



MEASUREMENT REPORT

FCC PART 15.247 / ISED RSS-247 Bluetooth (Low Energy)

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


Date of Testing:
 07/03 - 07/08/2019
Test Site/Location:
 PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
 1M1906140100-02.A3L

FCC ID:	A3LEJPN970
IC:	649E-EJPN970
APPLICANT:	Samsung Electronics Co., Ltd.

Application Type: Certification
Model/HVIN: EJ-PN970
EUT Type: Stylus Pen
Max. RF Output Power: 0.756 mW (-1.21 dBm) Peak Conducted
Frequency Range: 2402 – 2480MHz
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (15.247)
ISED Specification: RSS-247 Issue 2
Test Procedure(s): ANSI C63.10-2013, KDB 558074 D01 v05r02

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



FCC ID: A3LEJPN970	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 1 of 38

TABLE OF CONTENTS

1.0	INTRODUCTION	3
1.1	Scope	3
1.2	PCTEST Test Location	3
1.3	Test Facility / Accreditations	3
2.0	PRODUCT INFORMATION	4
2.1	Equipment Description	4
2.2	Device Capabilities	4
2.3	Test Configuration	4
2.4	EMI Suppression Device(s)/Modifications	4
3.0	DESCRIPTION OF TESTS	5
3.1	Evaluation Procedure	5
3.2	Radiated Emissions	5
3.3	Environmental Conditions	5
4.0	ANTENNA REQUIREMENTS	6
5.0	MEASUREMENT UNCERTAINTY	7
6.0	TEST EQUIPMENT CALIBRATION DATA	8
7.0	TEST RESULTS	9
7.1	Summary	9
7.2	6dB Bandwidth Measurement – Bluetooth (LE)	10
7.3	Output Power Measurement – Bluetooth (LE)	13
7.4	Power Spectral Density – Bluetooth (LE)	16
7.5	Conducted Emissions at the Band Edge	19
7.6	Conducted Spurious Emissions	21
7.7	Radiated Spurious Emission Measurements	26
7.8	Radiated Restricted Band Edge Measurements	33
7.9	Radiated Spurious Emissions Measurements – Below 1GHz	34
8.0	CONCLUSION	38

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 2 of 38	

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 Engineering Laboratory, Inc. 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 Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 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.

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 3 of 38	

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Stylus Pen FCC ID: A3LEJPN970**. 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.

Test Device Serial No.: N/A

2.2 Device Capabilities

This device contains the following capabilities:

Bluetooth (LE)

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

Table 2-1. Frequency / Channel Operations

2.3 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. See Sections 3.2 for radiated emissions test setups, and 7.2, 7.3, 7.4, 7.5, and 7.6 for antenna port conducted emissions test setups.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)	
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Approved by: Quality Manager Page 4 of 38

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 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.

3.3 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: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 5 of 38	

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.

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 6 of 38	

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 (\pm dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 7 of 38	

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)	6/5/2019	Annual	6/5/2020	WL25-1
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	5/10/2019	Annual	5/10/2020	441112
Emco	3116	Horn Antenna (18 - 40GHz)	6/7/2018	Triennial	6/7/2021	9203-2178
Keysight Technologies	N9030A	PXA Signal Analyzer	8/6/2018	Annual	8/6/2019	MYS4490576
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	8/23/2018	Annual	8/23/2019	NMLC-2
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	N/A			165450
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	9/12/2018	Annual	9/12/2019	101716
Rohde & Schwarz	HL562E	Ultralog Antenna	3/29/2018	Biennial	3/29/2020	101012
Rohde & Schwarz	TC-TA18	Vivaldi Antenna	8/17/2018	Biennial	8/17/2020	101072
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/25/2018	Annual	7/25/2019	102133
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	7/16/2018	Biennial	7/16/2020	101073

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.

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 8 of 38	

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LEJPN970
 FCC Classification: Digital Transmission System (DTS)
 Number of Channels: 40

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	CONDUCTED	PASS	Section 7.2
15.247(b)(3)	RSS-247 [5.4(d)]	Transmitter Output Power	< 1 Watt		PASS	Sections 7.3
15.247(e)	RSS-247 [5.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz Band		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

Table 7-1. Summary of Test Results

Notes:

- All modes of operation were investigated. The test results shown in the following sections represent the worst case emissions.
- 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.
- 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.
- 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.
- 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 0.2.16.

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 9 of 38	

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

1. 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 $\geq 3 \times$ 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.



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 10 of 38	

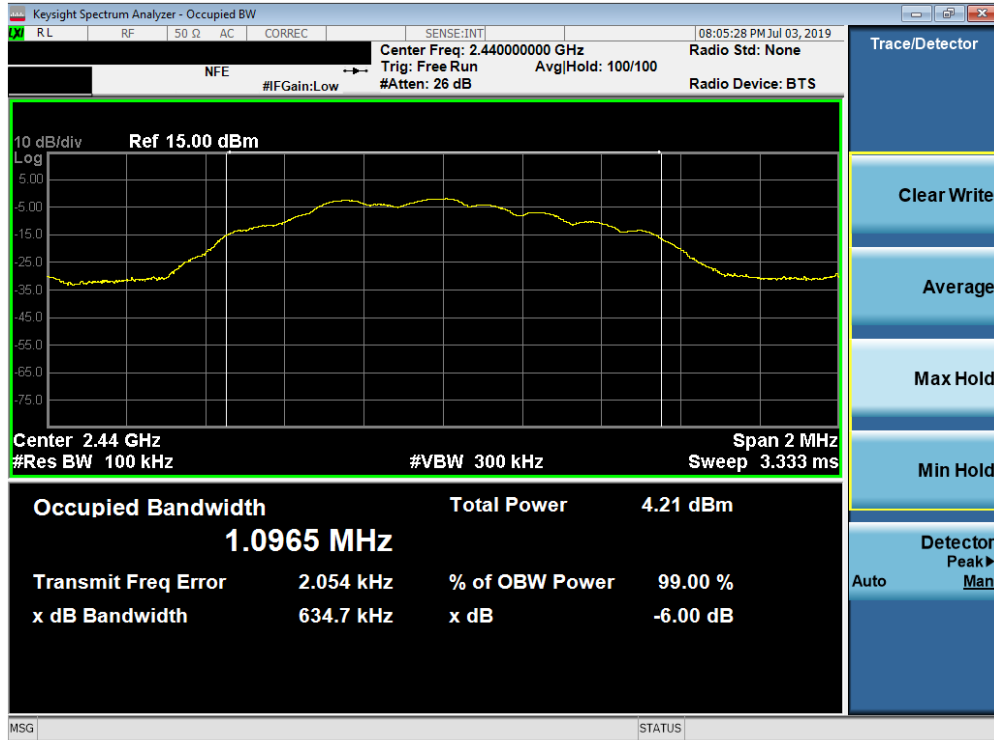
Frequency [MHz]	Data Rate	Channel No.	Bluetooth Mode	Measured Bandwidth [kHz]	Minimum Bandwidth [kHz]	Pass / Fail
2402	1 Mbps	0	LE	632.3	500	Pass
2440	1 Mbps	19	LE	634.7	500	Pass
2480	1 Mbps	39	LE	638.6	500	Pass

Table 7-2. Conducted Bandwidth Measurements

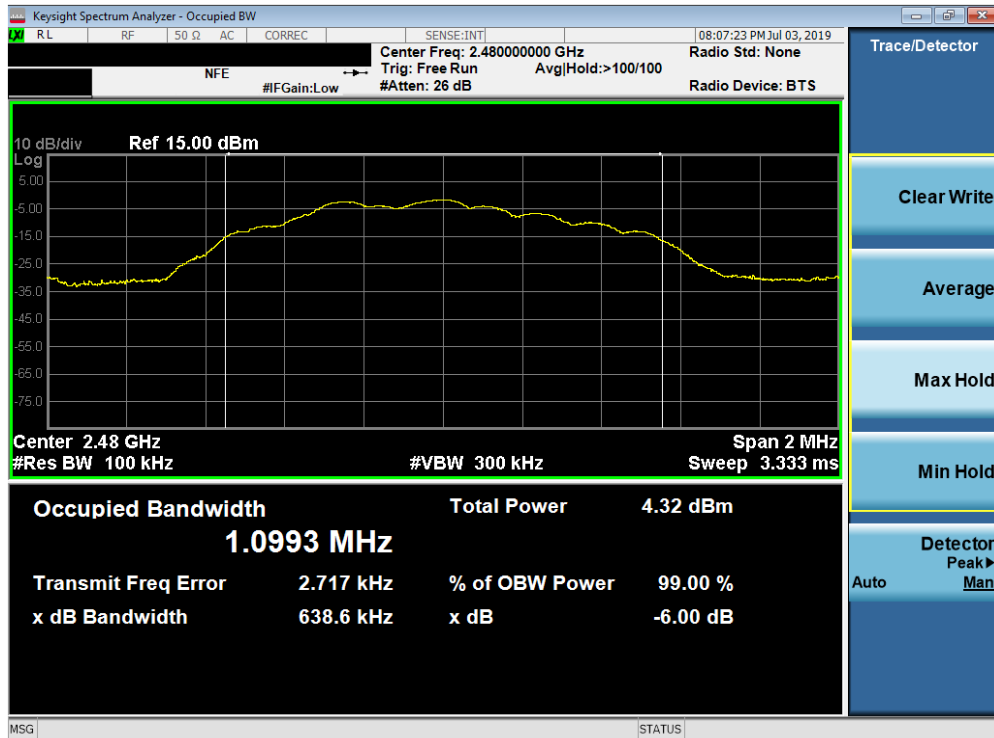


Plot 7-1. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps – Ch. 0)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 11 of 38



Plot 7-2. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps – Ch. 19)



Plot 7-3. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps – Ch. 39)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 12 of 38

7.3 Output Power Measurement – Bluetooth (LE) §15.247(b.3); RSS-247 [5.4(d)]

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 $\geq 3 \times$ 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: A3LEJPN970	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 13 of 38	

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Bluetooth Mode	Peak Conducted Power	
				[dBm]	[mW]
2402	1 Mbps	0	LE	-1.21	0.756
2440	1 Mbps	19	LE	-1.39	0.726
2480	1 Mbps	39	LE	-1.26	0.748

Table 7-3. Conducted Output Power Measurements (Bluetooth (LE))

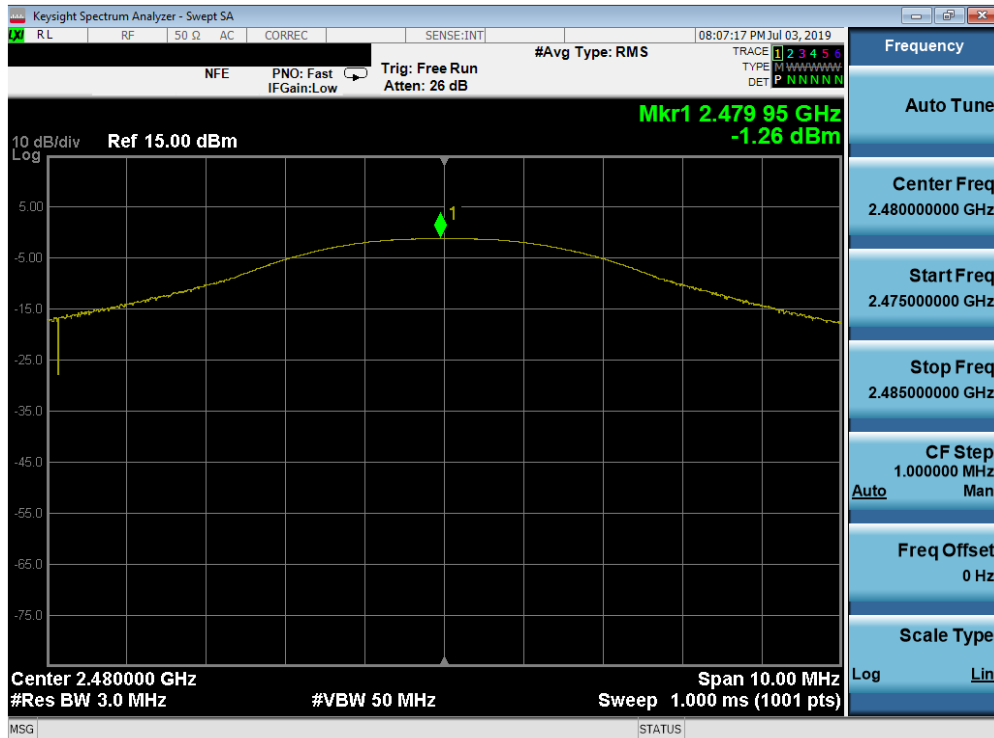


Plot 7-4. Peak Power Plot (Bluetooth (LE), 1Mbps – Ch. 0)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 14 of 38



Plot 7-5. Peak Power Plot (Bluetooth (LE), 1Mbps – Ch. 19)



Plot 7-6. Peak Power Plot (Bluetooth (LE), 1Mbps – Ch. 39)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 15 of 38

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

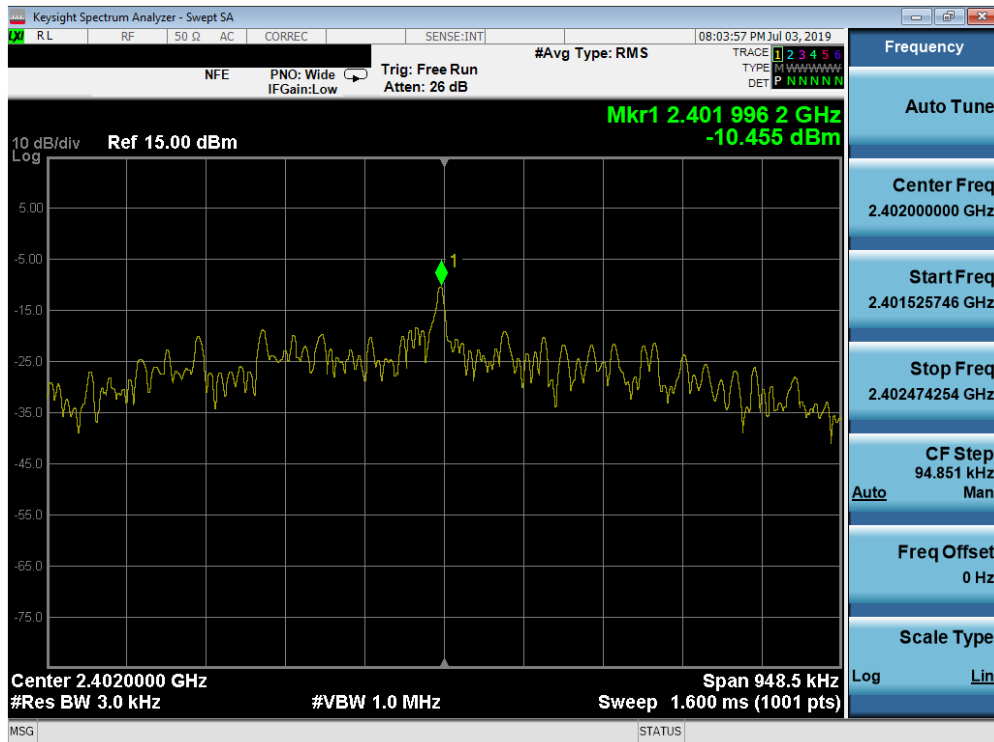
Test Notes

None

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 16 of 38

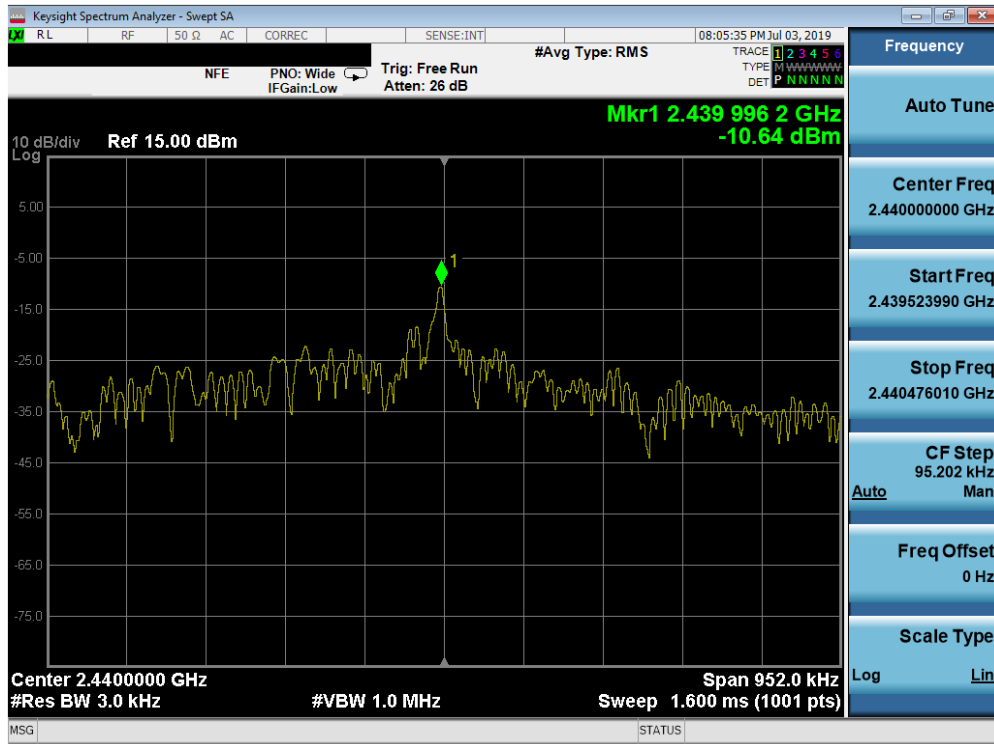
Frequency [MHz]	Data Rate [Mbps]	Channel No.	Bluetooth Mode	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]
2402	1 Mbps	0	LE	-10.46	8.0	-18.46
2440	1 Mbps	19	LE	-10.64	8.0	-18.64
2480	1 Mbps	39	LE	-10.41	8.0	-18.41

Table 7-4. Conducted Power Density Measurements

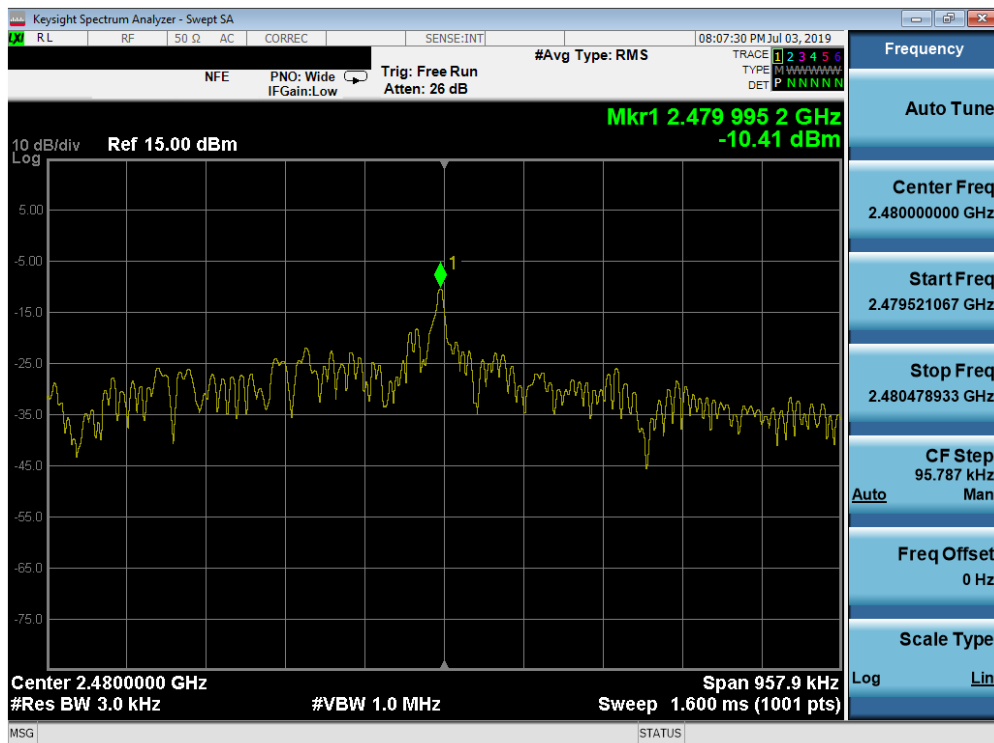


Plot 7-7. Power Spectral Density Plot (Bluetooth (LE), 1Mbps – Ch. 0)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 17 of 38



Plot 7-8. Power Spectral Density Plot (Bluetooth (LE), 1Mbps – Ch. 19)



Plot 7-9. Power Spectral Density Plot (Bluetooth (LE), 1Mbps – Ch. 39)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 18 of 38

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.

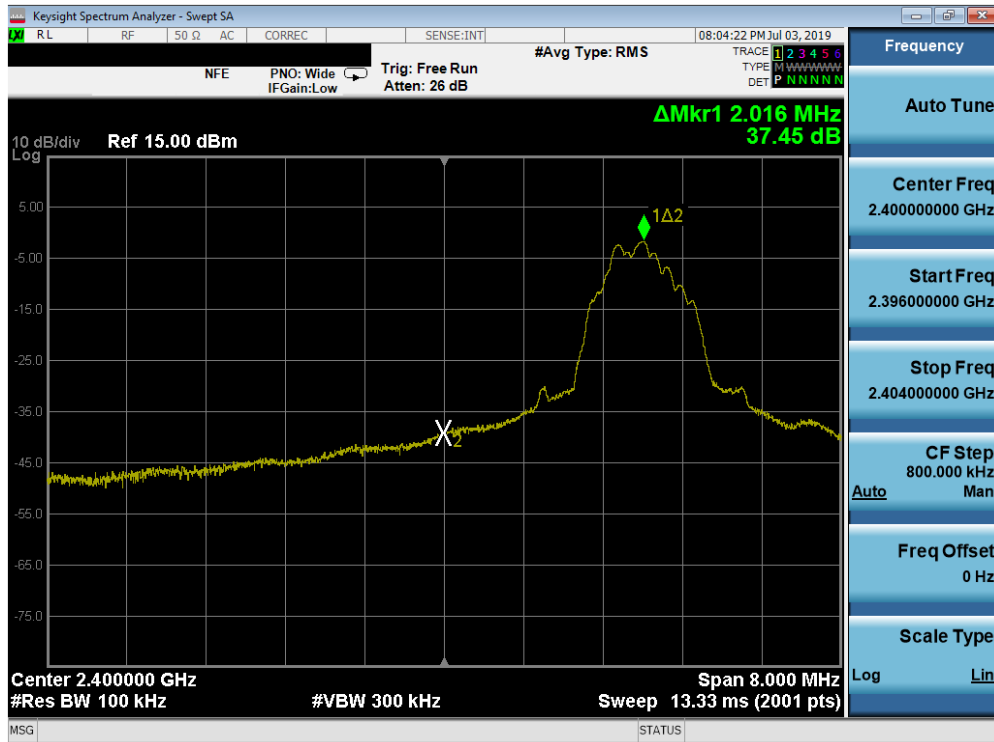


Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 19 of 38



Plot 7-10. Band Edge Plot (Bluetooth (LE), 1Mbps – Ch. 0)



Plot 7-11. Band Edge Plot (Bluetooth (LE), 1Mbps – Ch. 39)

FCC ID: A3LEJPN970	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 20 of 38

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.



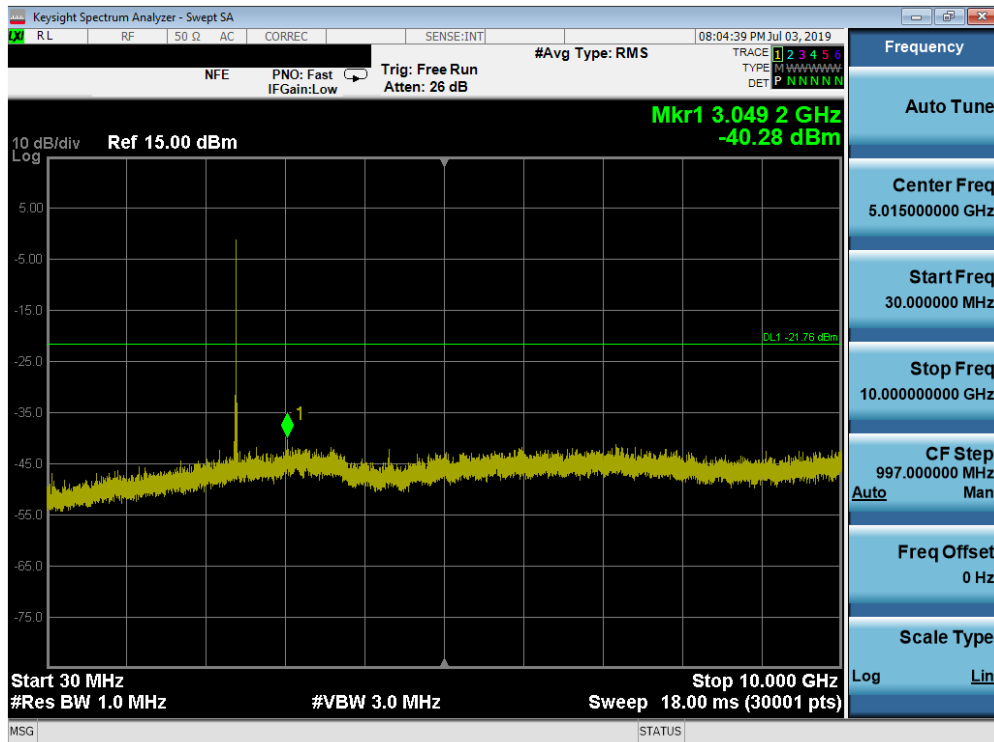
Figure 7-5. Test Instrument & Measurement Setup

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 21 of 38

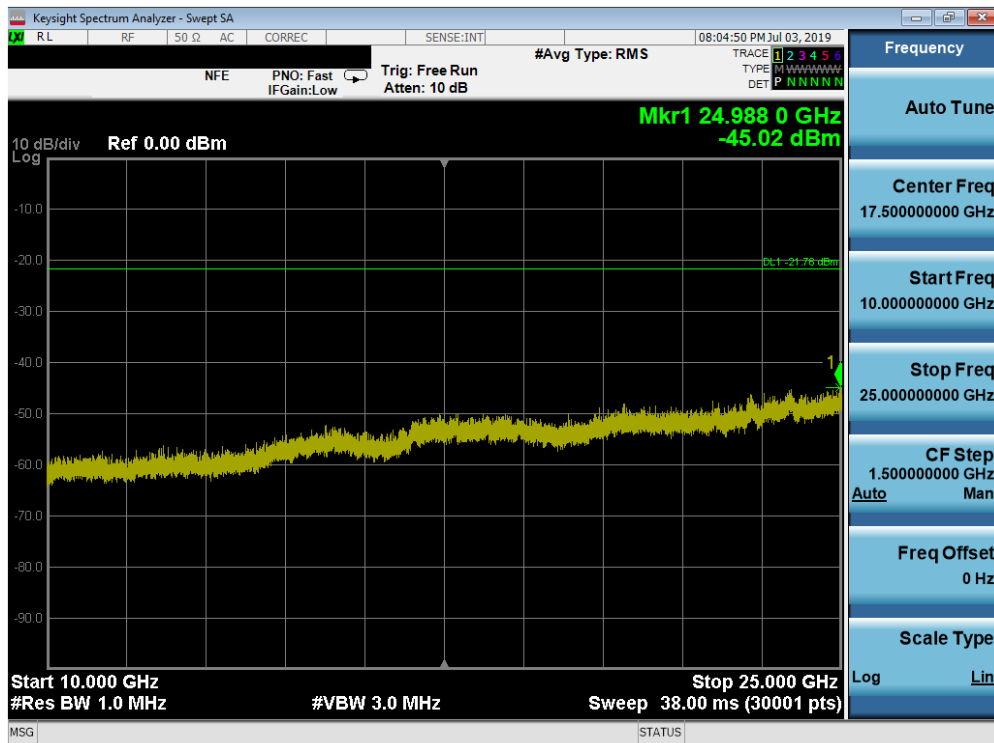
Test Notes

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.

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 22 of 38	

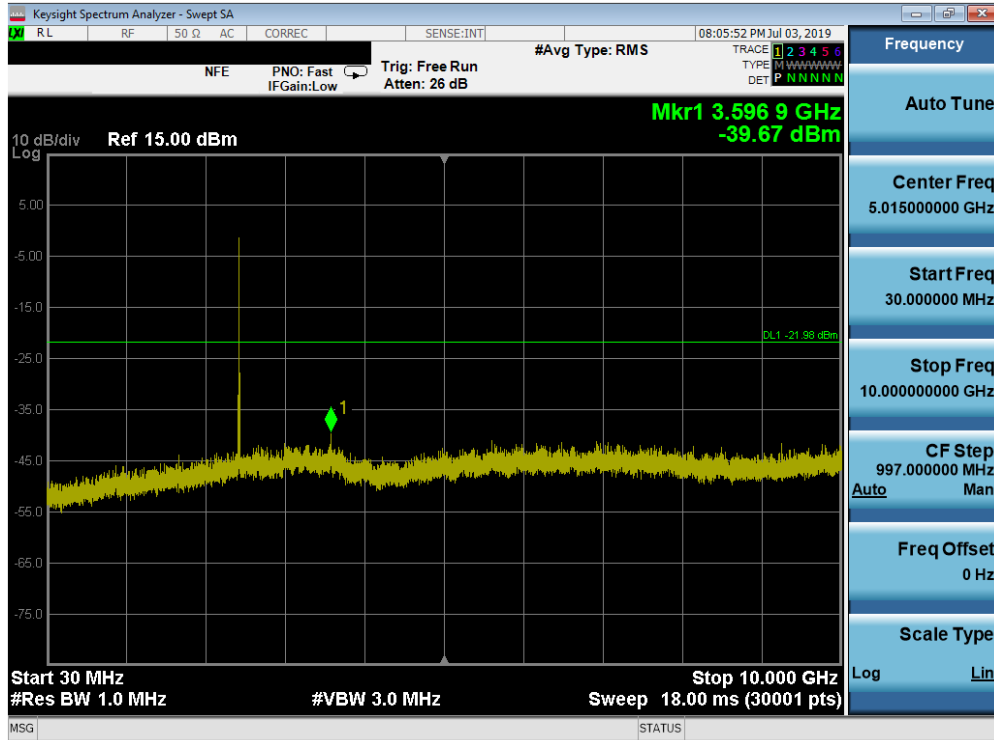


Plot 7-12. Conducted Spurious Plot (Bluetooth (LE), 1Mbps – Ch. 0)

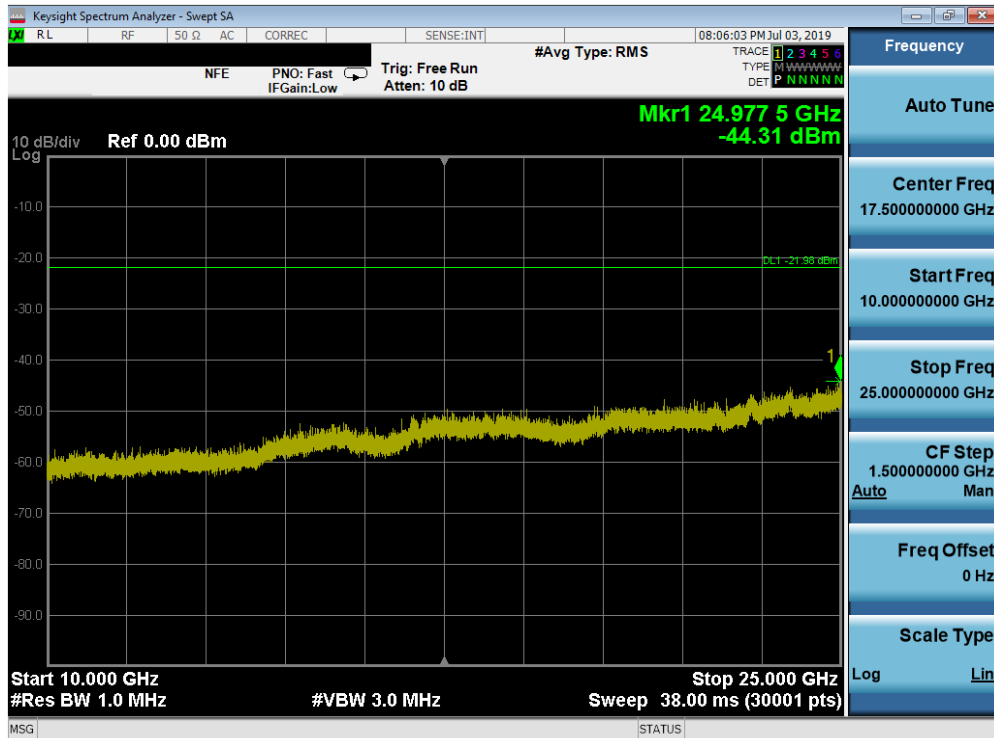


Plot 7-13. Conducted Spurious Plot (Bluetooth (LE), 1Mbps – Ch. 0)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 23 of 38

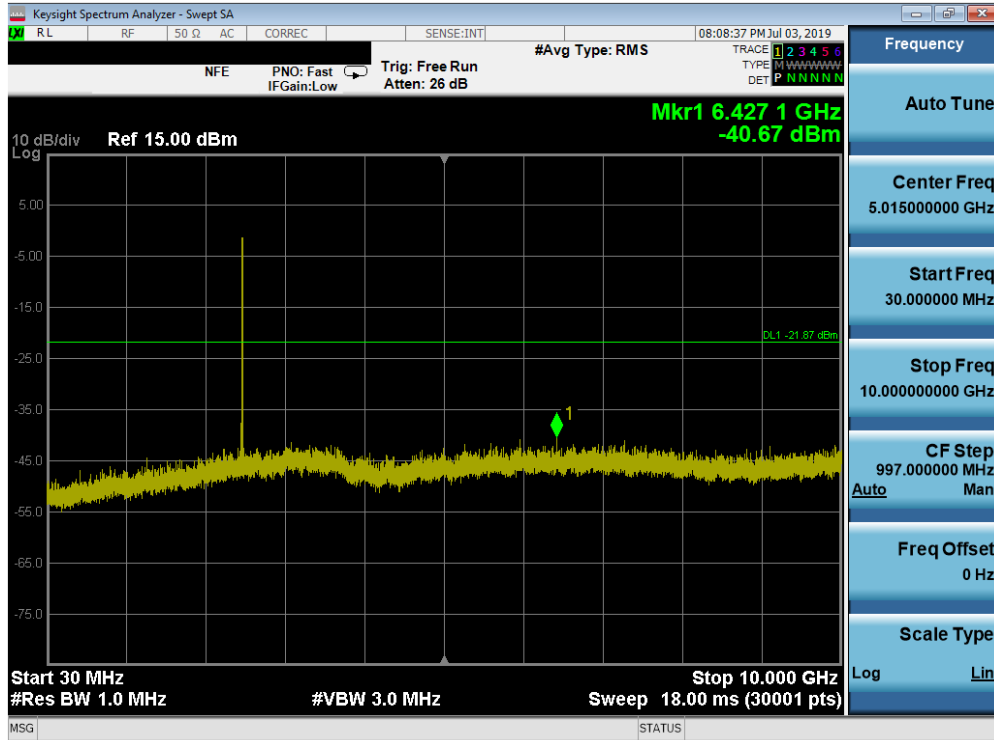


Plot 7-14. Conducted Spurious Plot (Bluetooth (LE), 1Mbps – Ch. 19)

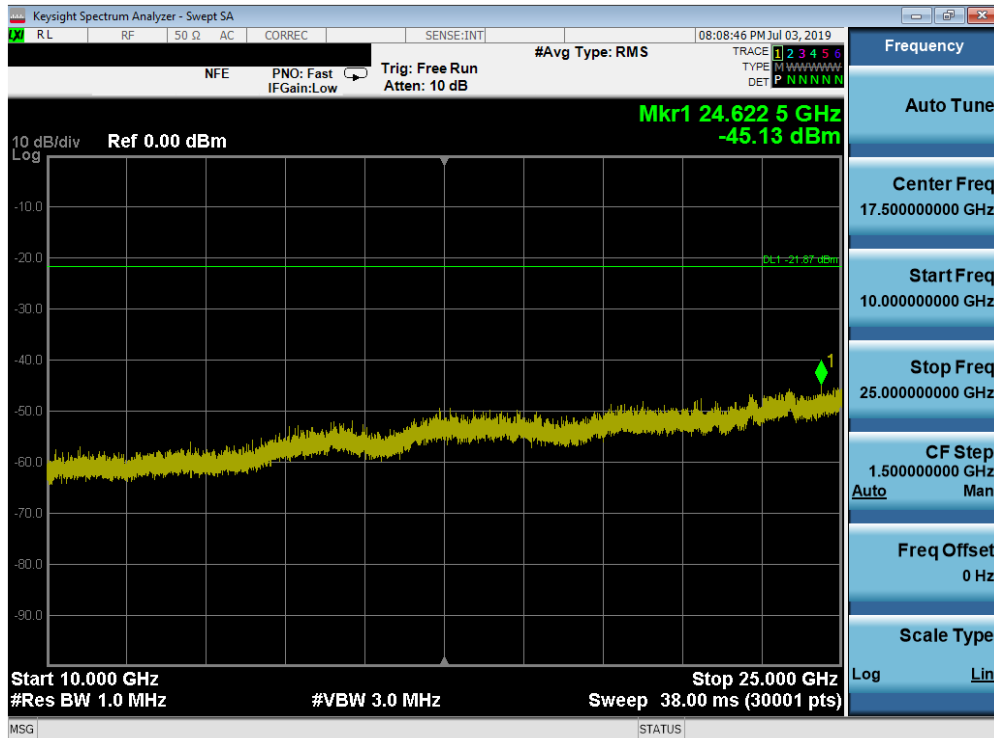


Plot 7-15. Conducted Spurious Plot (Bluetooth (LE), 1Mbps – Ch. 19)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 24 of 38



Plot 7-16. Conducted Spurious Plot (Bluetooth (LE), 1Mbps – Ch. 39)



Plot 7-17. Conducted Spurious Plot (Bluetooth (LE), 1Mbps – Ch. 39)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 25 of 38

7.7 Radiated Spurious Emission Measurements

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

Test Overview and Limit

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

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-5 per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [$\mu\text{V/m}$]	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 7-5. 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

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 26 of 38	

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 7-6 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 7-6. RBW as a Function of Frequency

Test Setup

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

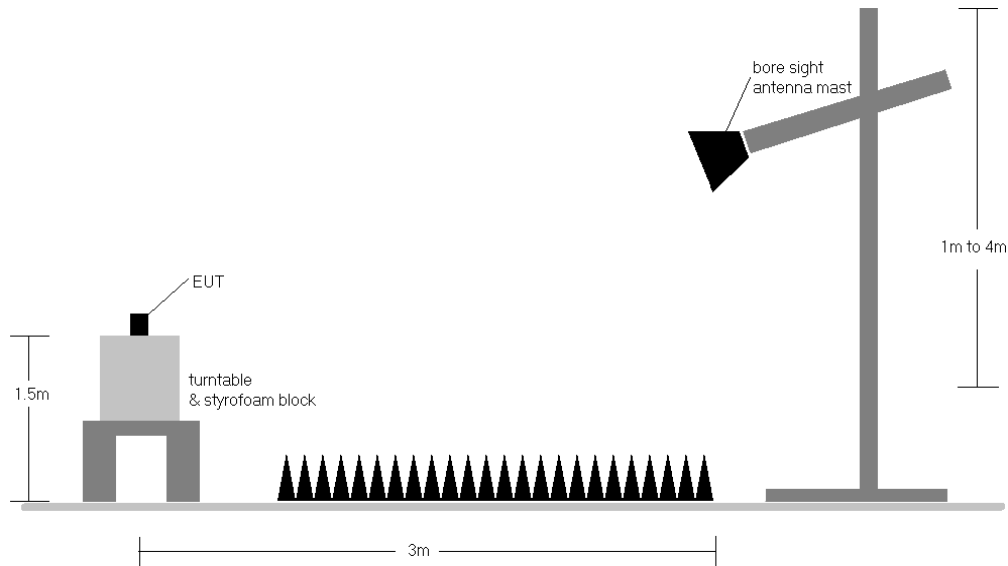


Figure 7-6. Radiated Test Setup >1GHz

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 27 of 38

Test Notes

1. 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 7-5.
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 while powered by a DC power source.
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.
6. 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

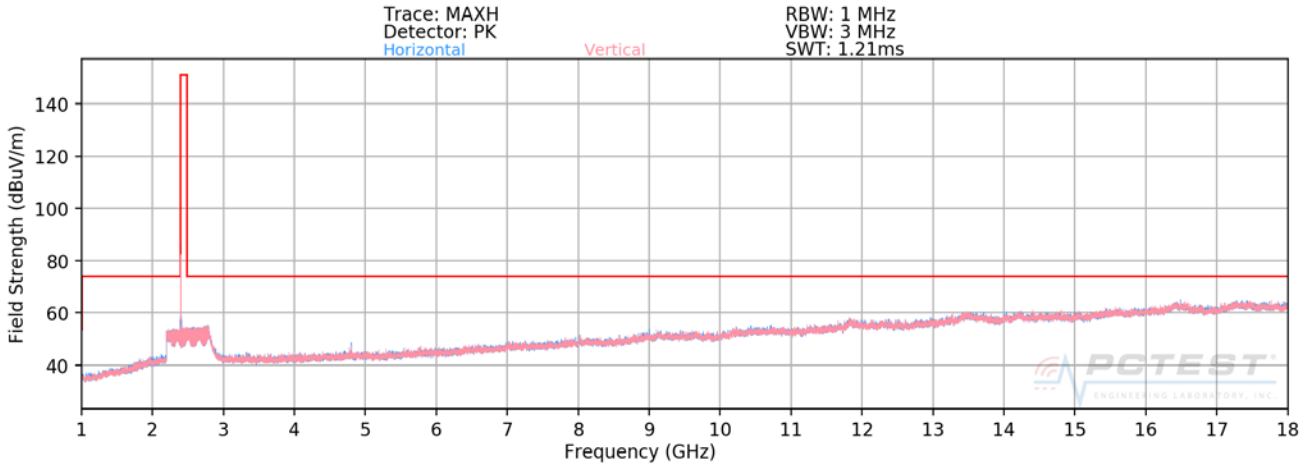
- Field Strength Level $_{[dB_{\mu V/m}]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$
- AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB_{\mu V/m}]}$ – Limit $_{[dB_{\mu V/m}]}$

Radiated Band Edge Measurement Offset

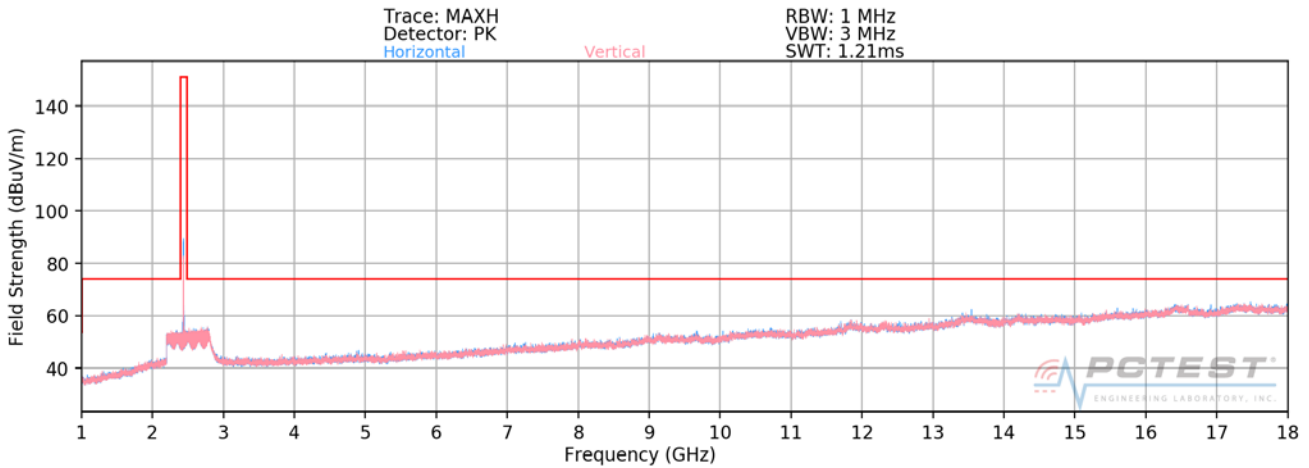
- The amplitude offset shown in the radiated restricted band edge plots in Section 7.8 was calculated using the formula:
 Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Pre-amplifier Gain

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 28 of 38	

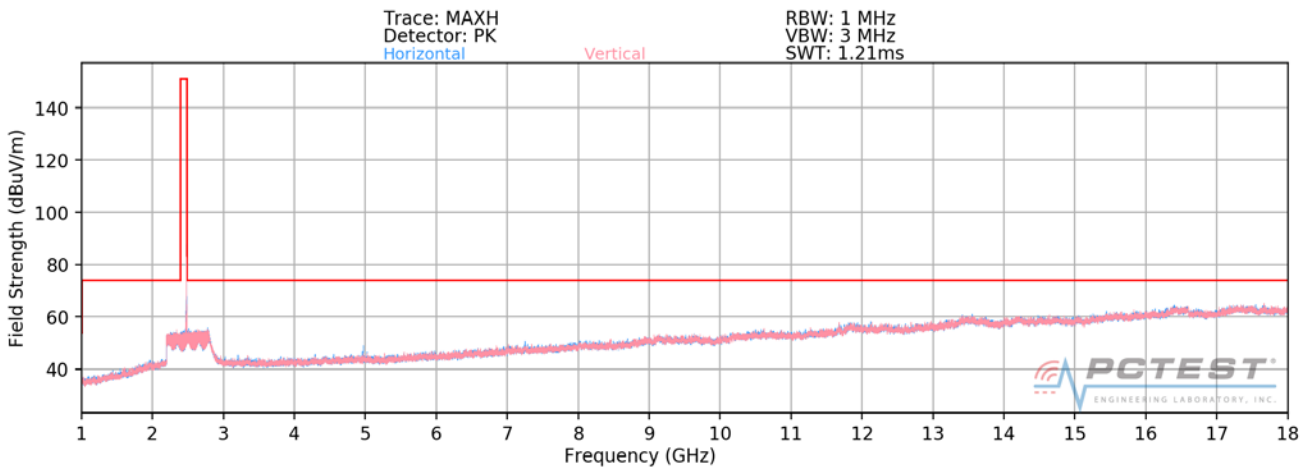
Radiated Spurious Emission Measurements
§15.205 §15.209 §15.247 (d); RSS-Gen [8.9]



Plot 7-18. Radiated Spurious Plot above 1GHz (BTLE- Ch. 0)



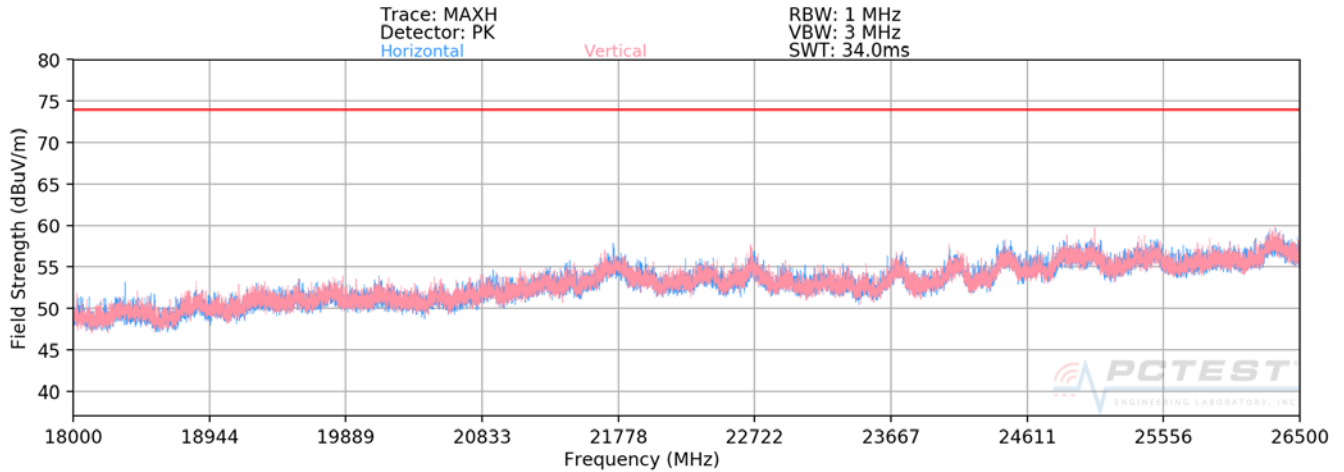
Plot 7-19. Radiated Spurious Plot above 1GHz (BTLE- Ch. 19)



Plot 7-20. Radiated Spurious Plot above 1GHz (BTLE- Ch. 39)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 29 of 38

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



Plot 7-21. Radiated Spurious Plot above 18GHz

<p>FCC ID: A3LEJPN970</p>	<p>PCTEST ENGINEERING LABORATORY, INC.</p> <p>MEASUREMENT REPORT (CERTIFICATION)</p> <p>SAMSUNG</p>		<p>Approved by: Quality Manager</p>
<p>Test Report S/N: 1M1906140100-02.A3L</p>	<p>Test Dates: 07/03 - 07/08/2019</p>	<p>EUT Type: Stylus Pen</p>	<p>Page 30 of 38</p>

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

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	H	123	345	-71.05	8.76	44.71	53.98	-9.27
4804.00	Peak	H	123	345	-65.54	8.76	50.22	73.98	-23.76
12010.00	Avg	H	-	-	-84.32	21.34	44.02	53.98	-9.96
12010.00	Peak	H	-	-	-72.53	21.34	55.81	73.98	-18.17

Table 7-7. Radiated Measurements @ 3 meters

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	H	104	212	-72.60	7.97	42.37	53.98	-11.61
4880.00	Peak	H	104	212	-65.08	7.97	49.89	73.98	-24.09
7320.00	Avg	H	296	230	-79.93	13.92	40.99	53.98	-12.99
7320.00	Peak	H	296	230	-69.13	13.92	51.79	73.98	-22.19
12200.00	Avg	H	-	-	-84.99	21.51	43.52	53.98	-10.46
12200.00	Peak	H	-	-	-71.84	21.51	56.67	73.98	-17.31

Table 7-8. Radiated Measurements @ 3 meters

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 31 of 38

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

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	H	108	29	-71.31	8.95	44.64	53.98	-9.34
4960.00	Peak	H	108	29	-65.17	8.95	50.78	73.98	-23.20
7440.00	Avg	H	101	248	-79.69	13.99	41.30	53.98	-12.68
7440.00	Peak	H	101	248	-69.57	13.99	51.42	73.98	-22.56
12400.00	Avg	H	-	-	-85.54	22.18	43.64	53.98	-10.34
12400.00	Peak	H	-	-	-72.68	22.18	56.50	73.98	-17.48

Table 7-9. Radiated Measurements @ 3 meters

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 32 of 38

7.8 Radiated Restricted Band Edge Measurements

§15.205 §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.

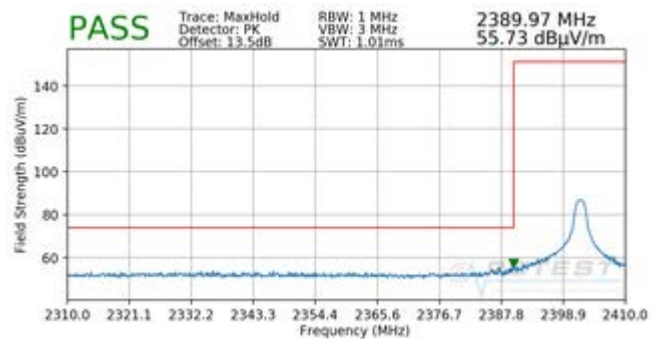
The amplitude offset shown in the following plots for average measurements was calculated using the formula:

$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss} + \text{Attenuator}) - \text{Preamplifier Gain}$$

Bluetooth Mode:	LE
Measurement Distance:	3 Meters
Operating Frequency:	2402MHz
Channel:	0

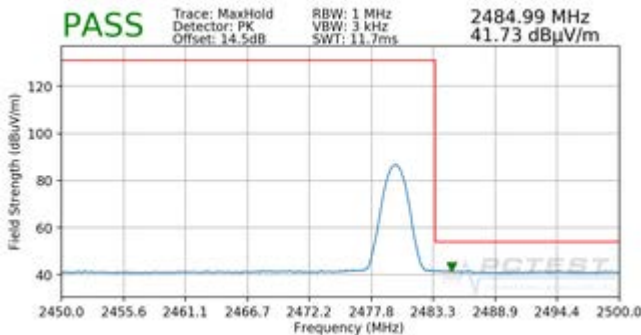


Plot 7-22. Radiated Restricted Lower Band Edge Measurement (Average)

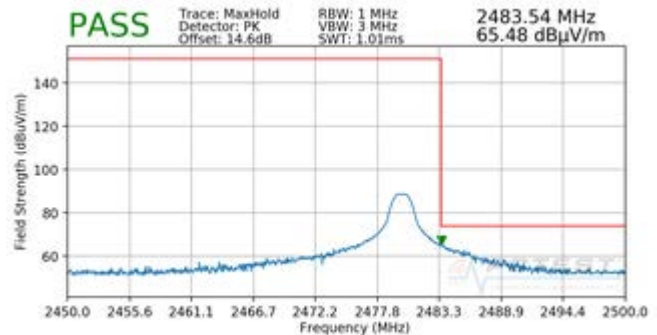


Plot 7-23. Radiated Restricted Lower Band Edge Measurement (Peak)

Bluetooth Mode:	LE
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	39



Plot 7-24. Radiated Restricted Upper Band Edge Measurement (Average)



Plot 7-25. Radiated Restricted Upper Band Edge Measurement (Peak)

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 33 of 38

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

Test Overview and Limit

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

All out of band emissions 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 7-10 per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [$\mu\text{V/m}$]	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 7-10. Radiated Limits

Test Procedures Used

ANSI C63.10-2013

Test Settings

Quasi-Peak Field Strength Measurements

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

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 34 of 38	

Test Setup

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

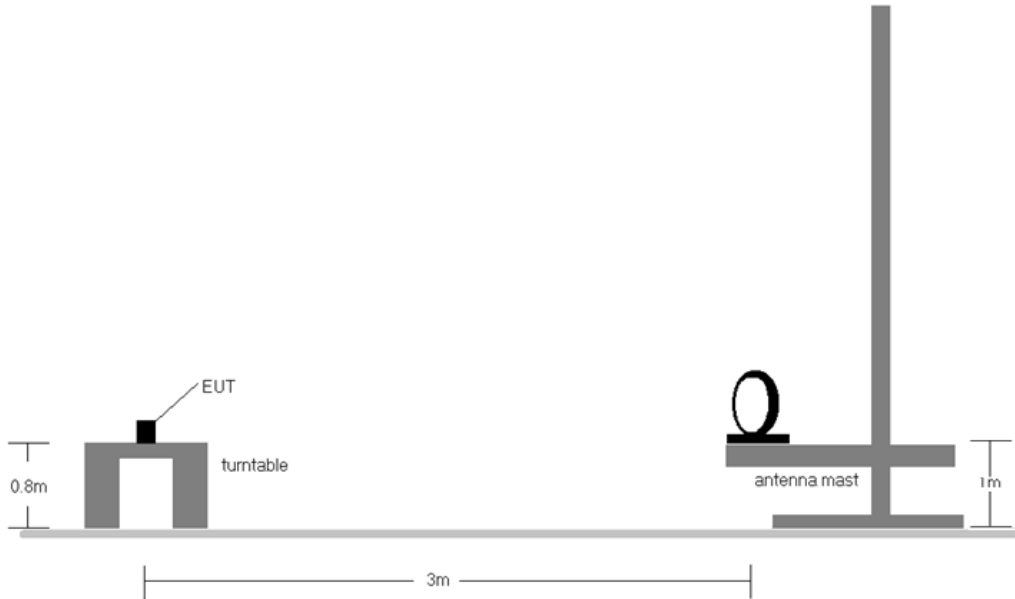


Figure 7-7. Radiated Test Setup < 30Mhz

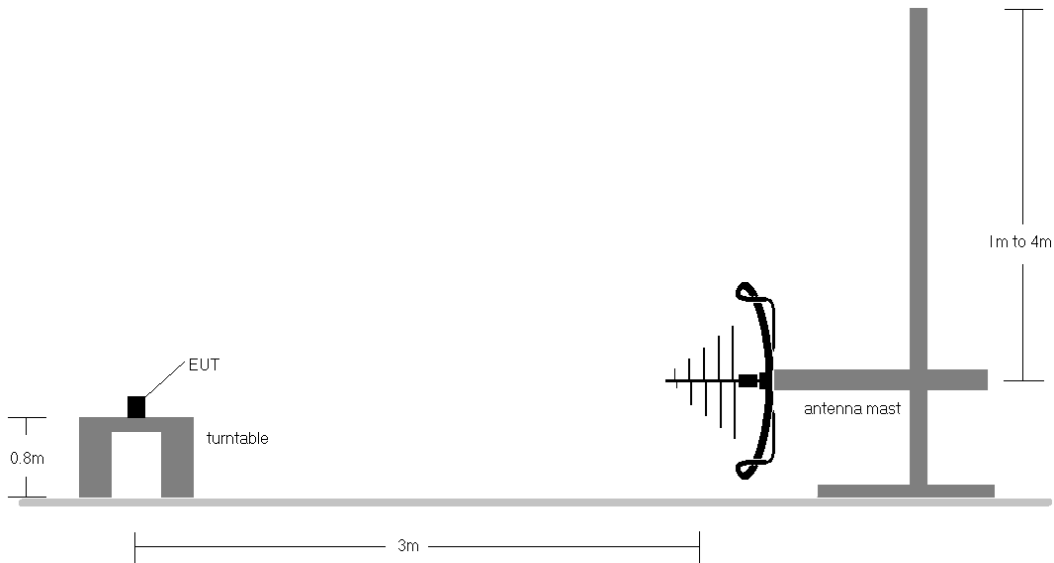


Figure 7-8. Radiated Test Setup < 1GHz

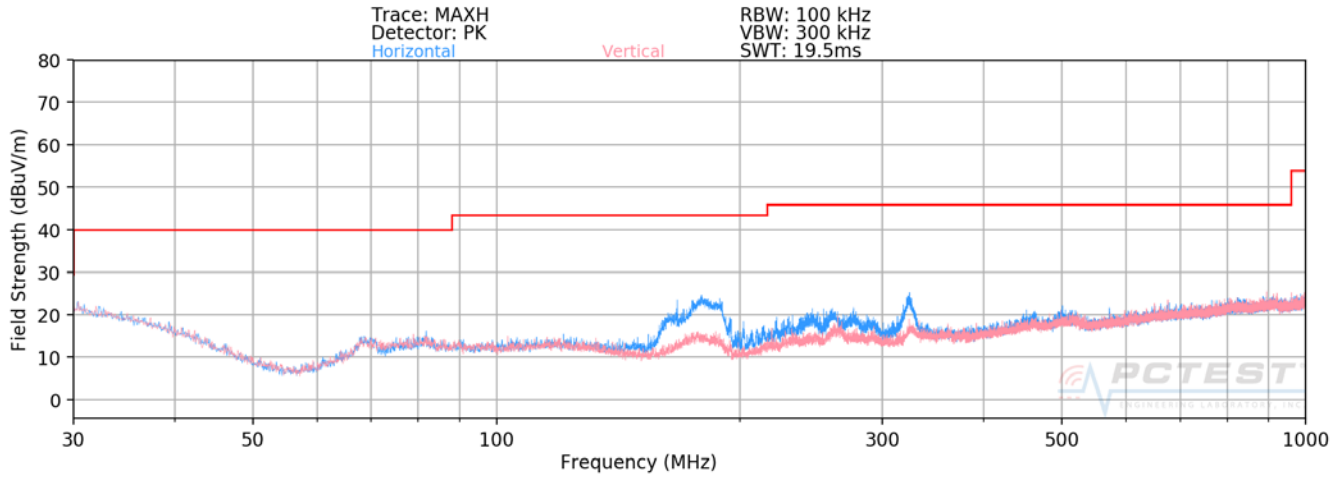
FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 35 of 38

Test Notes

1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen(8.10) are below the limit shown in Table 7-10.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. This unit was tested while powered by a DC power source.
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

FCC ID: A3LEJPN970	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 36 of 38

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



Plot 7-26. Radiated Spurious Plot below 1GHz

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
69.19	Quasi-Peak	H	367	352	-71.99	-17.86	17.15	40.00	-22.85
162.75	Quasi-Peak	H	222	232	-67.05	-16.53	23.42	43.52	-20.10
187.72	Quasi-Peak	H	188	323	-63.27	-17.53	26.20	43.52	-17.32
201.98	Quasi-Peak	H	219	247	-70.73	-17.00	19.27	43.52	-24.25
244.02	Quasi-Peak	H	102	106	-67.21	-15.58	24.21	46.02	-21.81
327.52	Quasi-Peak	H	111	124	-64.21	-13.35	29.44	46.02	-16.58

Table 7-11. Radiated Spurious Emissions below 1GHz

FCC ID: A3LEJPN970	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen		Page 37 of 38

8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Stylus Pen FCC ID: A3LEJPN970** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules and RSS-247 of the Innovation, Science and Economic Development Canada Rules.

FCC ID: A3LEJPN970		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1906140100-02.A3L	Test Dates: 07/03 - 07/08/2019	EUT Type: Stylus Pen	Page 38 of 38	