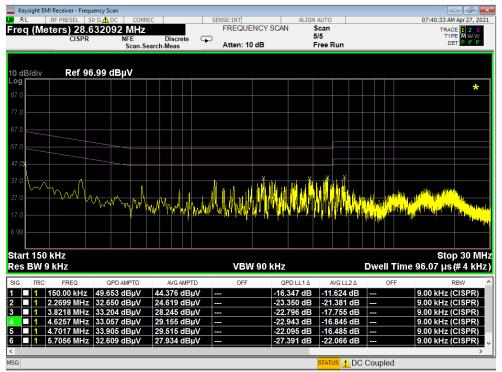
Plot 7-105. Line Conducted Plot with Bluetooth LE (L1) – N (OPEN)



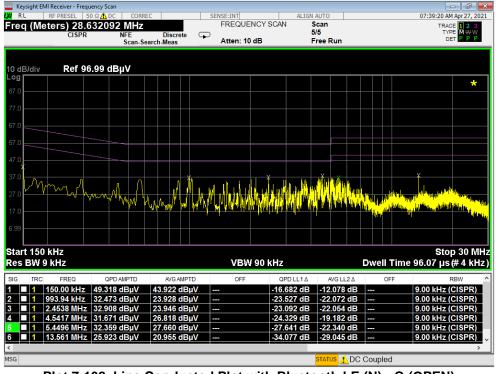


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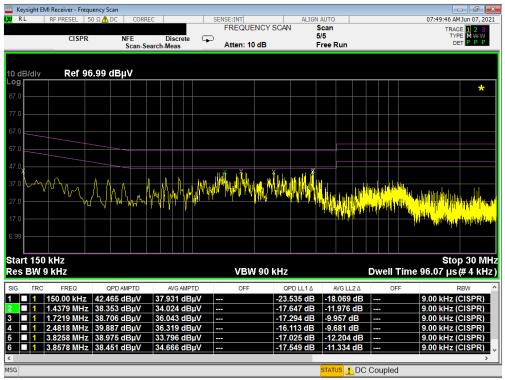
Plot 7-107. Line Conducted Plot with Bluetooth LE (L1) - Q (OPEN)



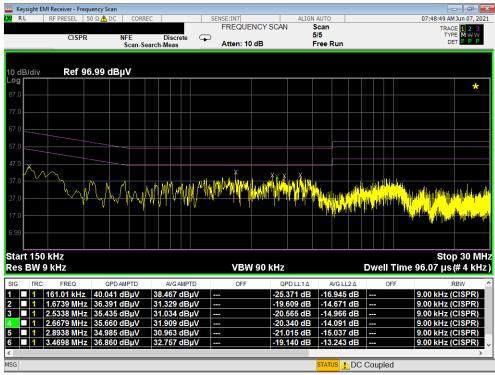
Plot 7-108. Line Conducted Plot with Bluetooth LE (N) - Q (OPEN)

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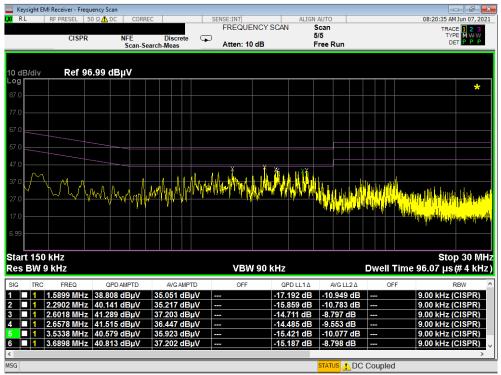
Plot 7-109. Line Conducted Plot with Bluetooth LE (L1) with WCP - N



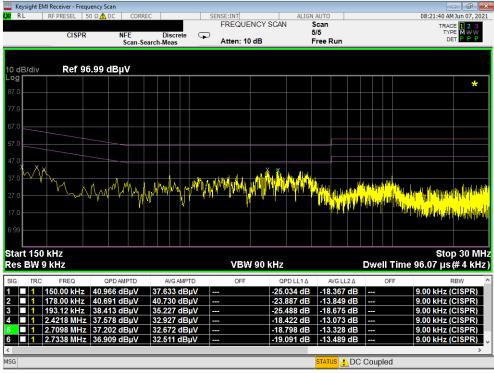


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Plot 7-111. Line Conducted Plot with Bluetooth LE (L1) with WCP - Q



Plot 7-112. Line Conducted Plot with Bluetooth LE (N) with WCP - Q

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8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMF711U** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules.

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