

MEASUREMENT REPORT FCC Part 15F ULTRA WIDEBAND

Applicant Name:
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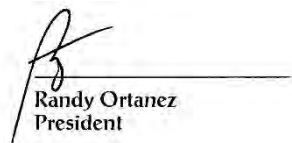
Date of Testing:
1/16 – 1/22/2021
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2101110003-14.A3L

FCC ID:	A3LSMG998JPN
APPLICANT:	Samsung Electronics Co., Ltd.

Application Type: Certification
Model: SC-52B
EUT Type: Portable Handset
FCC Classification: Ultra Wideband (UWB)
FCC Rule Part(s): FCC Part 15 Subpart F (15.519, 15.521)
UWB Classification: Hand-held Communication Device
Test Procedure(s): ANSI C63.10-2013, KDB 393764 D01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and has been tested in accordance with the measurement procedures specified in ANSI C63.4-2014 (See Test Report). These measurements were performed with no deviation from the standards. 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 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: A3LSMG998JPN**. The test data contained in this report pertains only to the EUT's ultra wideband transmitter.

Test Device Serial No.: 0289M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900GSM/GPRS/EDGE, 850 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, UWB

2.3 Test Configuration

The EUT was tested per the guidance of Section 10 of ANSI C63.10-2013. The EUT setup procedures of ANSI C63.10-2013 were used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Section 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups.

For more information please see Section 7.0 for test data and the test setup photos document for the test setup photographs.

2.4 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2014) was used in the measurement of the EUT.

Deviation from measurement procedure.....None




3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50μH 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 7.7. The EMI Receiver mode of the Agilent MXA 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 Clause 5, Figure 5.7 of ANSI C63.4-2014. A raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. 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(b)(1) 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

Except from §15.203 of the FCC Rules/Regulations:

“An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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 a connection to an external antenna


The EUT complies with the requirements 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 C63.4-2014. 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 Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07

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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
Emco	3116	Horn Antenna (18 - 40GHz)	8/7/2018	Triennial	8/7/2021	9203-2178
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	2/14/2019	Biennial	2/14/2021	125518
ETS-Lindgren	3816/2NM	LISN	7/9/2020	Biennial	7/9/2022	114451
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	9/17/2020	Annual	9/17/2021	MY57141001
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	8/17/2020	Annual	8/17/2021	MY52350166
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	1/9/2020	Annual	1/9/2021	NMLC-2
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/10/2020	Annual	8/10/2021	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Rohde & Schwarz	TC-TA18	Cross-Pol Antenna 400MHz-18GHz	7/8/2020	Biennial	7/8/2022	101058
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
Sunol Science	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107

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 DATA

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
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 FCC Classification: Ultra Wideband (UWB)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
§15.503, §15.519 (b)	10dB Bandwidth	≥ 500MHz	RADIATED	PASS	Section 7.2
§15.519(a)(1)	Cessation Time	Transmission shall cease in less than 10s		PASS	Section 7.3
§15.519(e)	Maximum Peak Power	< 0dBm EIRP in 50MHz BW		PASS	Section 7.4
§15.519(c)	Maximum Average Emission in the range of 3100 – 10600 MHz	< -41.3 EIRP in dBm		PASS	Section 7.4
§15.519(c)	Radiated Emissions Above 960MHz	See table in 15.519(c) for details		PASS	Section 7.4, 7.5
§15.519(d)	Radiated Emissions in the 1164 – 1240Mhz and 1559 – 1610MHz GPS Bands	< -85.3 EIRP in dBm		PASS	Section 7.5
§15.519(c), §15.519(a)	Radiate Emissions Below 960MHz	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS	Section 7.6
§15.207	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits (RSS-Gen)	LINE CONDUCTED	PASS	Section 7.7

Table 7-1. Summary of Test Results

Note:

The equipment was capable of operating on two antennas in two separate modes [HPRF and BPRF] as well as with different preambles. Care was taken to ensure the worst case modes were investigated and reported.

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7.2 10dB Bandwidth

§15.503(a), §15.519(b)

Test Overview and Limit

Per the definition of 15.503, the UWB Bandwidth is the frequency band bounded by the points that are 10 dB below the highest radiated emission, as based on the complete transmission system including the antenna.

The 10dB bandwidth of the UWB signal must remain fully within the 3100 – 10,600MHz band. The 10dB bandwidth of the UWB signal must also be greater than or equal to 500MHz.

Test Procedures Used

ANSI C63.10-2013 Section 10.1

Test Settings

1. RBW = 1MHz
2. VBW = 3MHz
3. Detector = Peak
4. Span was set wide enough to capture the 10dB points of the signal
5. Trace mode = max hold
6. Sweep = 2s
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 and Measurement Setup

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Bandwidth Results

ANT	CH	Preamble Id	CONFIG	Mode	PAYLOAD [Bytes]	FL [GHz]	FH [GHz]	fM [GHz]	BW [MHz]	Min BW [MHz]	Pass/Fail
1	9	9	SP0	BPRF	20	7.606	8.369	7.988	763.00	500	P
1	9	9	SP1	BPRF	20	7.607	8.367	7.987	760.00	500	P
1	9	9	SP3	BPRF	20	7.703	8.219	7.961	516.00	500	P
2	9	9	SP0	BPRF	20	7.715	8.237	7.976	522.00	500	P
2	9	9	SP1	BPRF	20	7.701	8.236	7.969	535.00	500	P
2	9	9	SP3	BPRF	20	7.664	8.260	7.962	596.00	500	P
1	9	10	SP0	BPRF	20	7.607	8.368	7.988	761.00	500	P
1	9	10	SP1	BPRF	20	7.733	8.367	8.050	634.00	500	P
1	9	10	SP3	BPRF	20	7.713	8.225	7.969	512.00	500	P
2	9	10	SP0	BPRF	20	7.641	8.178	7.910	537.00	500	P
2	9	10	SP1	BPRF	20	7.641	8.180	7.911	539.00	500	P
2	9	10	SP3	BPRF	20	7.624	8.206	7.850	582.00	500	P
1	9	11	SP0	BPRF	20	7.701	8.216	7.959	515.00	500	P
1	9	11	SP1	BPRF	20	7.702	8.219	7.961	517.00	500	P
1	9	11	SP3	BPRF	20	7.703	8.219	7.961	516.00	500	P
2	9	11	SP0	BPRF	20	7.625	8.206	7.916	581.00	500	P
2	9	11	SP1	BPRF	20	7.623	8.218	7.921	595.00	500	P
2	9	11	SP3	BPRF	20	7.630	8.217	7.924	587.00	500	P
1	9	12	SP0	BPRF	20	7.711	8.220	7.966	509.00	500	P
1	9	12	SP1	BPRF	20	7.717	8.366	8.042	649.00	500	P
1	9	12	SP3	BPRF	20	7.703	8.227	7.965	524.00	500	P
2	9	12	SP0	BPRF	20	7.630	8.194	7.912	564.00	500	P
2	9	12	SP1	BPRF	20	7.644	8.189	7.917	545.00	500	P
2	9	12	SP3	BPRF	20	7.622	8.210	7.916	588.00	500	P
1	9	25	SP0	HPRF	20	7.711	8.245	7.978	534.00	500	P
1	9	25	SP1	HPRF	20	7.711	8.245	7.978	534.00	500	P
1	9	25	SP3	HPRF	20	7.710	8.229	7.970	519.00	500	P
2	9	25	SP0	HPRF	20	7.621	8.176	7.899	555.00	500	P
2	9	25	SP1	HPRF	20	7.621	8.205	7.913	584.00	500	P
2	9	25	SP3	HPRF	20	7.621	8.196	7.909	575.00	500	P
1	9	26	SP0	HPRF	20	7.709	8.229	7.969	520.00	500	P
1	9	26	SP1	HPRF	20	7.704	8.220	7.962	516.00	500	P
1	9	26	SP3	HPRF	20	7.703	8.221	7.962	518.00	500	P
2	9	26	SP0	HPRF	20	7.653	8.174	7.914	521.00	500	P
2	9	26	SP1	HPRF	20	7.652	8.197	7.925	545.00	500	P
2	9	26	SP3	HPRF	20	7.669	8.201	7.935	532.00	500	P
1	9	27	SP0	HPRF	20	7.702	8.250	7.976	548.00	500	P
1	9	27	SP1	HPRF	20	7.702	8.254	7.978	552.00	500	P
1	9	27	SP3	HPRF	20	7.702	8.229	7.966	527.00	500	P
2	9	27	SP0	HPRF	20	7.652	8.167	7.910	515.00	500	P
2	9	27	SP1	HPRF	20	7.652	8.220	7.936	568.00	500	P
2	9	27	SP3	HPRF	20	7.678	8.222	7.950	544.00	500	P
1	9	28	SP0	HPRF	20	7.709	8.244	7.977	535.00	500	P
1	9	28	SP1	HPRF	20	7.709	8.228	7.969	519.00	500	P
1	9	28	SP3	HPRF	20	7.702	8.225	7.964	523.00	500	P
2	9	28	SP0	HPRF	20	7.634	8.214	7.924	580.00	500	P
2	9	28	SP1	HPRF	20	7.669	8.214	7.942	545.00	500	P
2	9	28	SP3	HPRF	20	7.676	8.213	7.945	537.00	500	P
1	9	29	SP0	HPRF	20	7.710	8.218	7.964	508.00	500	P
1	9	29	SP1	HPRF	20	7.712	8.225	7.969	513.00	500	P
1	9	29	SP3	HPRF	20	7.711	8.245	7.978	534.00	500	P
2	9	29	SP0	HPRF	20	7.621	8.175	7.898	554.00	500	P
2	9	29	SP1	HPRF	20	7.621	8.193	7.907	572.00	500	P
2	9	29	SP3	HPRF	20	7.630	8.188	7.909	558.00	500	P
1	9	30	SP0	HPRF	20	7.712	8.221	7.967	509.00	500	P
1	9	30	SP1	HPRF	20	7.708	8.220	7.964	512.00	500	P
1	9	30	SP3	HPRF	20	7.712	8.220	7.966	508.00	500	P
2	9	30	SP0	HPRF	20	7.637	8.245	7.941	608.00	500	P
2	9	30	SP1	HPRF	20	7.636	8.241	7.939	605.00	500	P
2	9	30	SP3	HPRF	20	7.671	8.184	7.928	513.00	500	P
1	9	31	SP0	HPRF	20	7.701	8.225	7.963	524.00	500	P
1	9	31	SP1	HPRF	20	7.696	8.224	7.960	528.00	500	P
1	9	31	SP3	HPRF	20	7.711	8.224	7.968	513.00	500	P
2	9	31	SP0	HPRF	20	7.676	8.207	7.942	531.00	500	P
2	9	31	SP1	HPRF	20	7.676	8.208	7.942	532.00	500	P
2	9	31	SP3	HPRF	20	7.676	8.207	7.942	531.00	500	P
1	9	32	SP0	HPRF	20	7.712	8.216	7.964	504.00	500	P
1	9	32	SP1	HPRF	20	7.712	8.225	7.969	513.00	500	P
1	9	32	SP3	HPRF	20	7.713	8.233	7.973	520.00	500	P
2	9	32	SP0	HPRF	20	7.676	8.222	7.949	546.00	500	P
2	9	32	SP1	HPRF	20	7.670	8.223	7.947	553.00	500	P
2	9	32	SP3	HPRF	20	7.674	8.226	7.950	552.00	500	P

Table 7-2. UWB 10dB Bandwidth Summary [Channel 9]

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset	Page 12 of 73	



Bandwidth Results



Plot 7-1. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 9



Plot 7-2. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 9


FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 13 of 73



Plot 7-3. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 9



Plot 7-4. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 9



FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 14 of 73



Plot 7-5. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 9



Plot 7-6. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 9


<p>FCC ID: A3LSMG998JPN</p>		<p>MEASUREMENT REPORT (Certification)</p>		<p>Approved by: Quality Manager</p>
<p>Test Report S/N: 1M2101110003-14.A3L</p>	<p>Test Dates: 1/16 – 1/22/2021</p>	<p>EUT Type: Portable Handset</p>	<p>Page 15 of 73</p>	



Plot 7-7. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 10



Plot 7-8. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 10


FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 16 of 73



Plot 7-9. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 10



Plot 7-10. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 10


FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 17 of 73



Plot 7-11. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 10



Plot 7-12. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 10


FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 18 of 73



Plot 7-13. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 11



Plot 7-14. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 11



FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 19 of 73



Plot 7-15. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 11



Plot 7-16. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 11



FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 20 of 73



Plot 7-17. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 11



Plot 7-18. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 11

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 21 of 73



Plot 7-19. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 12

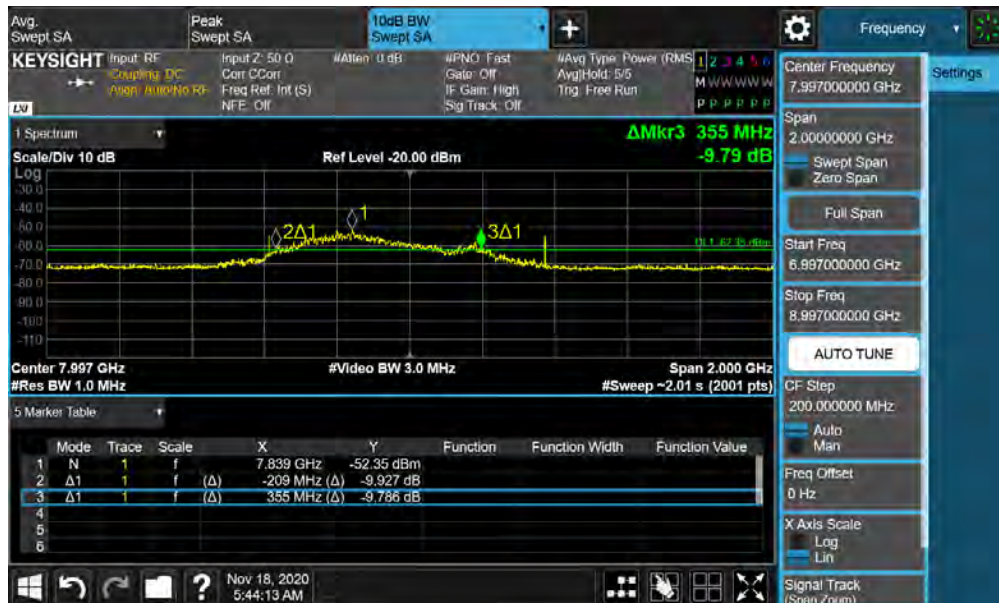


Plot 7-20. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 12

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 22 of 73



Plot 7-21. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 12



Plot 7-22. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 12



FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	MEASUREMENT REPORT (Certification)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 23 of 73



Plot 7-23. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 12



Plot 7-24. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 12



FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 24 of 73



Plot 7-25. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 25



Plot 7-26. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 25

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 25 of 73



Plot 7-27. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 25



Plot 7-28. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 25



FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	MEASUREMENT REPORT (Certification)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 26 of 73



Plot 7-29. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 25



Plot 7-30. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 25


FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 27 of 73



Plot 7-31. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 26



Plot 7-32. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 26

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 28 of 73



Plot 7-33. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 26



Plot 7-34. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 26



FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset	Page 29 of 73	



Plot 7-35. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 26



Plot 7-36. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 26



FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 30 of 73



Plot 7-37. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 27



Plot 7-38. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 27

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 31 of 73



Plot 7-39. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 27



Plot 7-40. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 27



FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	MEASUREMENT REPORT (Certification)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 32 of 73



Plot 7-41. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 27



Plot 7-42. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 27


FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 33 of 73



Plot 7-43. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 28



Plot 7-44. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 28

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 34 of 73



Plot 7-45. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 28



Plot 7-46. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 28



FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	MEASUREMENT REPORT (Certification)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 35 of 73



Plot 7-47. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 28



Plot 7-48. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 28



FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 36 of 73



Plot 7-49. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 29



Plot 7-50. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 29

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 37 of 73





Plot 7-51. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 29



Plot 7-52. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 29

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	MEASUREMENT REPORT (Certification)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 38 of 73





FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset	Page 39 of 73	



Plot 7-55. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 30



Plot 7-56. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 30

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 40 of 73



Plot 7-57. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 30



Plot 7-58. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 30


FCC ID: A3LSMG998JPN	Proud to be part of element	MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 41 of 73



Plot 7-59. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 30



Plot 7-60. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 30



FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 42 of 73



Plot 7-61. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 31



Plot 7-62. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 31

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 43 of 73



Plot 7-63. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 31



Plot 7-64. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 31



FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 44 of 73



Plot 7-65. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 31



Plot 7-66. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 31



FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 45 of 73



Plot 7-67. BANDWIDTH Plot – ANT1 - CH.9 - SP0 – Preamble 32



Plot 7-68. BANDWIDTH Plot – ANT1 - CH.9 – SP1 – Preamble 32

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 46 of 73



Plot 7-69. BANDWIDTH Plot – ANT1 - CH.9 – SP3 – Preamble 32



Plot 7-70. BANDWIDTH Plot – ANT2 - CH.9 - SP0 – Preamble 32



FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	MEASUREMENT REPORT (Certification)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 47 of 73



Plot 7-71. BANDWIDTH Plot – ANT2 - CH.9 – SP1 – Preamble 32



Plot 7-72. BANDWIDTH Plot – ANT2 - CH.9 – SP3 – Preamble 32

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 48 of 73

7.3 Cessation Time §15.519(a)(1)

Test Overview and Limit

§15.519(a)(1) A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgment from the associated receiver that its transmission is being received an acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

Test Settings

1. RBW = 1MHz
2. VBW = 3MHz
3. Span = 0 Span Mode
4. Sweep time shall be sufficient to demonstrate EUTs compliance with the rule part.
5. Vertical Markers are placed to indicate the point in which the receiver ceases acknowledging the EUT and the point 10s after.

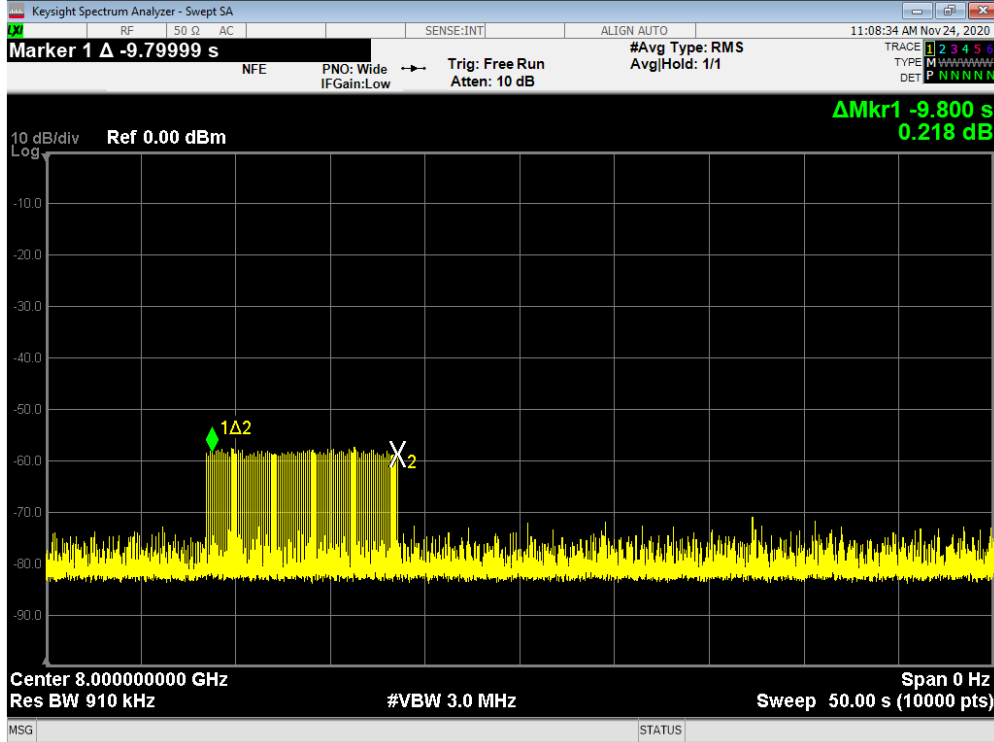
Test Setup

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





Figure 7-2. Test Instrument and Measurement Setup

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset	Page 49 of 73	



Plot 7-73. Cessation Time Plot

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 50 of 73

7.4 Peak Power and Maximum Average Emissions

§15.519(e), §15.519(c)

Test Overview and Limit

15.519 (3)(e) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fM. That limit is 0 dBm EIRP.

15.519 (3)(c) The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
3100 - 10600	-41.3

Test Procedures Used

ANSI C63.10-2013


Test Settings

Peak:

1. Analyzer frequency set to the frequency of the radiated spurious emission of interest
2. RBW = 50MHz, VBW = 80MHz
3. Detector = Peak
4. Sweep time = 2s
5. Trace mode = max hold
6. Trace was allowed to stabilize

Average:

1. Analyzer frequency set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz, VBW = 3MHz
3. Detector = Average-RMS (for Average)
4. Sweep time = 2s
5. Sweep Points = 2001 (1ms integration period per measurement bin)
6. Trace mode = max hold
7. Trace was allowed to stabilize

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 51 of 73

RESULTS – BPRF

ANT	CH	MODE	Preamble	Meas. Ant.	FM [GHz]	Peak Power [dBm/50MHz]	Peak Limit [dBm/50MHz]	Margin [dB]
1	9	SP1	9	V	7.997	-4.35	0	-4.35
2	9	SP1	9	V	7.997	-8.03	0	-8.03

Table 7-3. BPRF Highest Peak Power Results

ANT	CH	MODE	Preamble	Meas. Ant.	FM [GHz]	Peak Power [dBm/50MHz]	Peak Limit [dBm/50MHz]	Margin [dB]
1	9	SP3	11	V	7.839	-42.85	-41.3	-1.55
2	9	SP3	11	V	7.839	-42.88	-41.3	-1.58

Table 7-4. BPRF Highest Average Power Results



Sample Calculation:

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the EIRP level is calculated by applying the additional factors shown below for a test distance of 3 meter

$$RSE\ EIRP\ (dBm) = \text{Analyzer Level (dBm)} + 107 + AFCL\ (dB/m) + 20\text{Log}(Dm) - 104.8$$

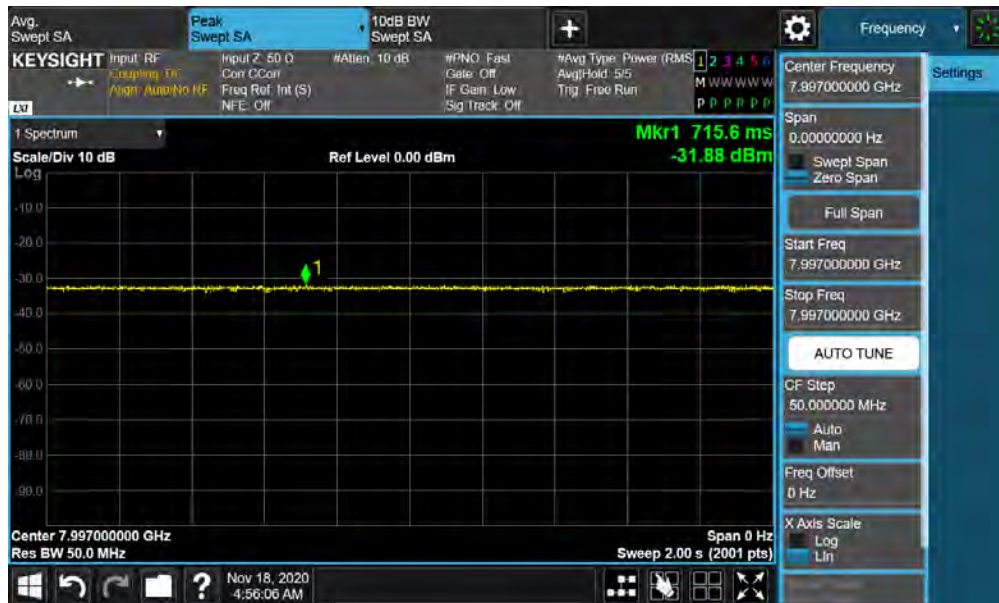


Plot 7-74. UWB Peak Power Measurement - ANT 1 - CH.9 – SP1 – BPRF

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 52 of 73



Plot 7-75. UWB Average Power Measurement - ANT 1 - CH.9 – SP3 - BPRF






Plot 7-76. UWB Peak Power Measurement - ANT 2 - CH.9 – SP1 – BPRF

FCC ID: A3LSMG998JPN	Proud to be part of element	MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 53 of 73



Plot 7-77. UWB Average Power Measurement - ANT 2 - CH.9 – SP3 - BPRF

FCC ID: A3LSMG998JPN	 Proud to be part of 	MEASUREMENT REPORT (Certification)	 Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset	Page 54 of 73

RESULTS – HPRF

ANT	CH	MODE	Preamble	Meas. Ant.	FM [GHz]	Peak Power [dBm/50MHz]	Peak Limit [dBm/50MHz]	Margin [dB]
1	9	SP0	30	V	7.997	-3.61	0	-3.61
2	9	SP0	28	V	7.997	-5.59	0	-5.59

Table 7-5. HPRF Highest Peak Power Results

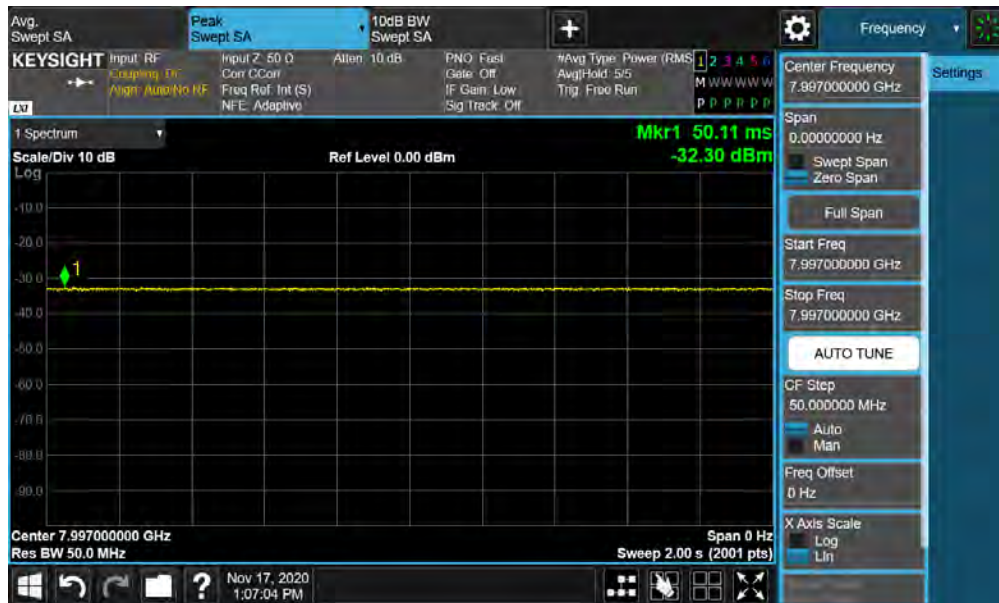
ANT	CH	MODE	Preamble	Meas. Ant.	FM [GHz]	Peak Power [dBm/50MHz]	Peak Limit [dBm/50MHz]	Margin [dB]
1	9	SP3	28	V	7.835	-42.84	-41.3	-1.54
2	9	SP3	31	V	7.85	-43.00	-41.3	-1.70

Table 7-6. HPRF Highest Average Power Results

Sample Calculation

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the EIRP level is calculated by applying the additional factors shown below for a test distance of 3 meter

$$RSE \text{ EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + AFCL \text{ (dB/m)} + 20\text{Log}(Dm) - 104.8$$



Plot 7-78. UWB Peak Power Measurement - ANT 1 - CH.9 – SP0 – BPRF

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 55 of 73



Plot 7-79. UWB Average Power Measurement - ANT 1 - CH.9 – SP3 - BPRF




Plot 7-80. UWB Peak Power Measurement - ANT 2 - CH.9 – SP0 – BPRF

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
Test Report S/N: 1M2101110003-14.A3L	Test Dates: 1/16 – 1/22/2021	EUT Type: Portable Handset		Page 56 of 73



Plot 7-81. UWB Average Power Measurement - ANT 2 - CH.9 – SP3 - BPRF

<p>FCC ID: A3LSMG998JPN</p>		<p>MEASUREMENT REPORT (Certification)</p>	 <p>Approved by: Quality Manager</p>
<p>Test Report S/N: 1M2101110003-14.A3L</p>	<p>Test Dates: 1/16 – 1/22/2021</p>	<p>EUT Type: Portable Handset</p>	<p>Page 57 of 73</p>

7.5 Radiated Measurement Data above 960MHz

§15.519 (c), §15.519(d), §15.209(a)

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.

§15.519(c)

Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-1990	-63.3
1990-3100	-61.3
3100-10600	-41.3
Above 10600	-61.3

Table 7-7. Above 960MHz Average Limits

§15.519(d)

Frequency in MHz	EIRP in dBm
1164-1240	-85.3
1559-1610	-85.3

Table 7-8. Above 960MHz Average Limits

Test Procedures Used

ANSI C63.10-2013

Test Settings

Average EIRP Measurements

1. Analyzer frequency set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz (3kHz for emissions in the GPS bands)
3. VBW = 3MHz (30kHz for the emissions in the GPS bands)
4. Detector = RMS
5. Sweep time = auto couple
6. Trace mode = trace averaging
7. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown test setup photos provided.

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Test Notes

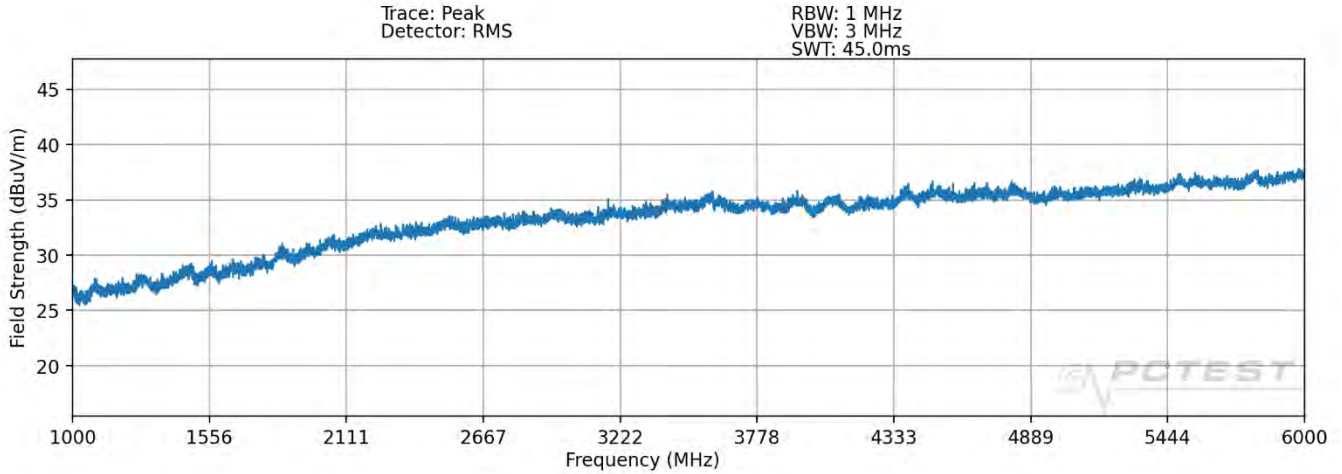
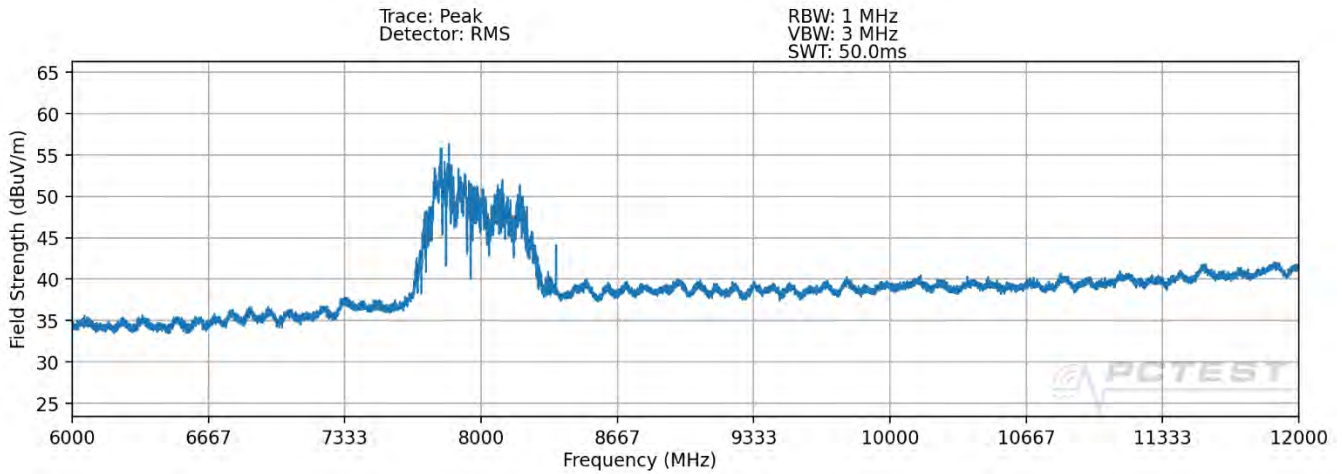
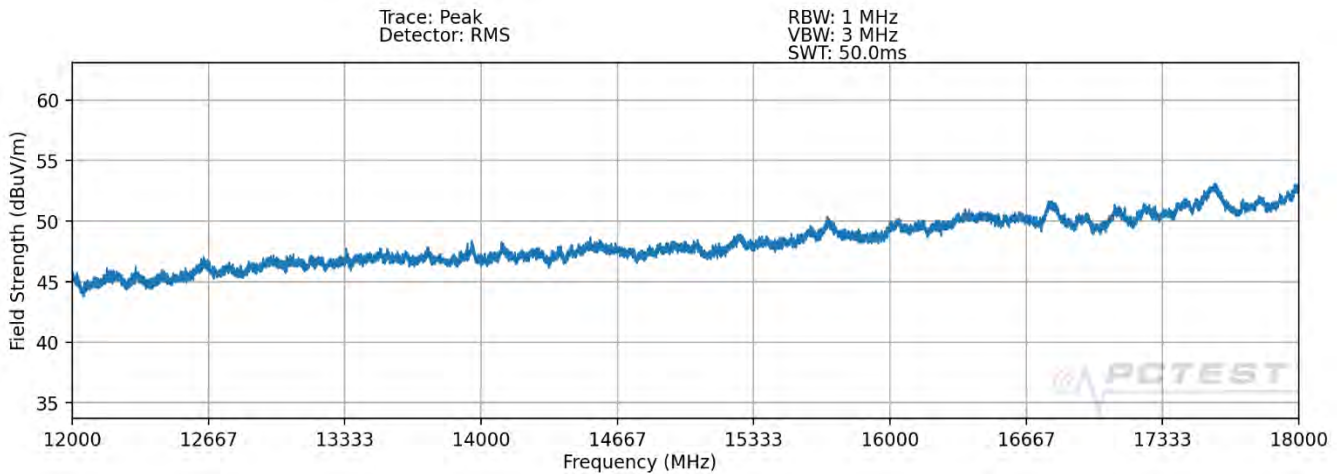
1. All modes of operation and settings (Preamble, Packet Type, etc) were investigated and the worst-case emissions are reported.
2. The RBW for measurements in the GPS Bands were reduced to 3kHz in order to show compliance.
3. Pre-scan plots that are included are not corrected for antenna factors, cable losses, or pre-amplifier gains. The plots are only for the purpose of spurious emission identification.
4. All readings are calibrated by a signal generator with accuracy traceable to the National Institute of Standards and Technology (NIST).
5. AFCL (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)




Sample Calculation

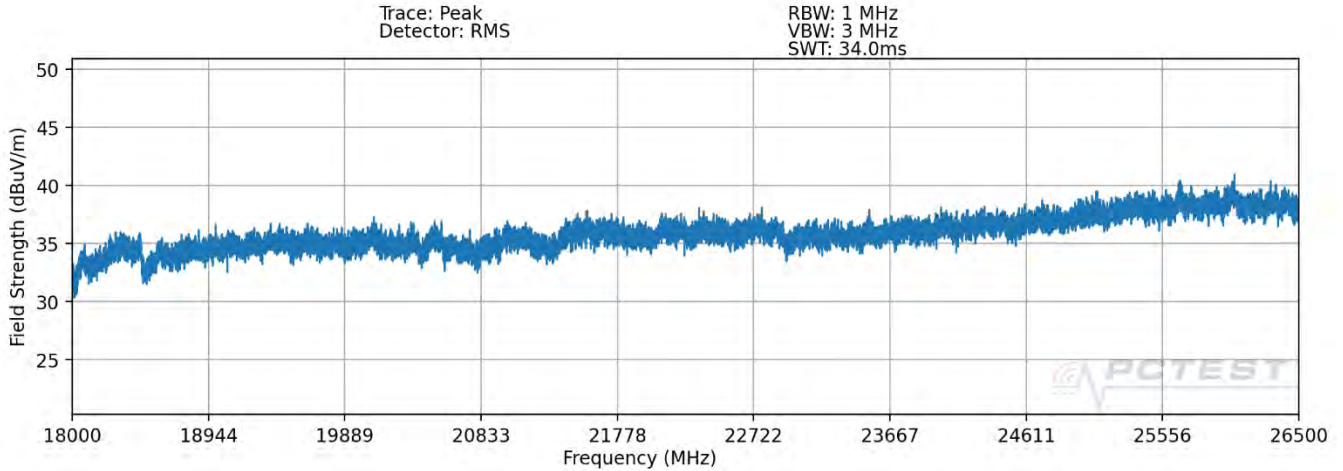
The raw radiated spurious level is converted to field strength in dBuV/m. Then, the EIRP RSE level is calculated by applying the additional factors shown below for a test distance of 3 meter

$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

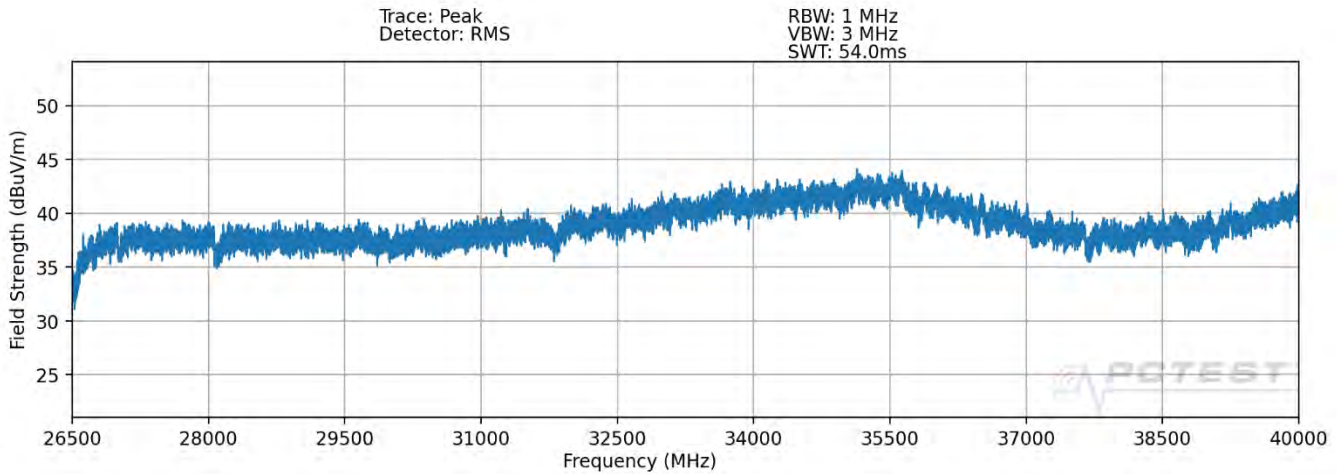
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Channel 9 ANTENNA 1:

Plot 7-82. Radiated Spurious Pre-Scan 960 - 6000 MHz - CH.9 - ANT 1

Plot 7-83. Radiated Spurious Pre-Scan 6000 - 12000 MHz - CH.9 - ANT 1

Plot 7-84. Radiated Spurious Pre-Scan 12000 - 18000 MHz - CH.9 - ANT 1

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Plot 7-85. Radiated Spurious Pre-Scan 18 – 26.5 GHz - CH.9 - ANT 1



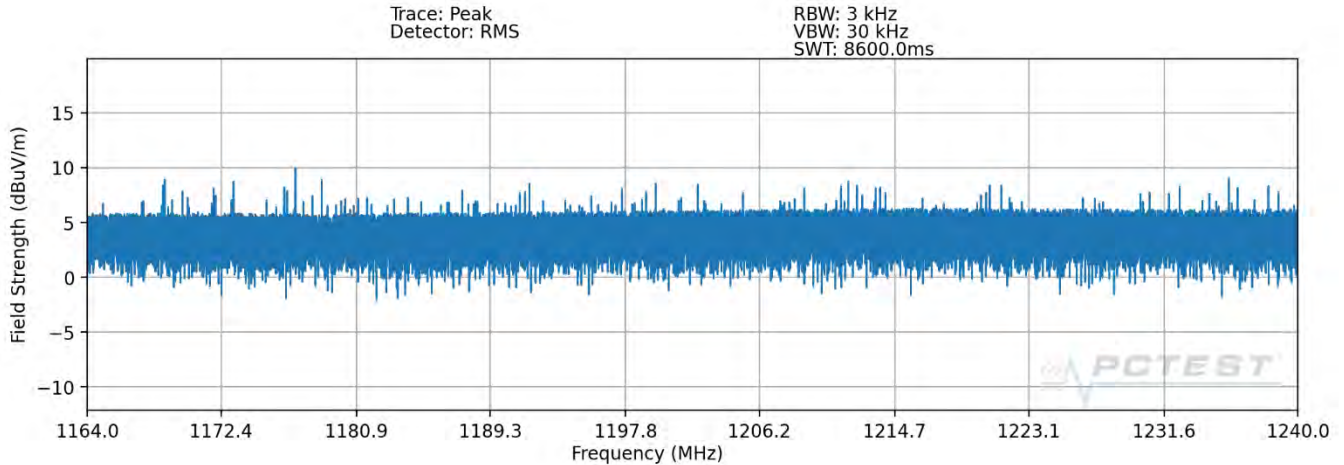
Plot 7-86. Radiated Spurious Pre-Scan 26.5 – 40.0 GHz - CH.9 - ANT 1

Channel:	9
Frequency (MHz):	8000
Preamble id:	10
Config	SP3

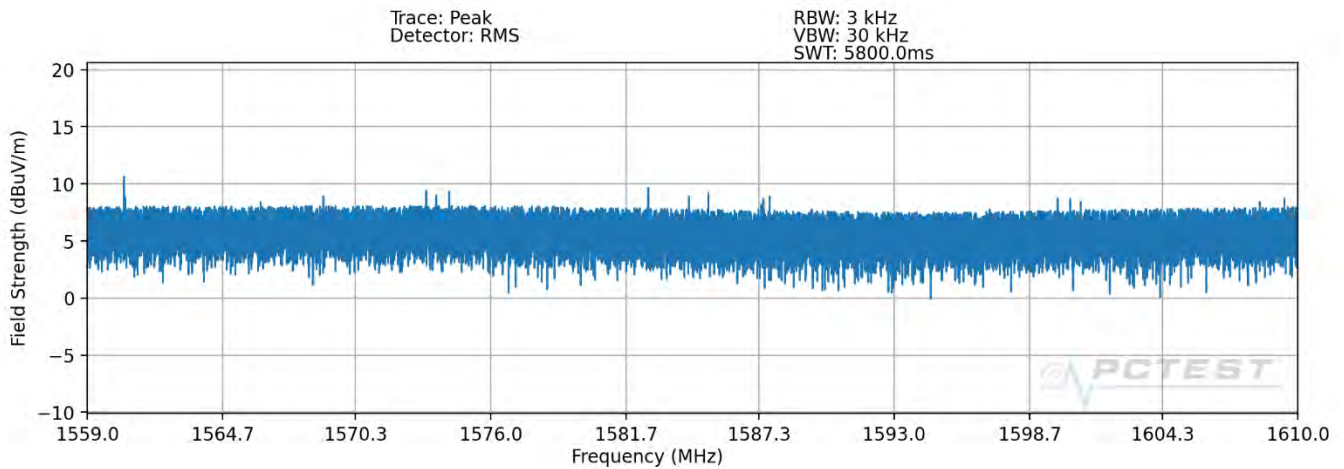
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1633.00	AVERAGE	H	-	-	-77.00	-5.72	-70.98	-63.30	-7.68
3022.00	AVERAGE	H	-	-	-77.93	-0.26	-66.45	-61.30	-5.15
4963.00	AVERAGE	H	-	-	-78.36	3.34	-63.28	-41.30	-21.98
7422.00	AVERAGE	H	-	-	-79.63	8.63	-59.25	-41.30	-17.95
11316.00	AVERAGE	H	-	-	-93.89	16.45	-65.70	-61.30	-4.40

Table 7-9. Radiated Spurious Emissions CH. 9 – ANT1

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Plot 7-87. Radiated Spurious Pre-Scan 1164 - 1240 MHz - CH.9 - ANT 1



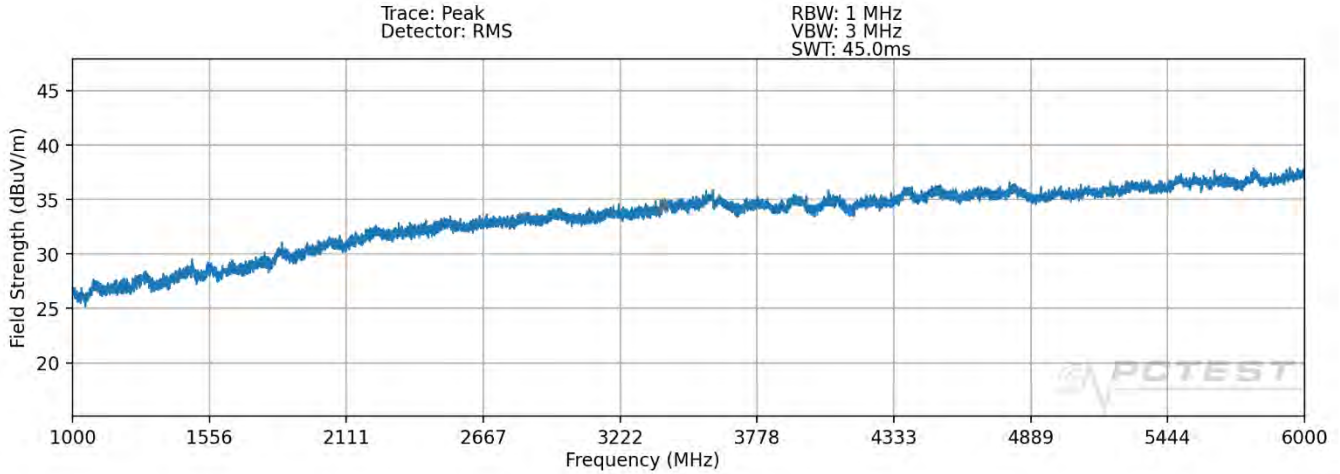
Plot 7-88. Radiated Spurious Pre-Scan 1559 - 1610 MHz - CH.9 - ANT 1

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1221.00	AVERAGE	H	-	-	-99.52	-6.47	-94.24	-85.30	-8.94
1571.00	AVERAGE	H	-	-	-98.66	-5.07	-91.98	-85.30	-6.68

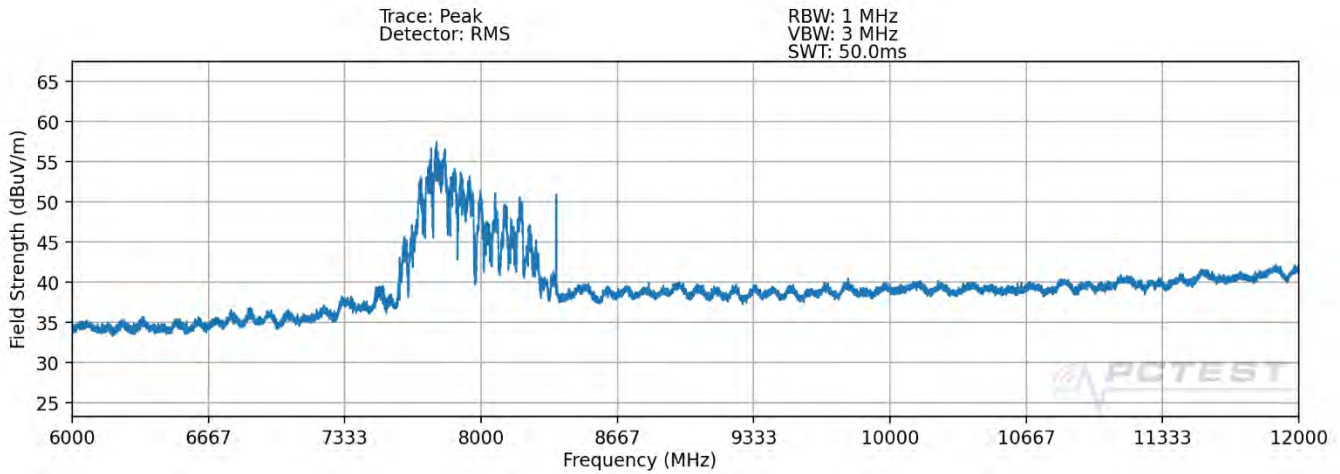
Table 7-10. Radiated Spurious Emissions CH. 9 – ANT1 – GPS BANDS

FCC ID: A3LSMG998JPN		MEASUREMENT REPORT (Certification)		Approved by: Quality Manager
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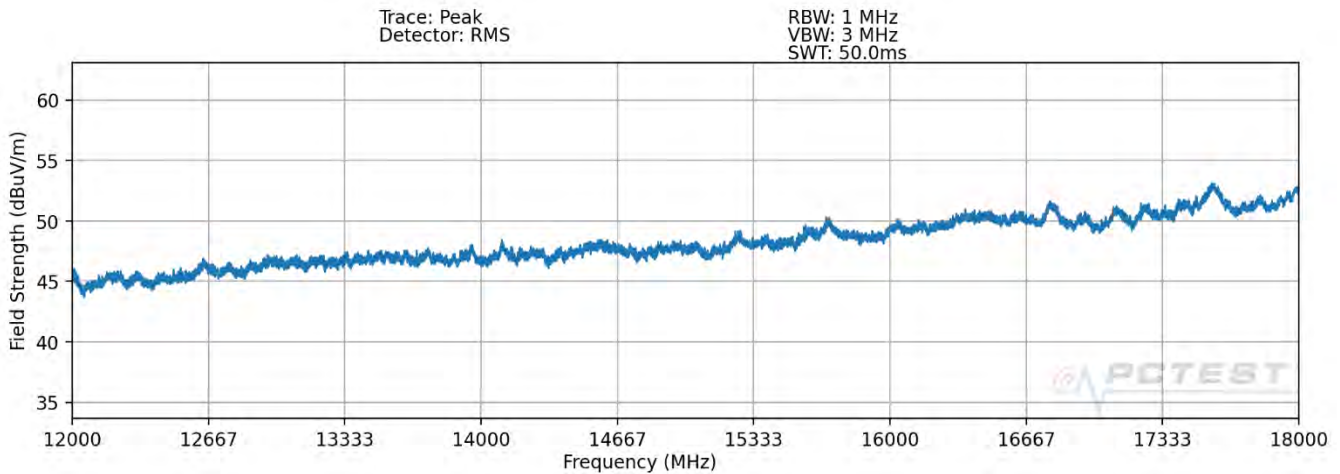
Channel 9 ANTENNA 2:





Plot 7-89. Radiated Spurious Pre-Scan 960 - 6000 MHz - CH.9 - ANT 2

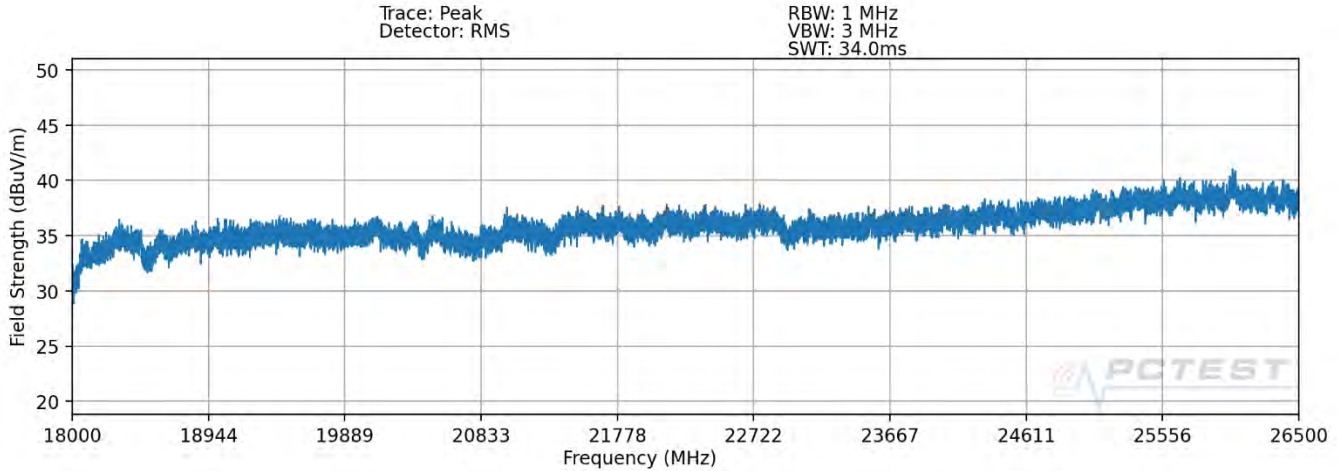


Plot 7-90. Radiated Spurious Pre-Scan 6000 - 12000 MHz - CH.9 - ANT 2

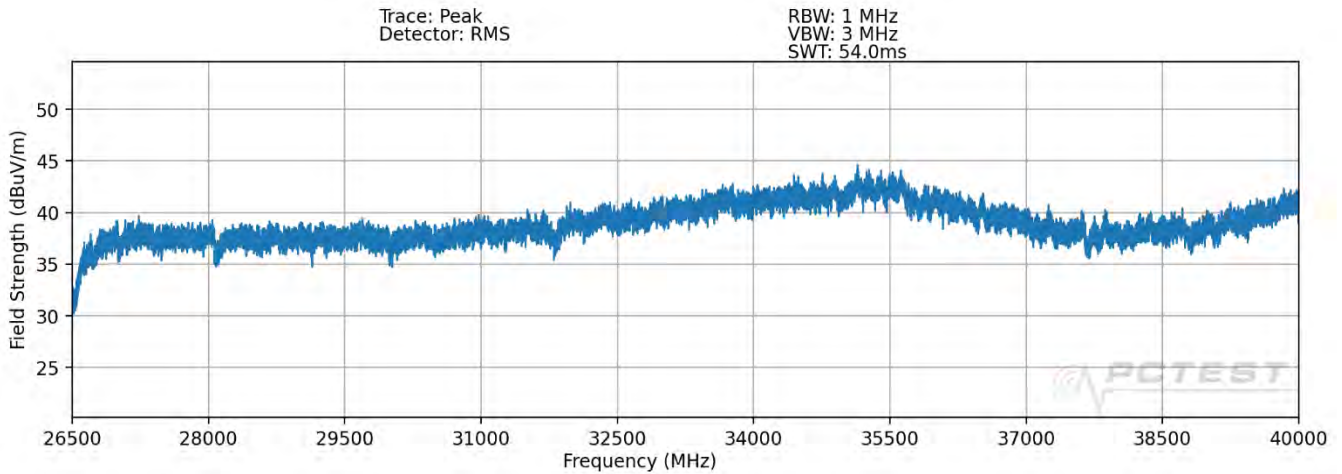


Plot 7-91. Radiated Spurious Pre-Scan 12000 - 18000 MHz - CH.9 - ANT 2

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Plot 7-92. Radiated Spurious Pre-Scan 18 – 26.5 GHz - CH.9 - ANT 2




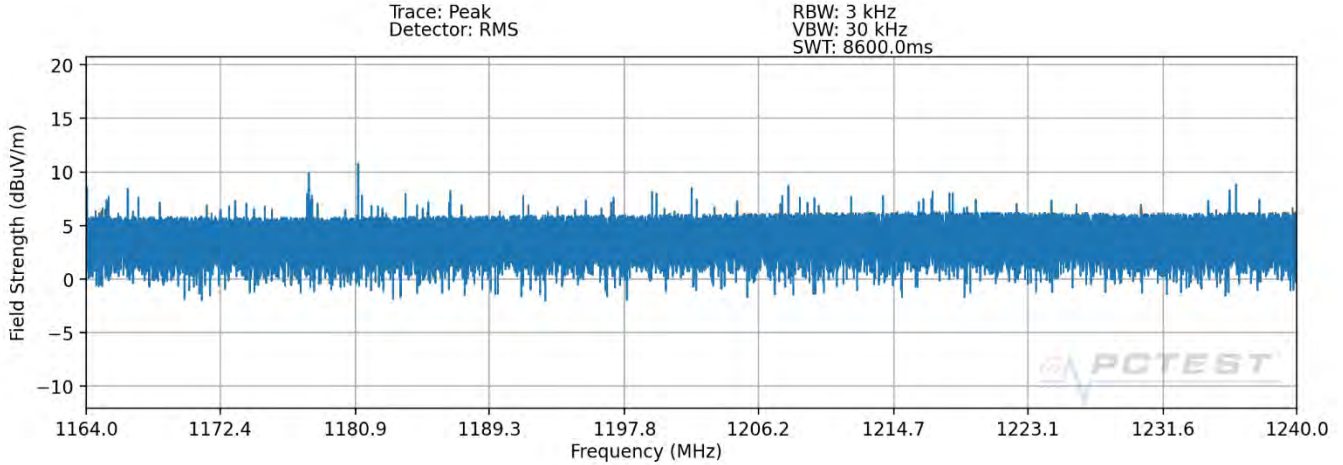
Plot 7-93. Radiated Spurious Pre-Scan 26.5 – 40.0 GHz - CH.9 - ANT 2

Channel:	9
Frequency (MHz):	8000
Preamble id:	12
Config	SP3

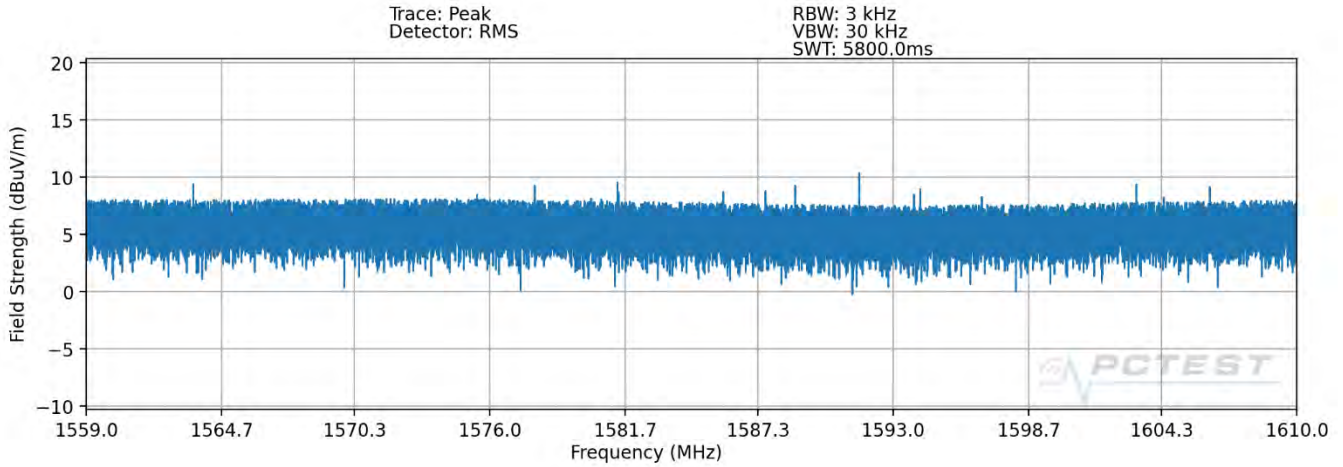
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBuV/m]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1703.00	AVERAGE	H	-	-	-77.22	-4.98	24.80	-70.46	-63.30	-7.16
2225.00	AVERAGE	H	-	-	-76.99	-2.60	27.41	-67.85	-61.30	-6.55
3024.00	AVERAGE	H	-	-	-77.89	-0.31	28.80	-66.46	-61.30	-5.16
9000.00	AVERAGE	H	-	-	-80.57	11.35	37.78	-57.48	-41.30	-16.18
10467.00	AVERAGE	H	-	-	-81.11	12.18	38.07	-57.19	-41.30	-15.89

Table 7-11. Radiated Spurious Emissions CH. 9 – ANT2

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Plot 7-94. Radiated Spurious Pre-Scan 1164 - 1240 MHz - CH.9 - ANT 2



Plot 7-95. Radiated Spurious Pre-Scan 1559 - 1610 MHz - CH.9 - ANT 2

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBuV/m]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1227.00	AVERAGE	H	-	-	-98.14	-6.40	2.46	-92.80	-85.30	-7.50
1589.00	AVERAGE	H	-	-	-99.09	-5.31	2.60	-92.66	-85.30	-7.36

Table 7-12. Radiated Spurious Emissions CH. 9 – ANT2 – GPS BANDS

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7.6 Radiated Spurious Emissions Measurements – Below 1GHz

§15.209(a), §15.519(c); 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 7-18 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 7-13. 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

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Test Setup

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

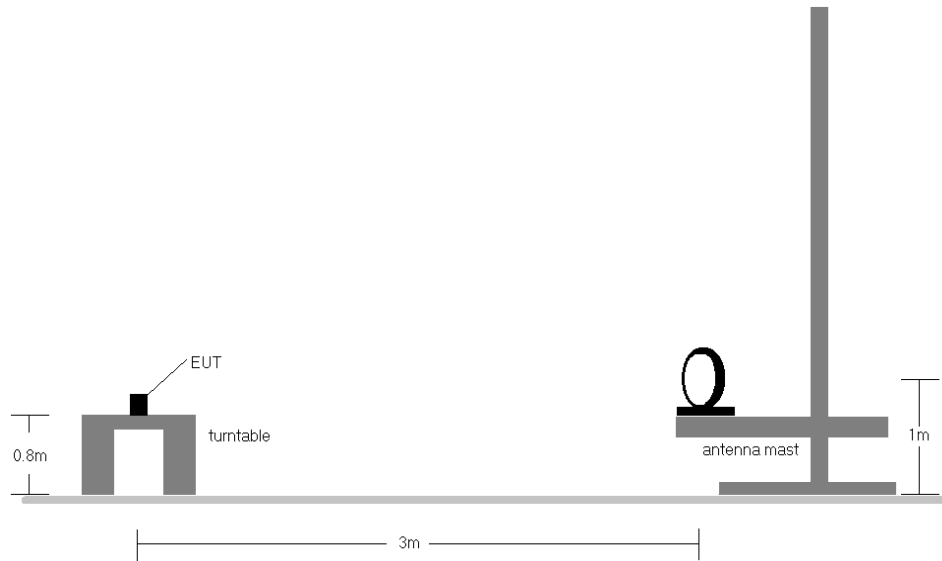


Figure 7-3. Radiated Test Setup < 30Mhz

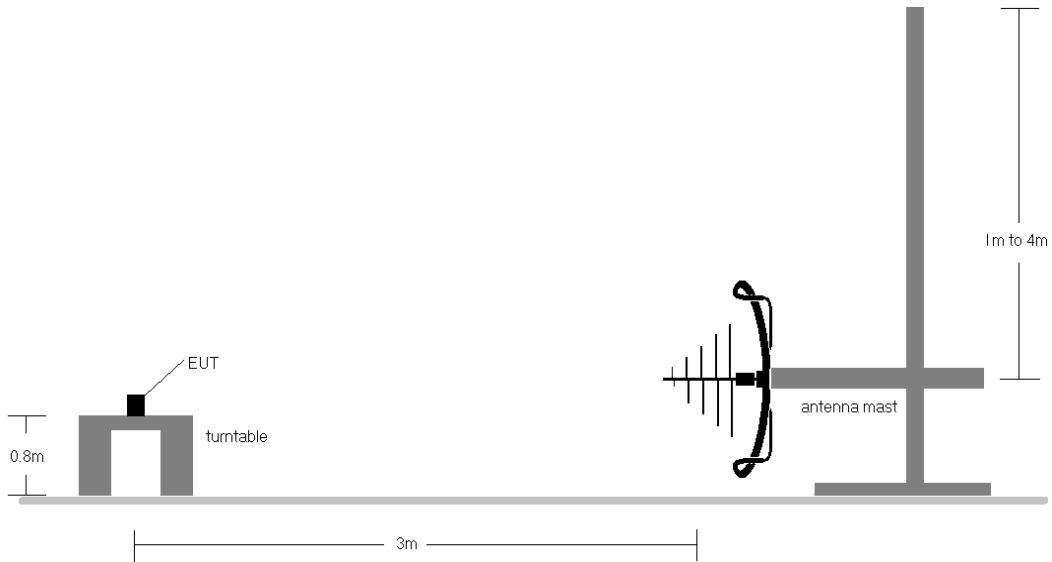



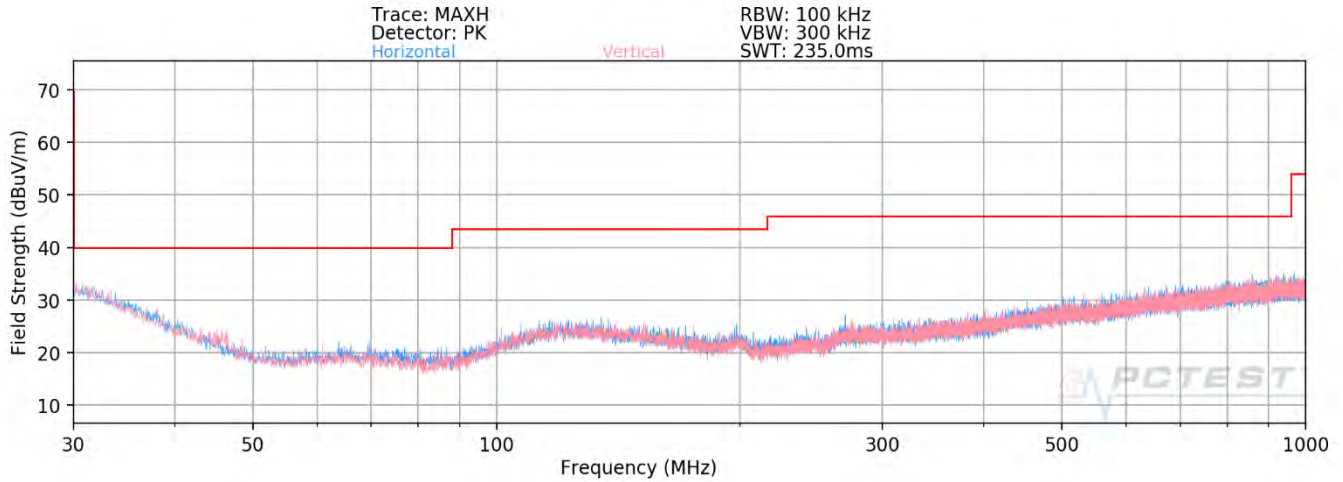
Figure 7-4. Radiated Test Setup < 1GHz

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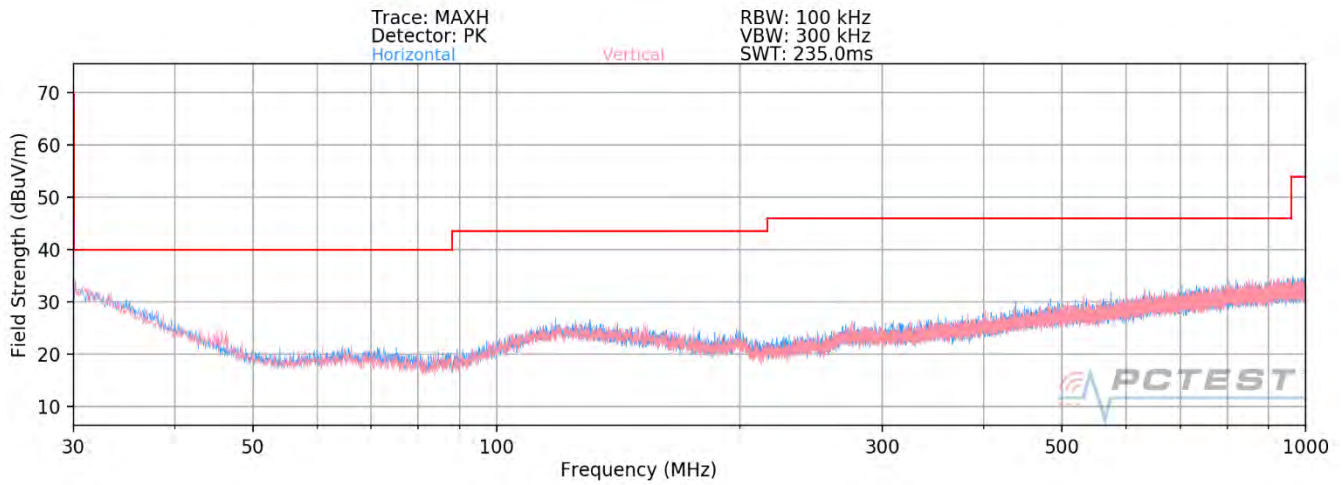
Test Notes

1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen(8.10) are below the limit shown in Table 7-18 .
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
3. 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.
4. Emissions were measured at a 3 meter test distance.
5. 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.
6. No spurious emissions were detected within 20dB of the limit below 30MHz.
7. 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.
8. 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.




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Plot 7-96. 30MHz - 1 GHz Pre-Scan Plots ANT1



Plot 7-97. 30MHz - 1 GHz Pre-Scan Plots ANT2

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7.7 Line Conducted Measurement Data

§15.207

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 limit shown in the table below.

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

Table 7-14. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.4-2014

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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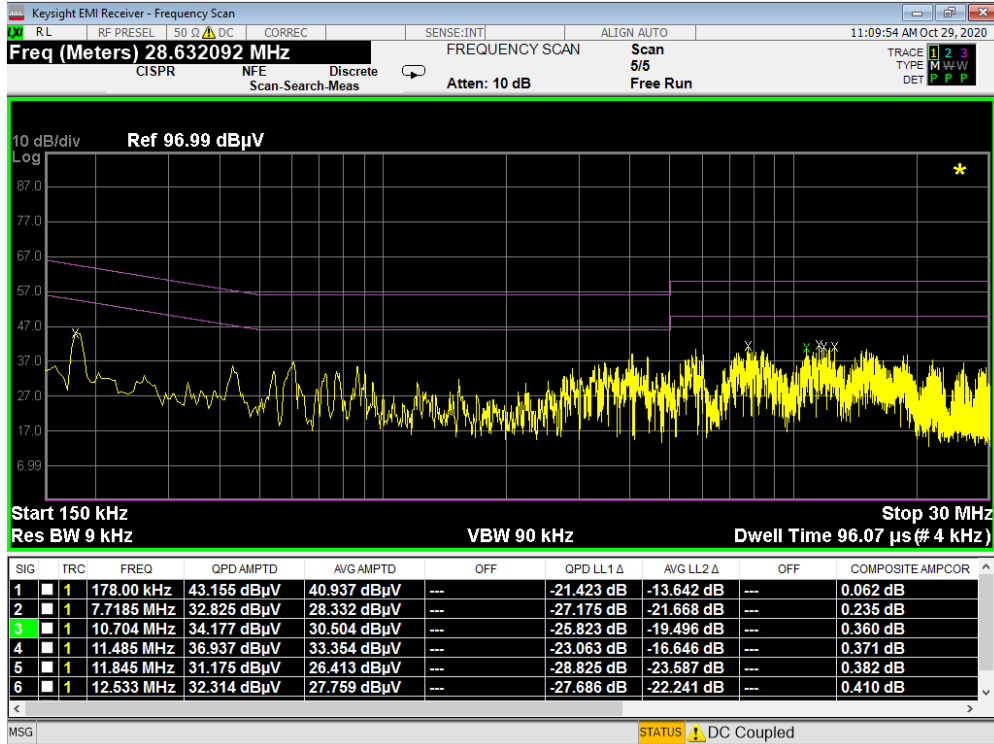
Test Setup

The EUT and measurement equipment were set up as shown in the test setup photos provided.

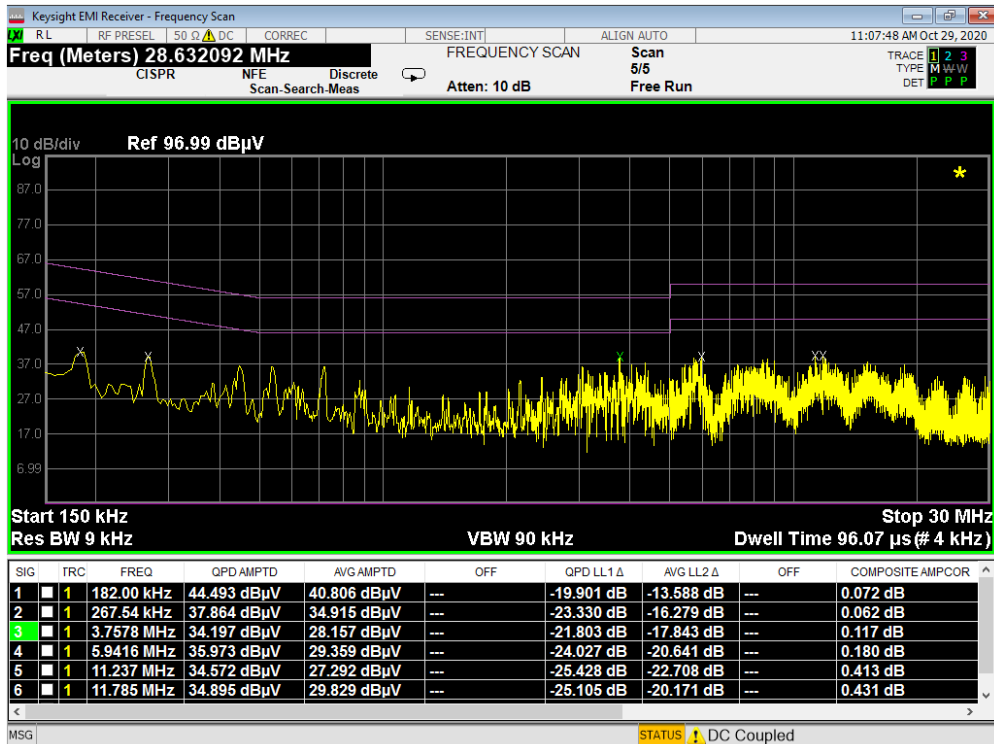
Test Notes

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.107 and ICES-003.
3. L1 = Phase; N = Neutral
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Reading (dBμV) + Factor (dB)
6. Margin (dB) = QP/AV Limit (dBμV) – QP/AV Level (dBμV)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.



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Plot 7-98. Line Conducted Plot (L1)


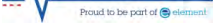



Plot 7-99. Line Conducted Plot (N)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG998JPN** has been tested to comply with the requirements specified in §15.519 and §15.521 of the FCC rules.

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