

MEASUREMENT REPORT EN-DC

Applicant Name:

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

Date of Testing:

11/11 - 12/03/2019

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M1911080182-02.A3L

FCC ID:

A3LSMN976U

APPLICANT:

Samsung Electronics Co., Ltd.

Application Type:

Class II Permissive Change

Model:

SM-N976U

EUT Type:

Portable Handset

FCC Classification:

PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part(s):

27

Test Procedure(s):

ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01,
KDB 648474 D03 v01r04

Class II Permissive Change:

Please see FCC change document

Original Grant Date:

11/15/2019

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 §2.947. 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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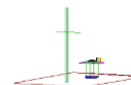
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FCC Part 27



Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
			Max. Power (W)	Max. Power (dBm)		
Band n41	27	2506 - 2680	0.217	23.35	18M0G7D	QPSK
Band n41	27	2506 - 2680	0.190	22.78	18M0W7D	16QAM
Band n41	27	2506 - 2680	0.147	21.68	18M0W7D	64QAM
Band n41	27	2506 - 2680	0.086	19.34	18M0W7D	256QAM
Band n41	27	2516 - 2670	0.237	23.74	35M8G7D	QPSK
Band n41	27	2516 - 2670	0.208	23.17	35M9W7D	16QAM
Band n41	27	2516 - 2670	0.161	22.07	35M8W7D	64QAM
Band n41	27	2516 - 2670	0.094	19.73	35M8W7D	256QAM
Band n41	27	2521 - 2665	0.215	23.32	46M0G7D	QPSK
Band n41	27	2521 - 2665	0.188	22.75	45M8W7D	16QAM
Band n41	27	2521 - 2665	0.146	21.65	46M0W7D	64QAM
Band n41	27	2521 - 2665	0.085	19.31	45M8W7D	256QAM
Band n41	27	2526 - 2660	0.204	23.09	58M1G7D	QPSK
Band n41	27	2526 - 2660	0.179	22.52	57M7W7D	16QAM
Band n41	27	2526 - 2660	0.139	21.42	58M1W7D	64QAM
Band n41	27	2526 - 2660	0.081	19.08	58M0W7D	256QAM
Band n41	27	2536 - 2650	0.168	22.24	77M2G7D	QPSK
Band n41	27	2536 - 2650	0.152	21.81	77M4W7D	16QAM
Band n41	27	2536 - 2650	0.104	20.15	77M1W7D	64QAM
Band n41	27	2536 - 2650	0.077	18.87	77M3W7D	256QAM
Band n41	27	2541 - 2645	0.179	22.54	87M0G7D	QPSK
Band n41	27	2541 - 2645	0.152	21.82	87M0W7D	16QAM
Band n41	27	2541 - 2645	0.134	21.28	87M3W7D	64QAM
Band n41	27	2541 - 2645	0.087	19.39	87M1W7D	256QAM
Band n41	27	2546 - 2640	0.184	22.64	96M8G7D	QPSK
Band n41	27	2546 - 2640	0.168	22.26	96M6W7D	16QAM
Band n41	27	2546 - 2640	0.130	21.13	96M5W7D	64QAM
Band n41	27	2546 - 2640	0.085	19.28	96M7W7D	256QAM

EUT Overview

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1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST 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 ISSED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISSED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMN976U**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 0466M, 0719M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, ANT+, Wireless Power Transfer, 5G NR(n41)

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

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

2.4 EMI Suppression Device(s)/Modifications

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

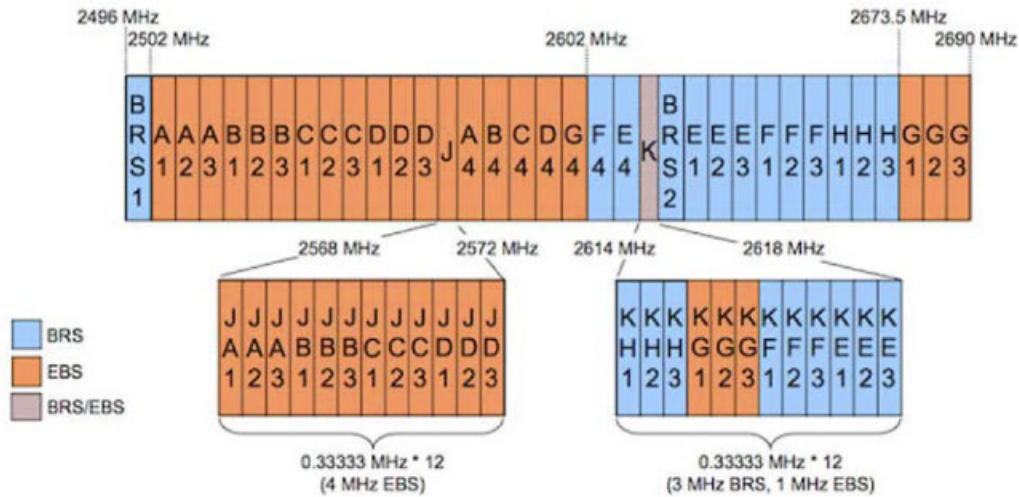
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3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

3.2 BRS/EBS Frequency Block



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3.3 Radiated Power and Radiated Spurious 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. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table 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. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_d \text{ [dBm]} = P_g \text{ [dBm]} - \text{cable loss [dB]} + \text{antenna gain [dBd/dBi]}$$

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_g \text{ [dBm]} - \text{cable loss [dB]}$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10 \log_{10}(\text{Power}_{\text{[Watts]}})$. For Band 41, the calculated P_d levels are compared to the absolute spurious emission limit of -25dBm which is equivalent to the required minimum attenuation of $55 + 10 \log_{10}(\text{Power}_{\text{[Watts]}})$.

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.

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4.0 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 Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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5.0 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
-	LTX3	Licensed Transmitter Cable Set	6/3/2019	Annual	6/3/2020	LTX3
Agilent	N9030A	PXA Signal Analyzer (44GHz)	6/12/2019	Annual	6/12/2020	MY52350166
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	6/7/2018	Triennial	6/7/2021	9203-2178
Espec	ESX-2CA	Environmental Chamber	6/13/2019	Annual	6/13/2020	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	4/19/2019	Annual	4/19/2020	11401010036
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	6/5/2019	Annual	6/5/2020	100342
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/11/2019	Annual	7/11/2020	102134
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

Table 5-1. Test Equipment

Notes:

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

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm - (-24.80).

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7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSMN976U
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
2.1051	Out of Band Emissions	$> 43 + 10 \log_{10}(P[\text{Watts}])$ at Band Edge and for all out-of-band emissions			Section 7.3
27.53(m)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.3, 7.4
2.1046	Transmitter Conducted Output Power	N/A			See RF Exposure Report
2.1055 27.54	Frequency Stability	Fundamental emissions stay within authorized frequency block (Part 27)			Section 7.7

Table 7-1. Summary of Conducted Test Results

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FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
27.50(h)(2)	Equivalent Isotropic Radiated Power (Band n41)	< 2 Watts max. EIRP	RADIATED	PASS	Section 7.5
27.53(m)	Undesirable Emissions (Band n41)	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.6
27.53(m)	Uplink Carrier Aggregation	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.6

Table 7-2. Summary of Radiated Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots (Sections 7.2, 7.3) were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "LTE Automation," Version 5.3.
- 5) For operation <1GHz, the EIRP limits in the table above are referenced to the specifications written in the relevant Radio Standards Specifications for Innovation, Science, and Economic Development Canada.

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7.2 Occupied Bandwidth

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
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
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Setup

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

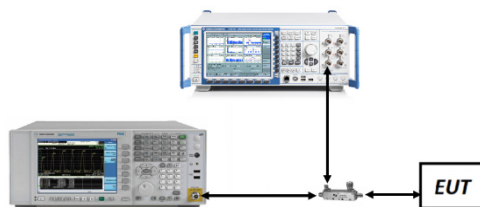
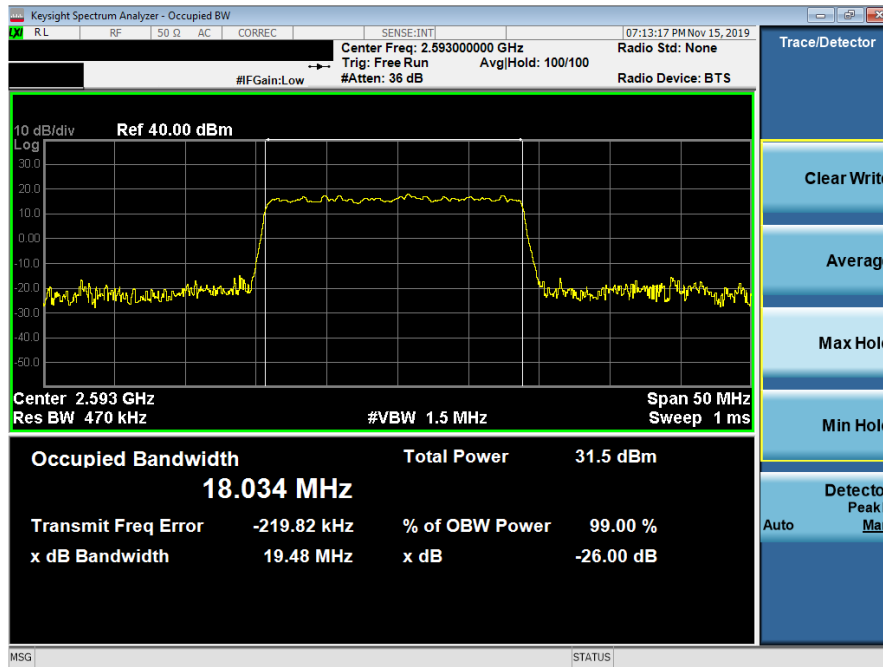


Figure 7-1. Test Instrument & Measurement Setup

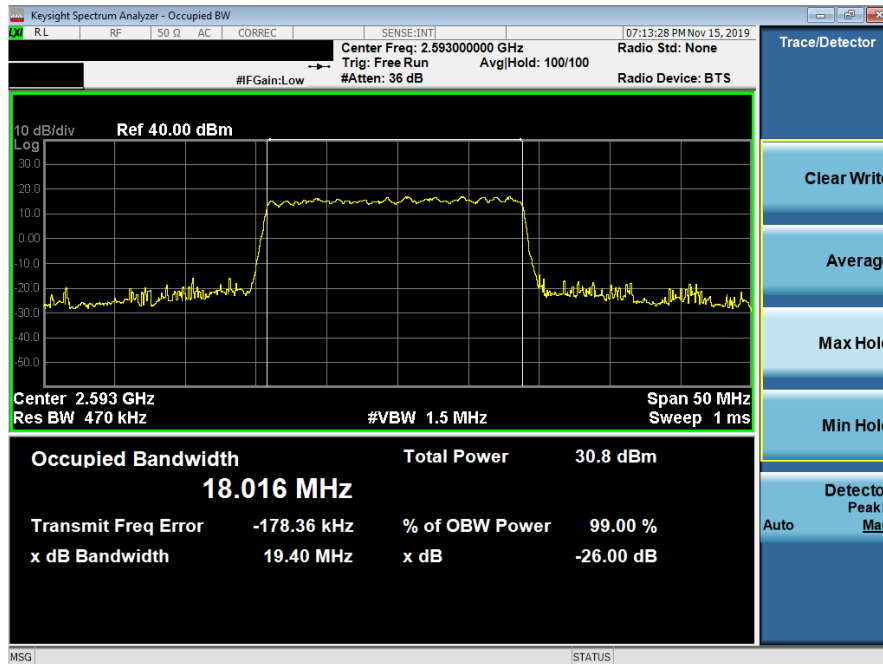
Test Notes

None.

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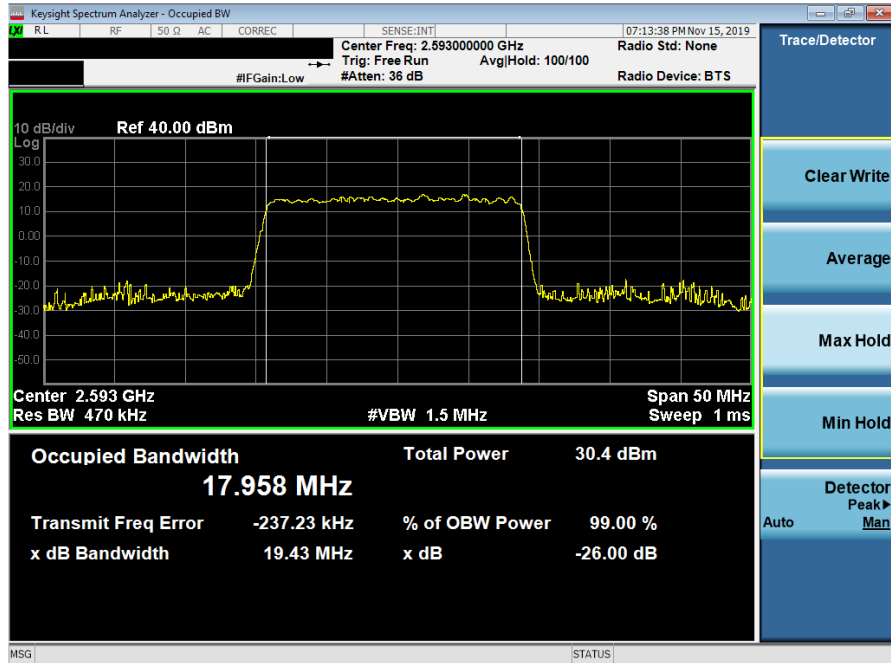


Plot 7-1. Occupied Bandwidth Plot (n41 20MHz QPSK - Full RB Configuration)

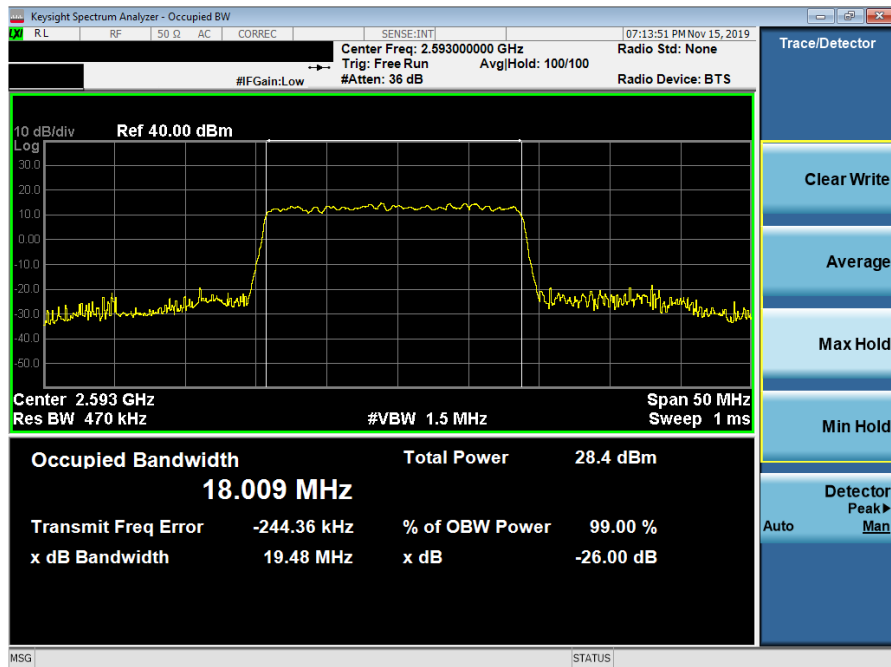


Plot 7-2. Occupied Bandwidth Plot (n41 20MHz 16QAM - Full RB Configuration)

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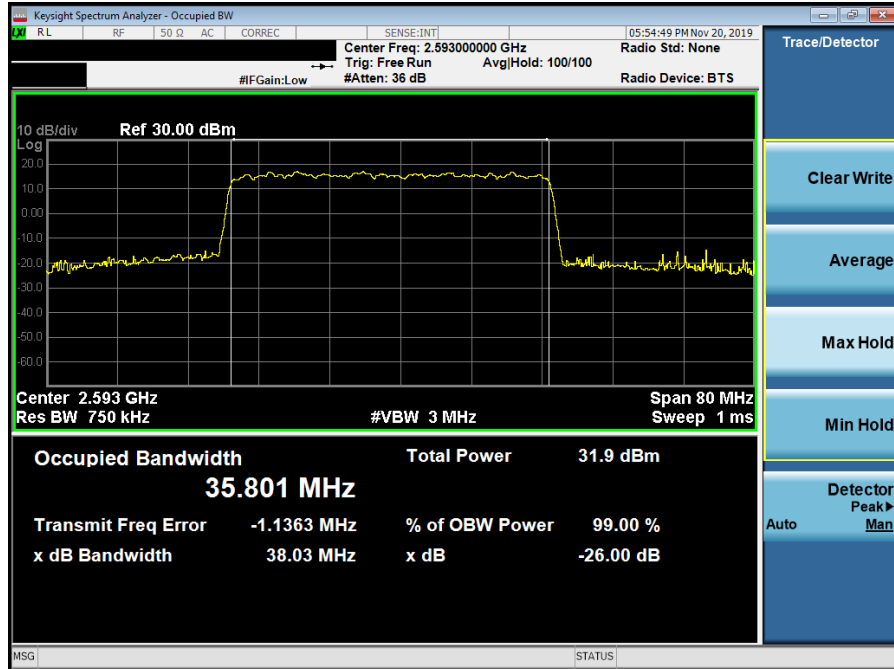


Plot 7-3. Occupied Bandwidth Plot (n41 20MHz 64QAM- Full RB Configuration)

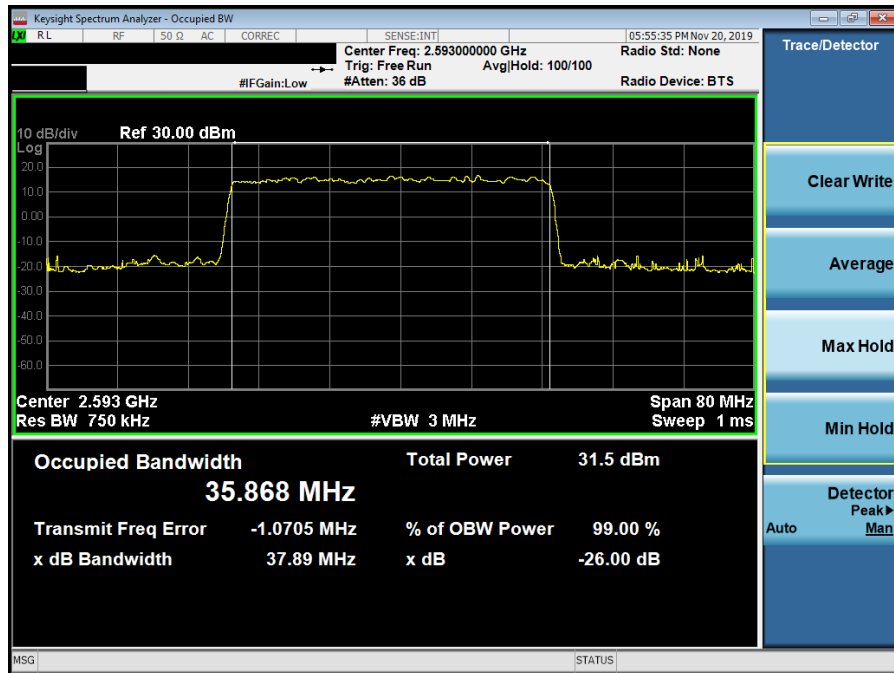


Plot 7-4. Occupied Bandwidth Plot (n41 20MHz 256QAM - Full RB Configuration)

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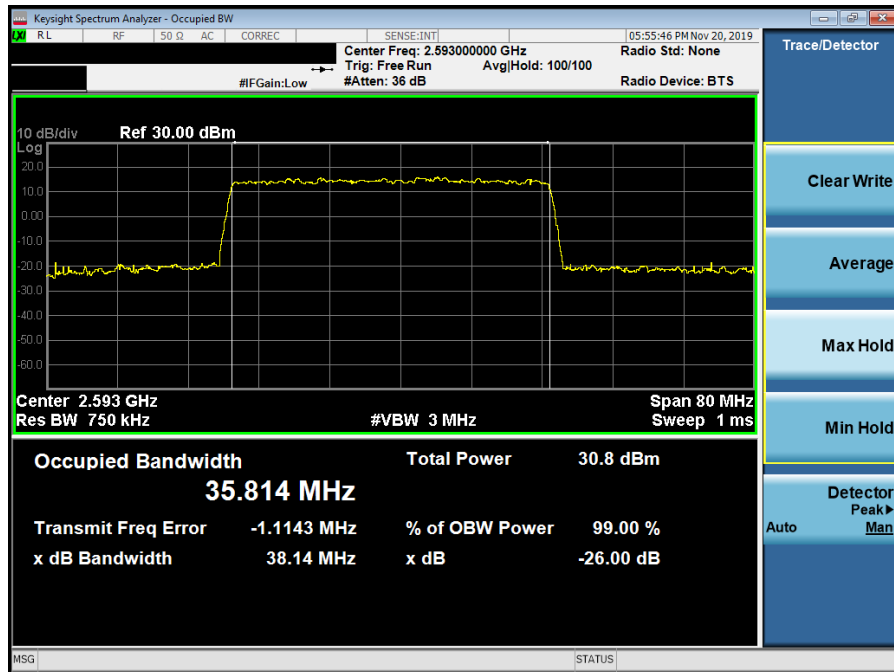


Plot 7-5. Occupied Bandwidth Plot (n41 40MHz QPSK - Full RB Configuration)

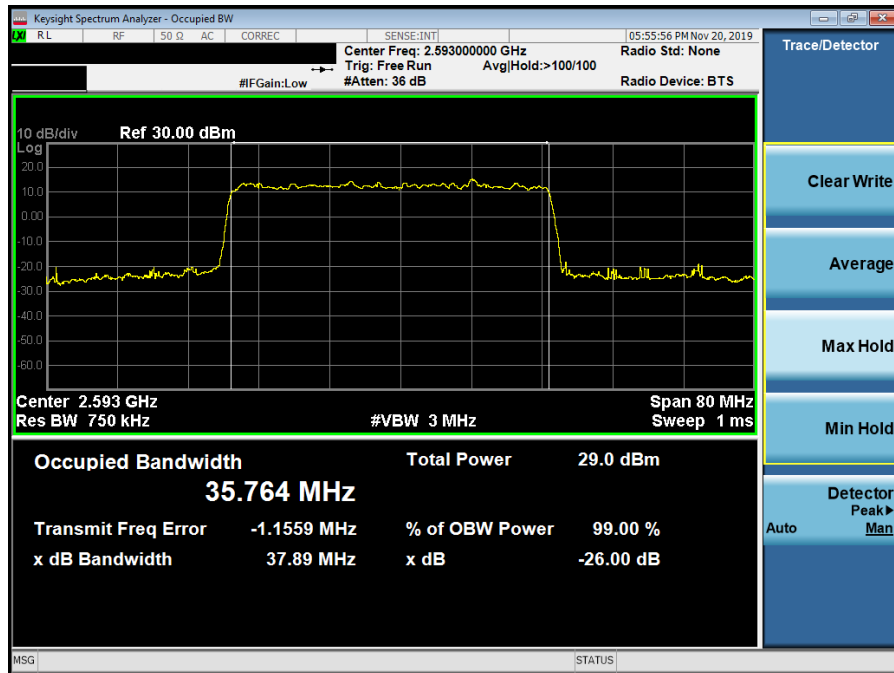


Plot 7-6. Occupied Bandwidth Plot (n41 40MHz 16QAM - Full RB Configuration)

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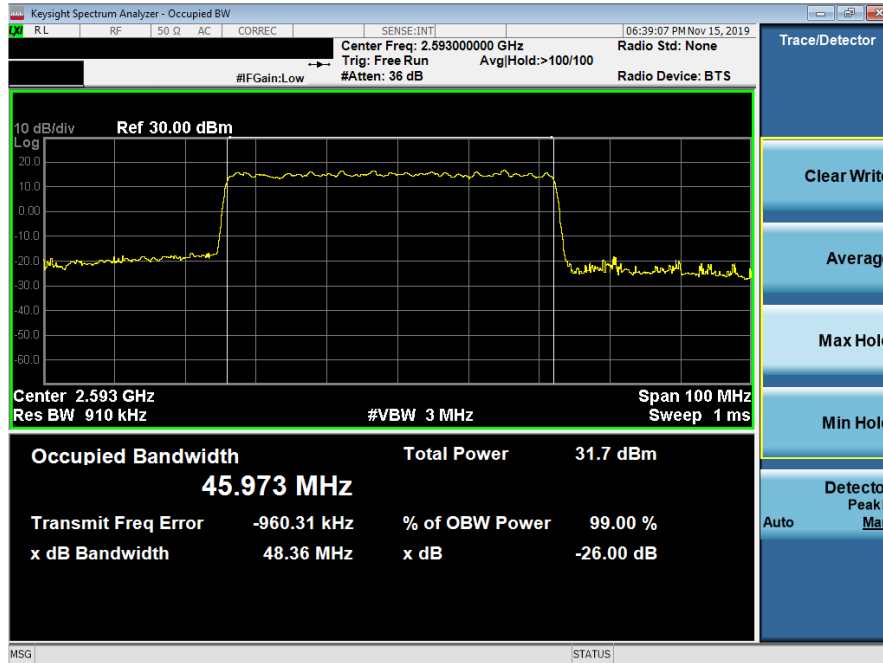


Plot 7-7. Occupied Bandwidth Plot (n41 40MHz 64QAM- Full RB Configuration)

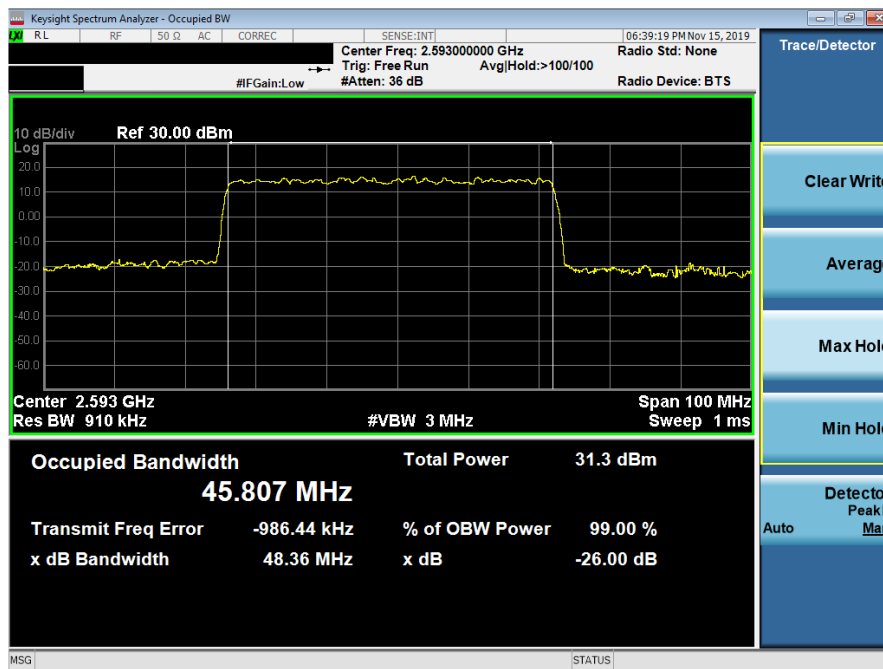


Plot 7-8. Occupied Bandwidth Plot (n41 40MHz 256QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 17 of 54

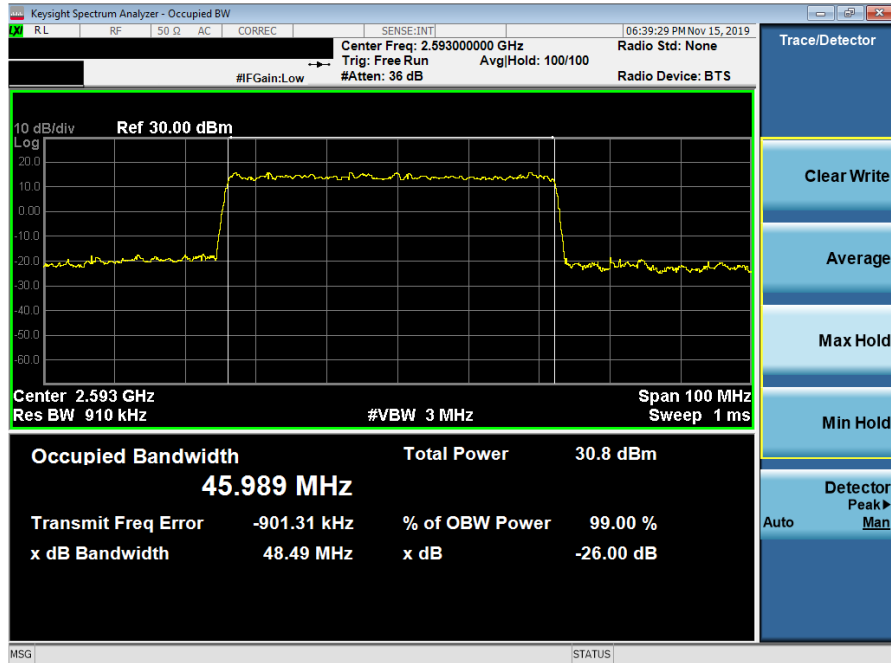


Plot 7-9. Occupied Bandwidth Plot (n41 50MHz QPSK - Full RB Configuration)

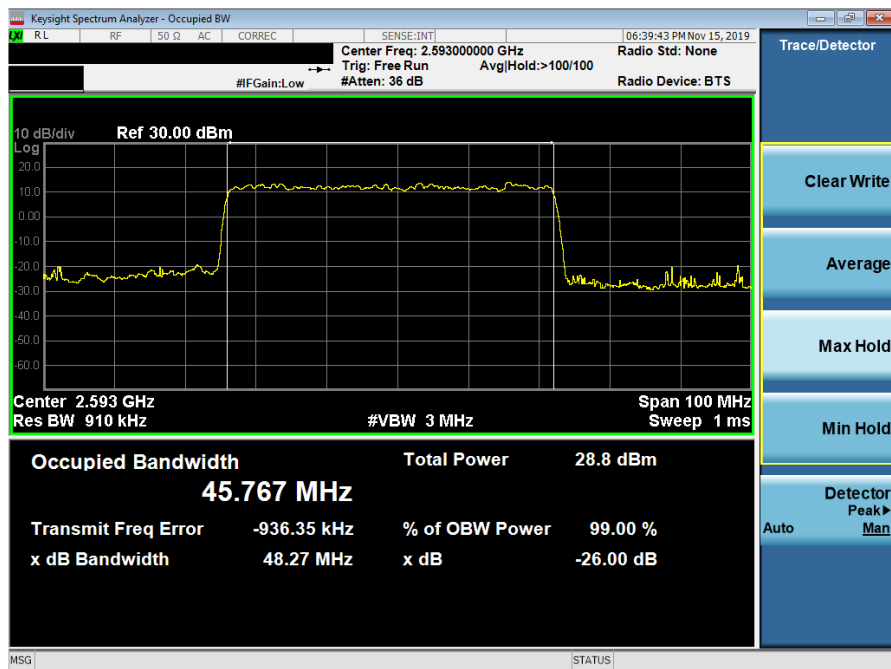


Plot 7-10. Occupied Bandwidth Plot (n41 50MHz 16QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 18 of 54

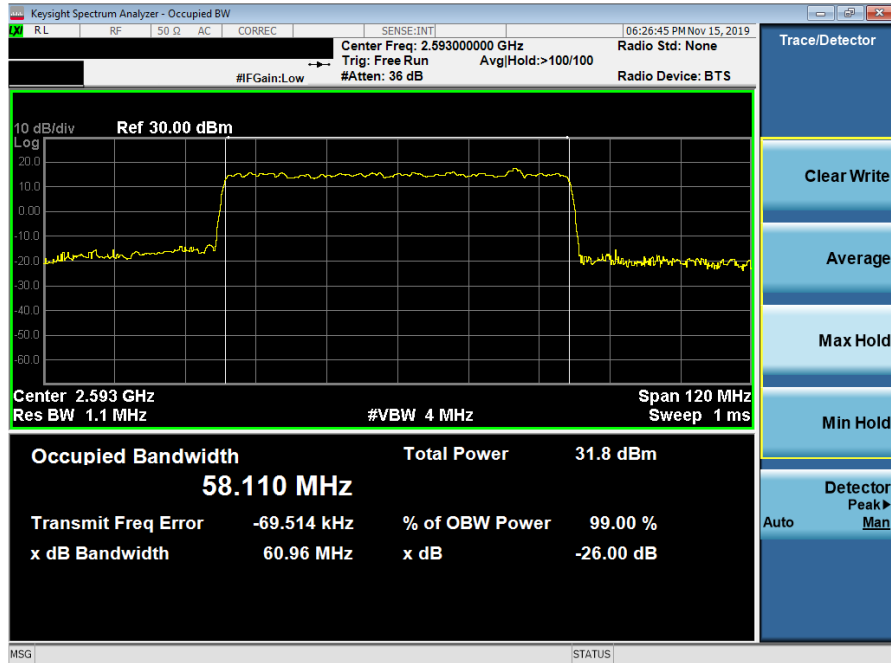


Plot 7-11. Occupied Bandwidth Plot (n41 50MHz 64QAM- Full RB Configuration)

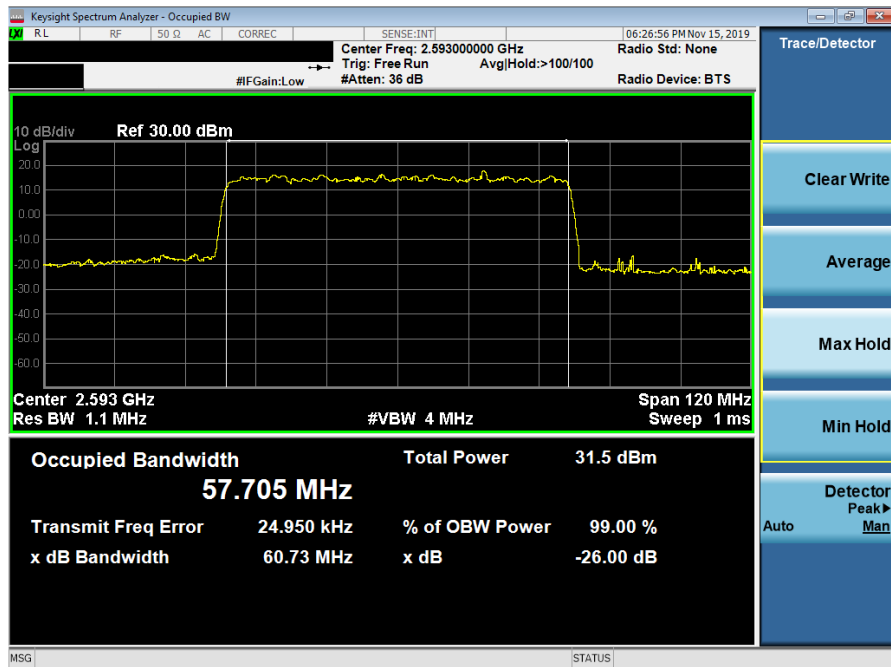


Plot 7-12. Occupied Bandwidth Plot (n41 50MHz 256QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 19 of 54

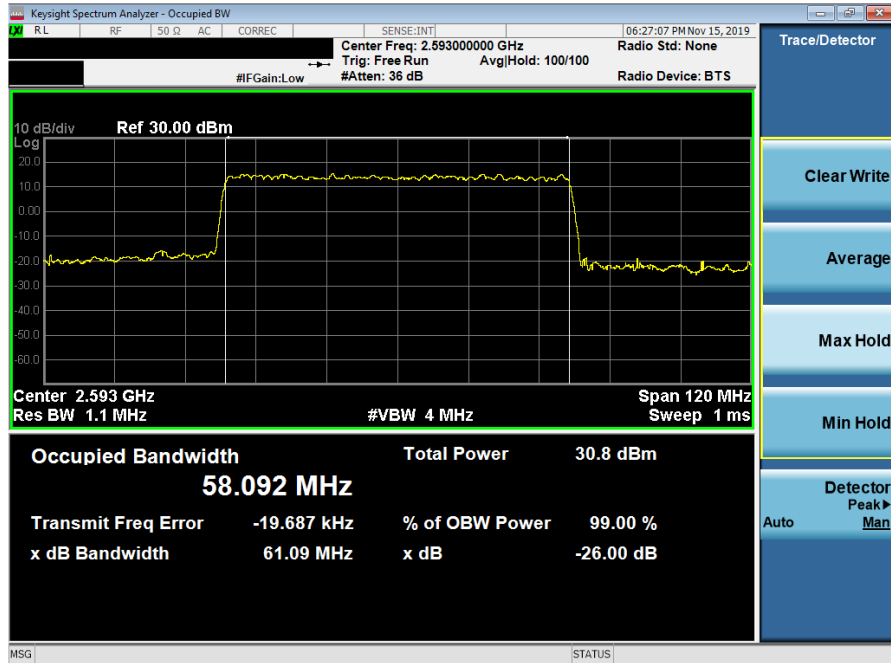


Plot 7-13. Occupied Bandwidth Plot (n41 60MHz QPSK - Full RB Configuration)

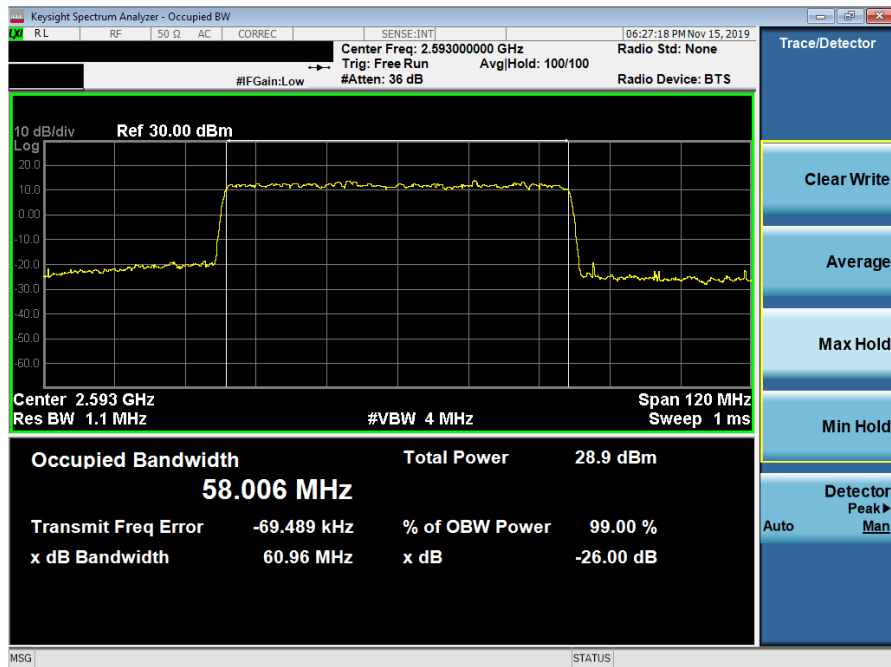


Plot 7-14. Occupied Bandwidth Plot (n41 60MHz 16QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 20 of 54

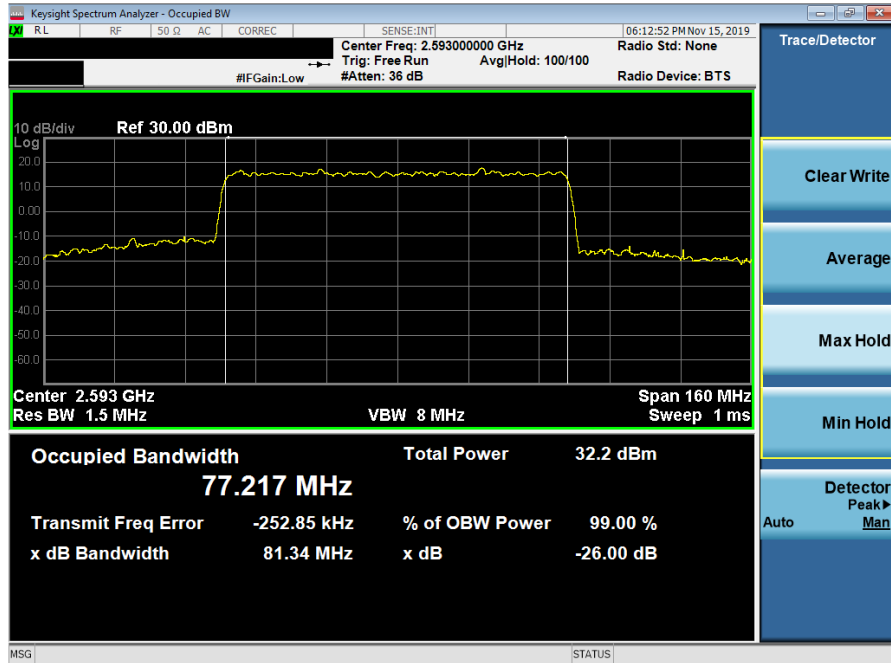


Plot 7-15. Occupied Bandwidth Plot (n41 60MHz 64QAM- Full RB Configuration)

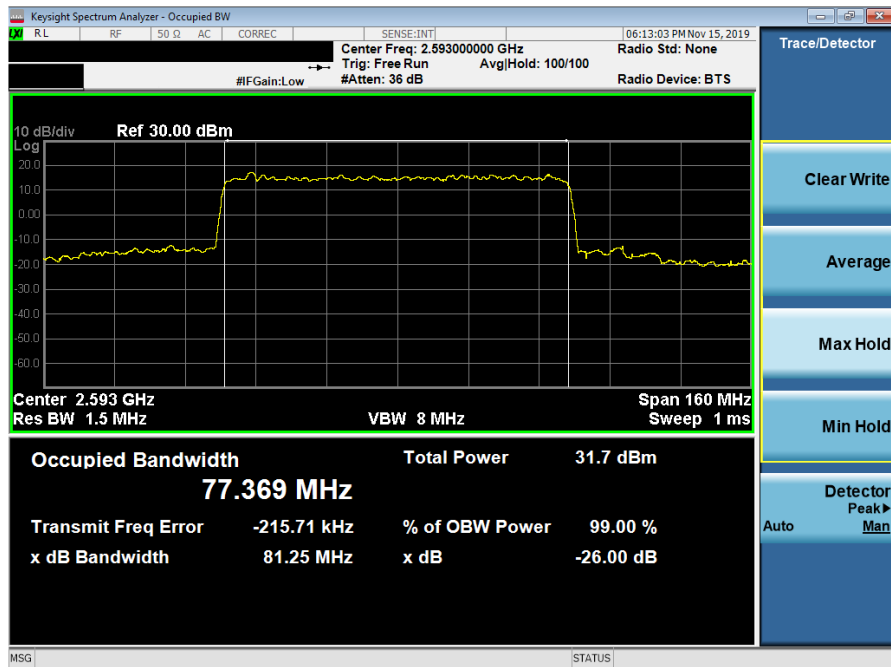


Plot 7-16. Occupied Bandwidth Plot (n41 60MHz 256QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 21 of 54

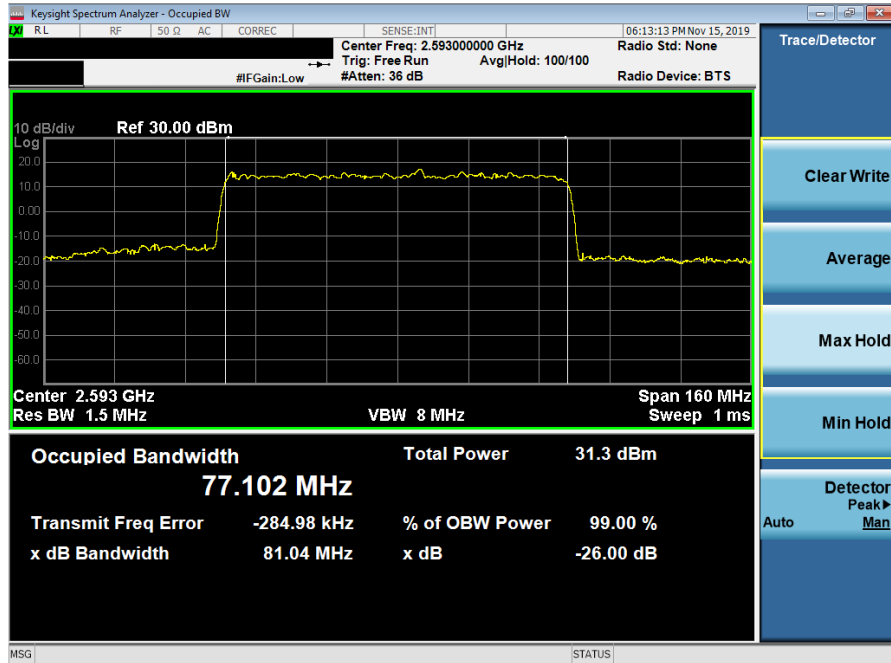


Plot 7-17. Occupied Bandwidth Plot (n41 80MHz QPSK - Full RB Configuration)

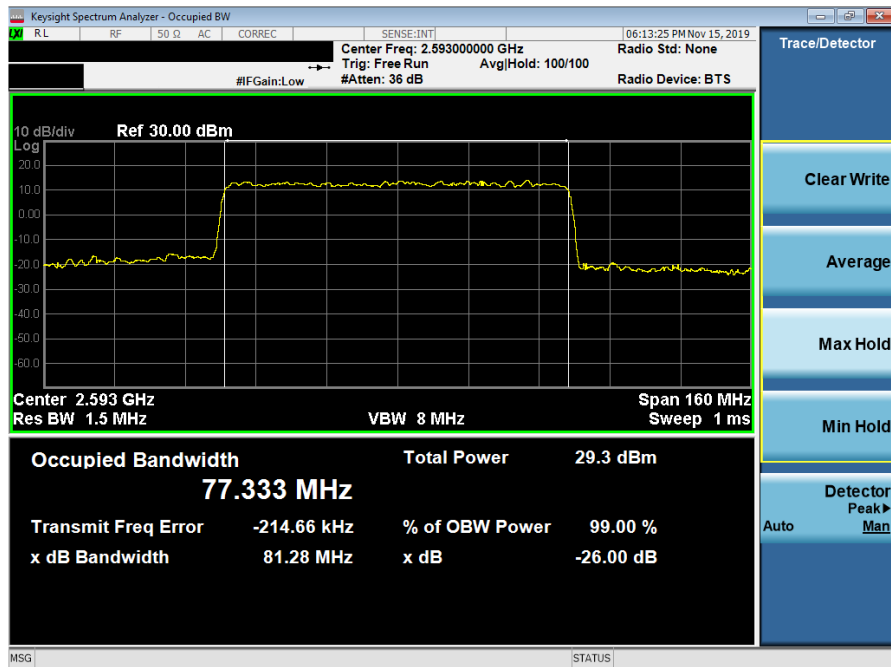


Plot 7-18. Occupied Bandwidth Plot (n41 80MHz 16QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 22 of 54

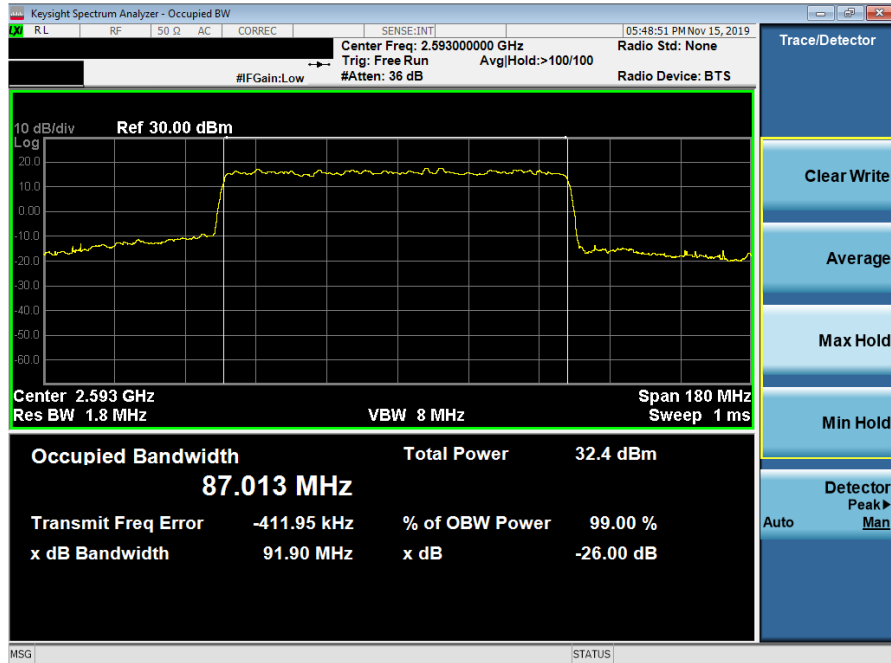


Plot 7-19. Occupied Bandwidth Plot (n41 80MHz 64QAM- Full RB Configuration)

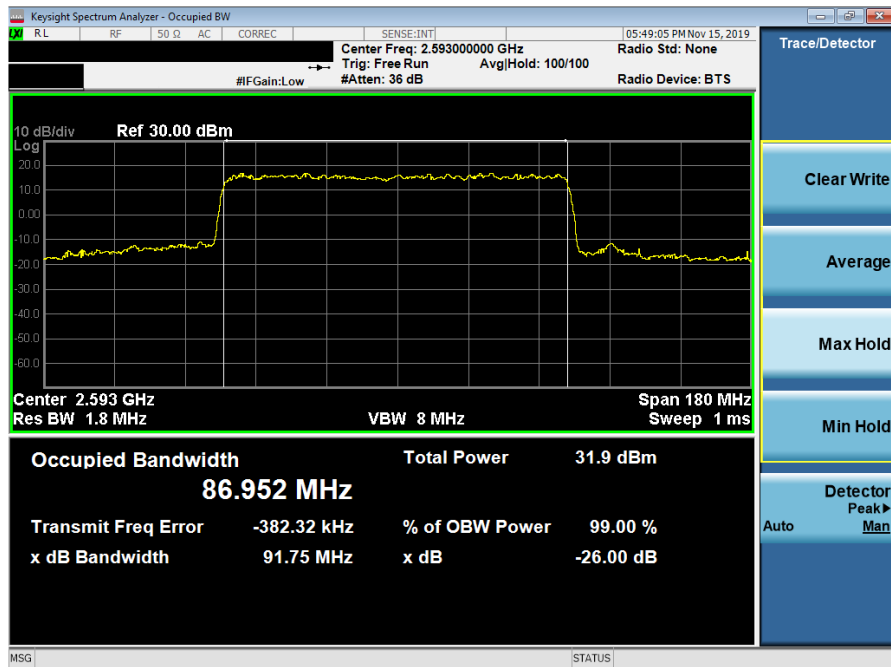


Plot 7-20. Occupied Bandwidth Plot (n41 80MHz 256QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 23 of 54

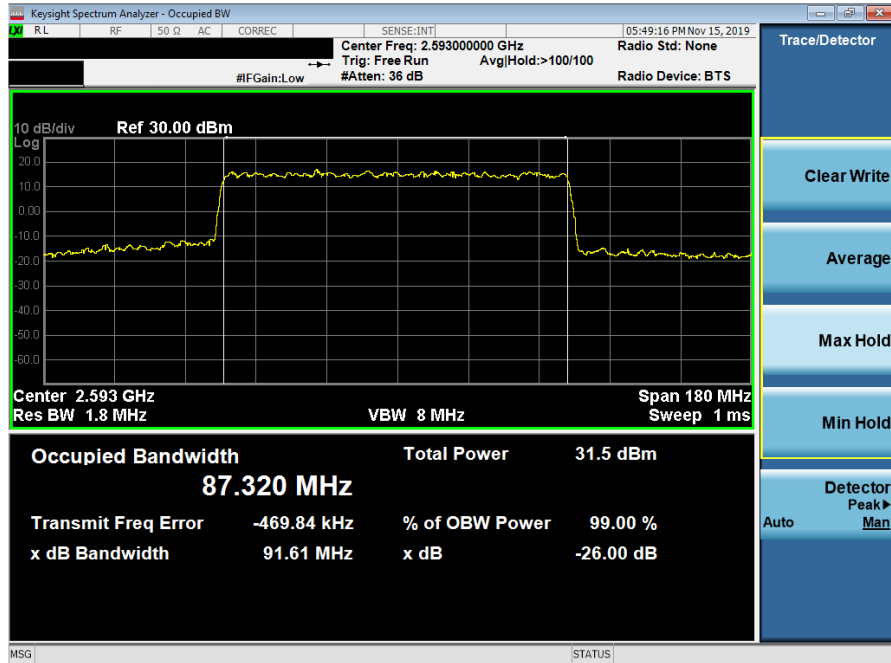


Plot 7-21. Occupied Bandwidth Plot (n41 90MHz QPSK - Full RB Configuration)

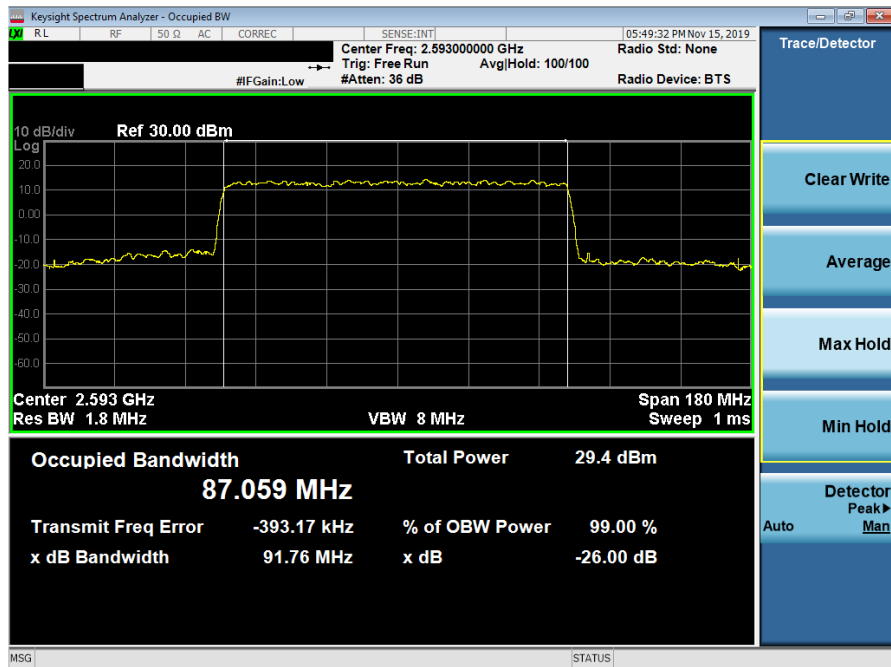


Plot 7-22. Occupied Bandwidth Plot (n41 90MHz 16QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 24 of 54

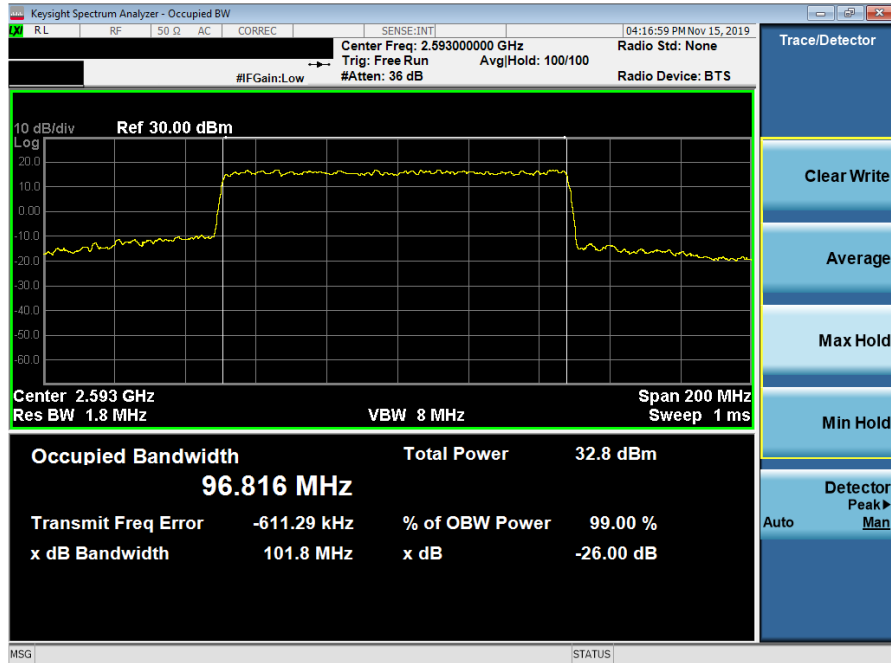


Plot 7-23. Occupied Bandwidth Plot (n41 90MHz 64QAM- Full RB Configuration)

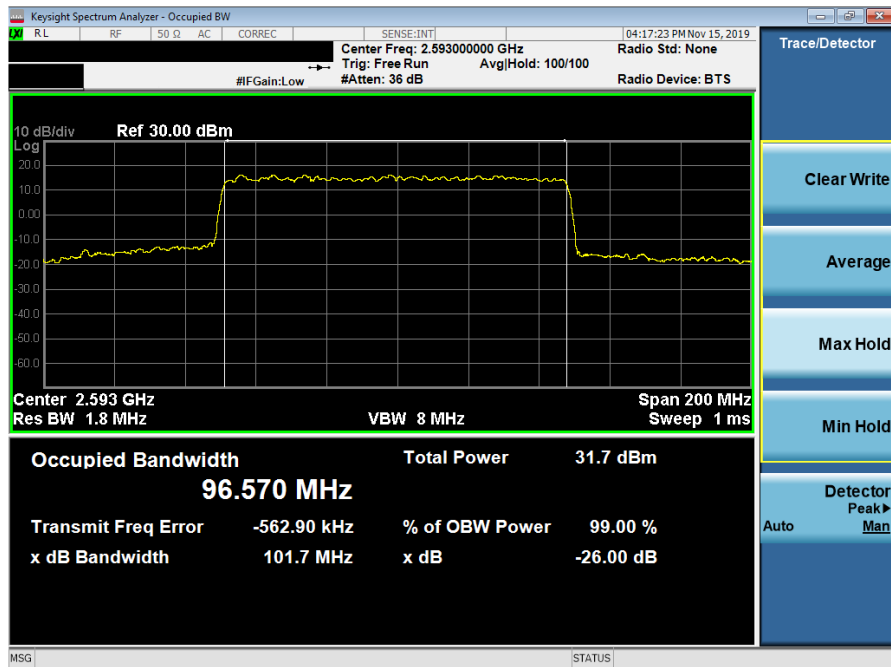


Plot 7-24. Occupied Bandwidth Plot (n41 90MHz 256QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 25 of 54

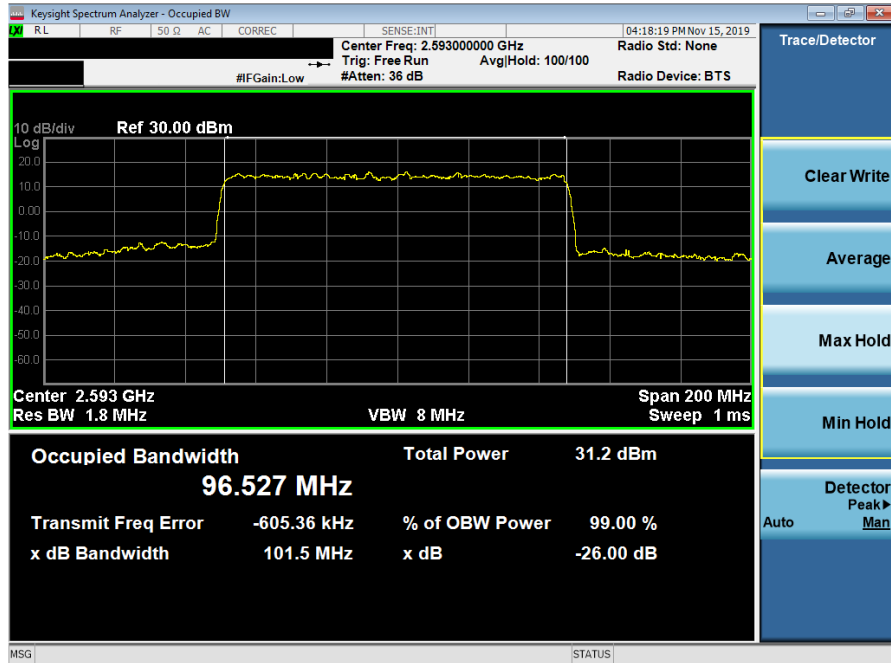


Plot 7-25. Occupied Bandwidth Plot (n41 100MHz QPSK - Full RB Configuration)

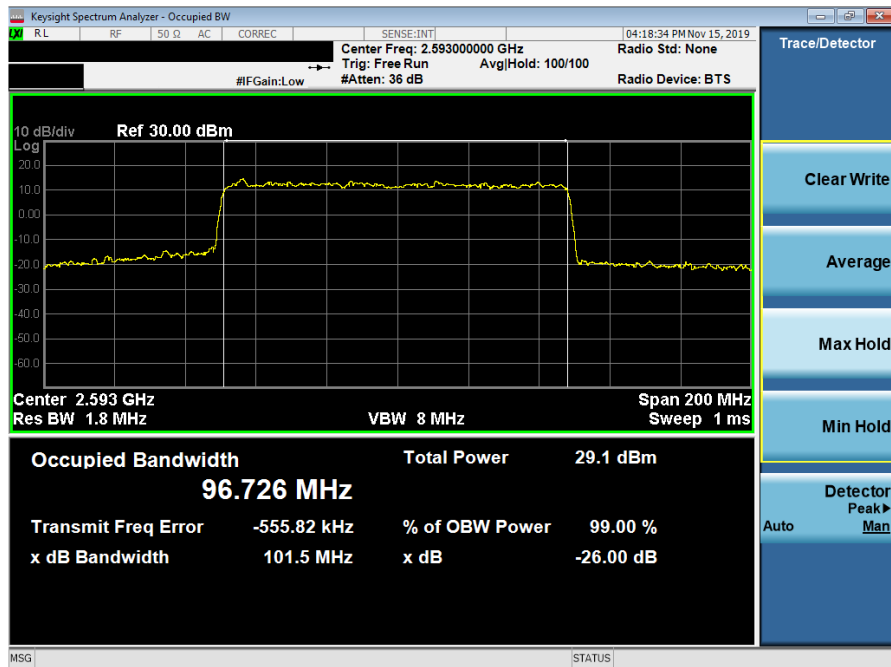


Plot 7-26. Occupied Bandwidth Plot (n41 100MHz 16QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 26 of 54



Plot 7-27. Occupied Bandwidth Plot (n41 100MHz 64QAM- Full RB Configuration)



Plot 7-28. Occupied Bandwidth Plot (n41 100MHz 256QAM - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 27 of 54

7.3 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

For Band n41, the minimum permissible attenuation level of any spurious emission is $55 + 10 \log_{10}(P_{\text{Watts}})$.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

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

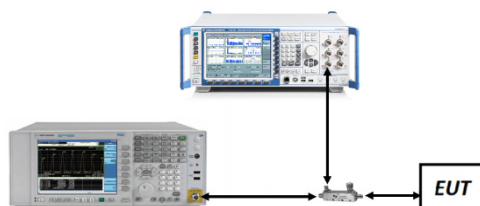


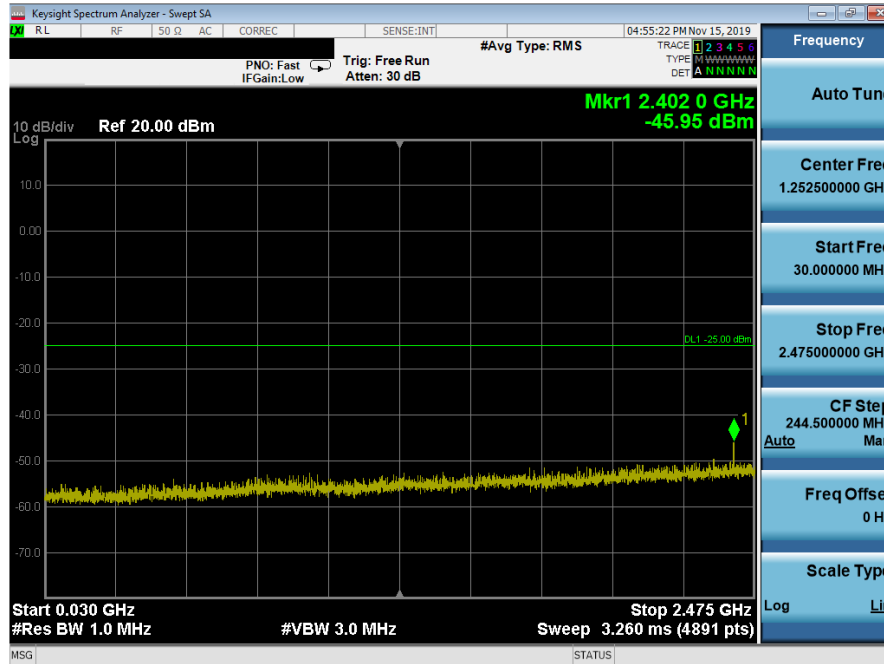
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

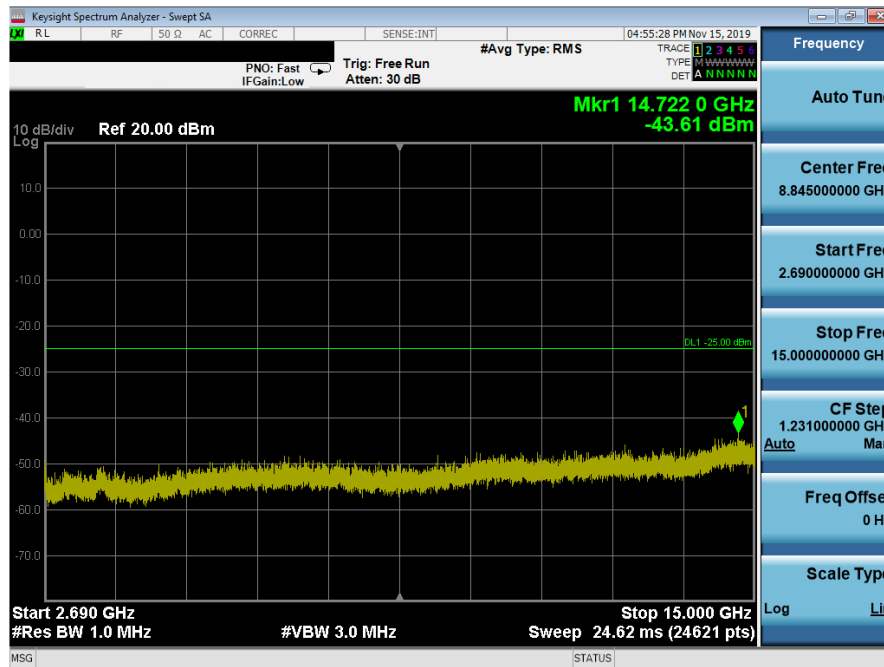
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 28 of 54

Band n41

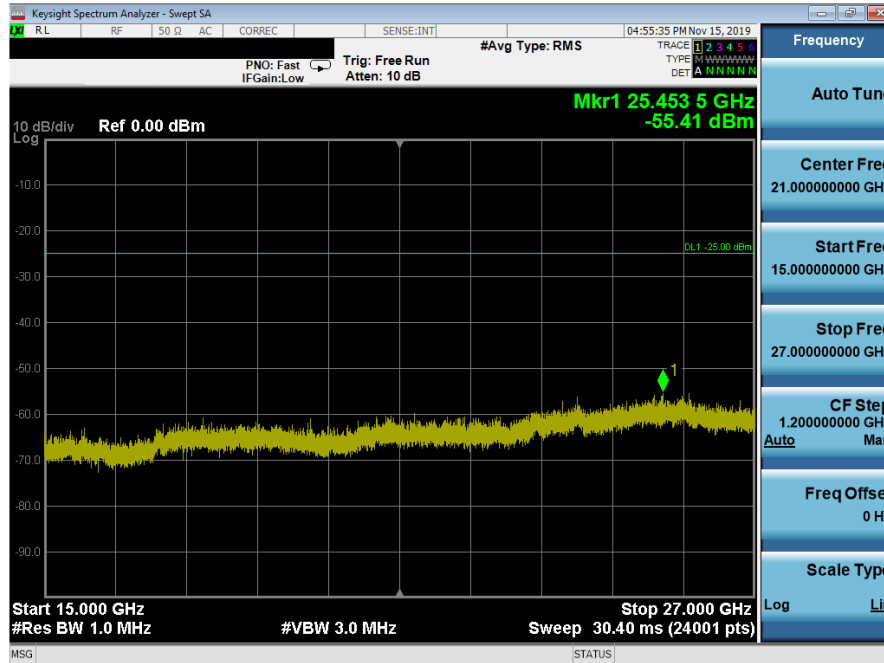


Plot 7-29. Conducted Spurious Plot (n41 - 100MHz DFT-QPSK - RB Size 1, RB Offset 0 - Low Channel)

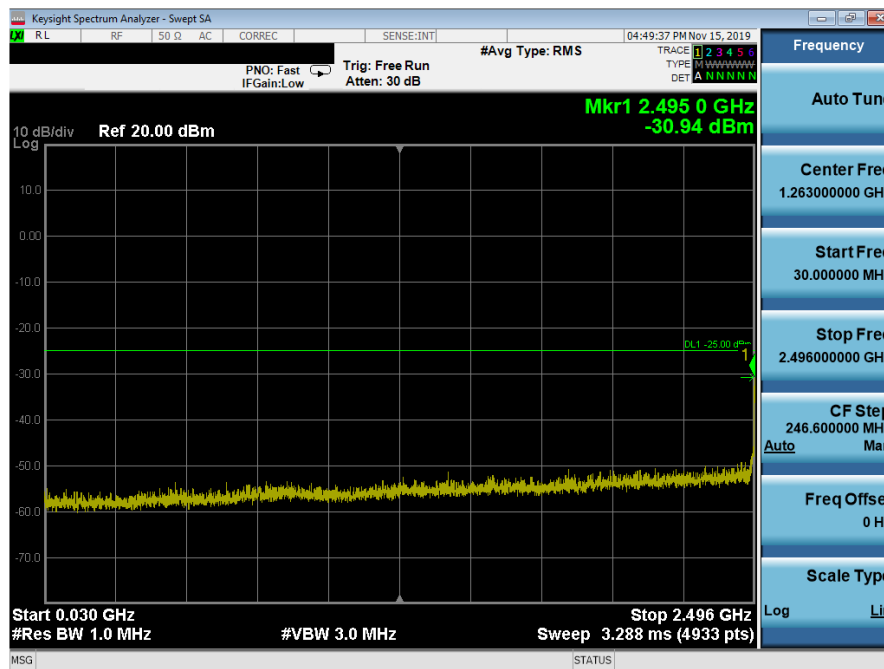


Plot 7-30. Conducted Spurious Plot (n41 - 100MHz DFT-QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 29 of 54

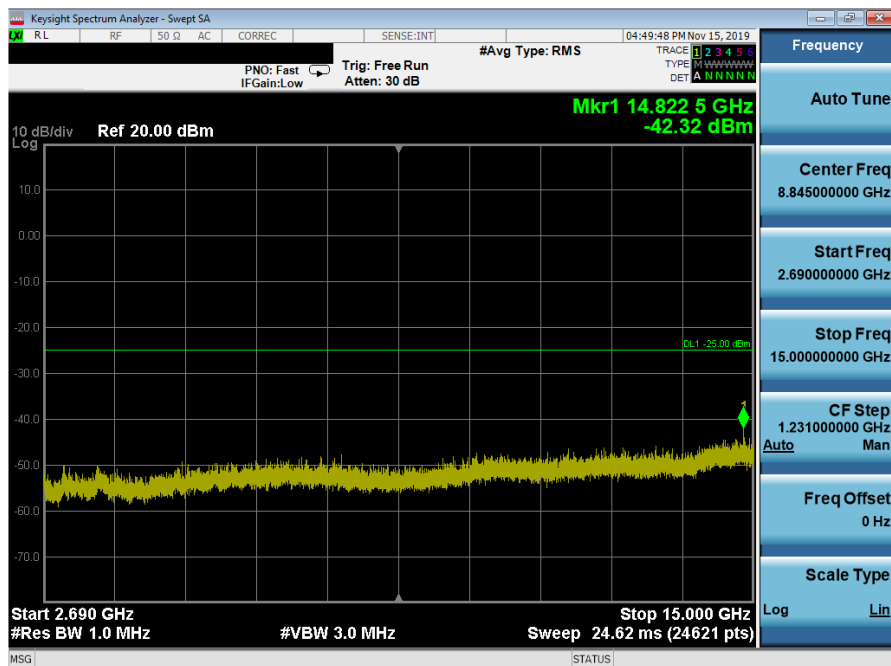


Plot 7-31. Conducted Spurious Plot (n41 - 100MHz DFT-QPSK - RB Size 1, RB Offset 0 - Low Channel)

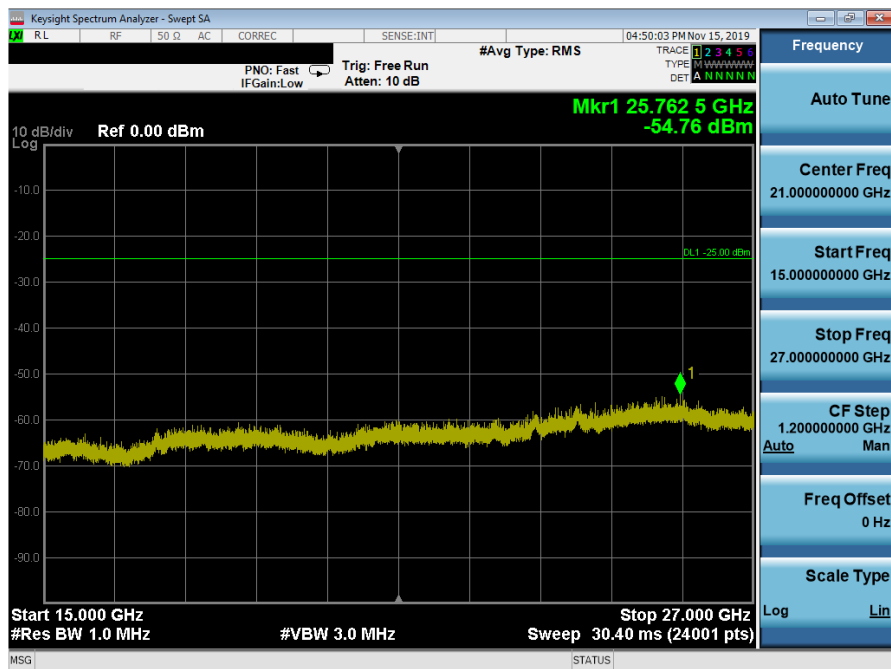


Plot 7-32. Conducted Spurious Plot (n41 - 100MHz DFT-QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 30 of 54

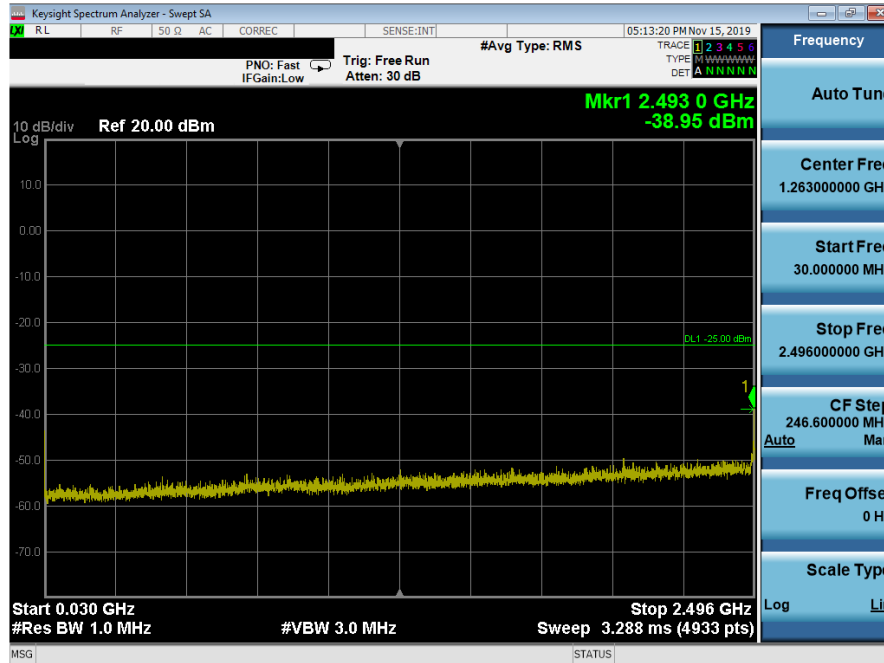


Plot 7-33. Conducted Spurious Plot (n41 - 100MHz DFT-QPSK - RB Size 1, RB Offset 0 - Mid Channel)

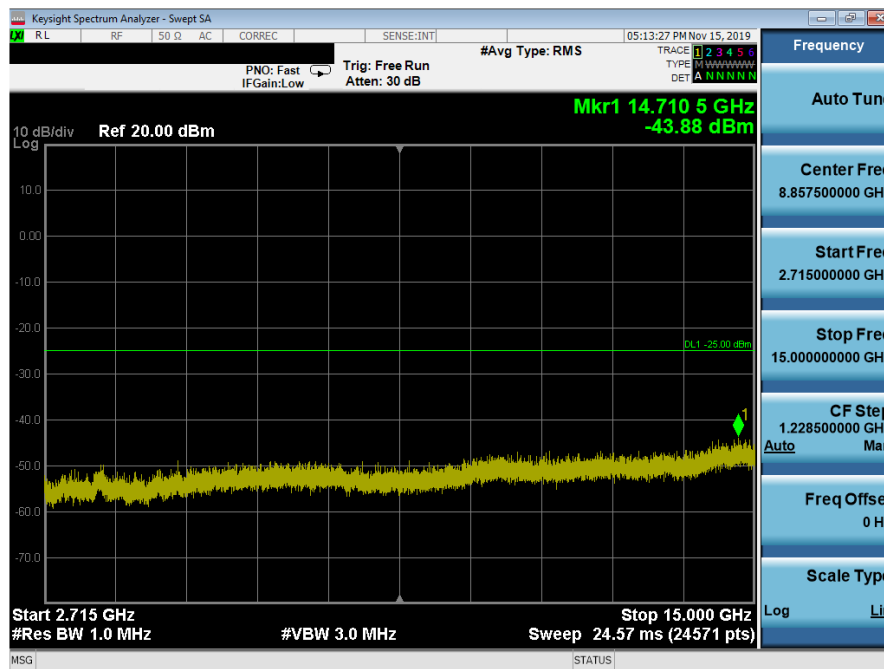


Plot 7-34. Conducted Spurious Plot (n41 - 100MHz DFT-QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMN976U	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset	Page 31 of 54	

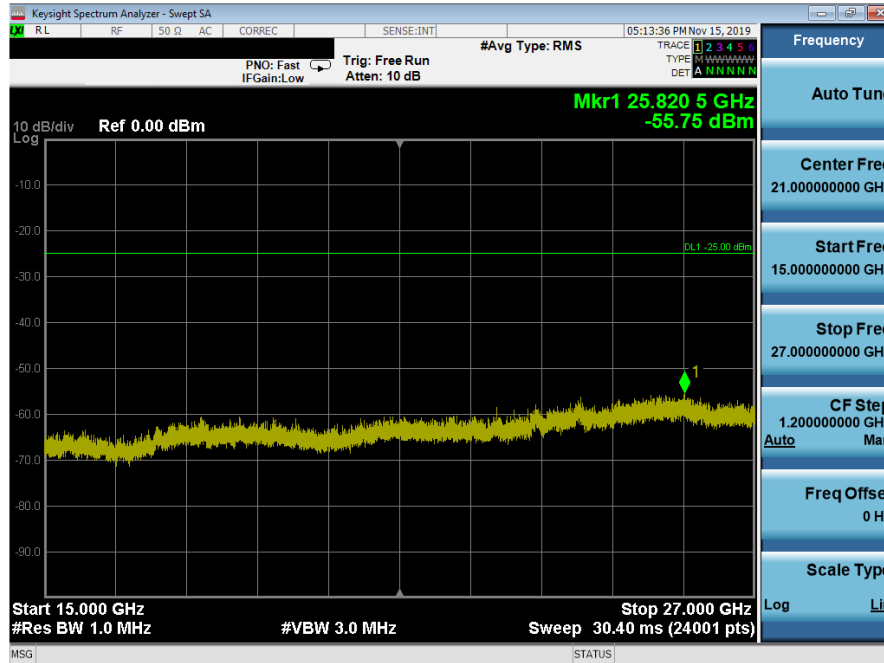


Plot 7-35. Conducted Spurious Plot (n41 - 100MHz DFT-QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-36. Conducted Spurious Plot (n41 - 100MHz DFT-QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 32 of 54



Plot 7-37. Conducted Spurious Plot (n41 - 100MHz DFT-QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 33 of 54

7.4 Band Edge Emissions at Antenna Terminal

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level for Band n41 is as noted in the Test Notes on the following page.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

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 $\geq$ 1% of the emission bandwidth
4. VBW $\geq$ 3 x RBW
5. Detector = RMS
6. Number of sweep points $\geq$ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

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

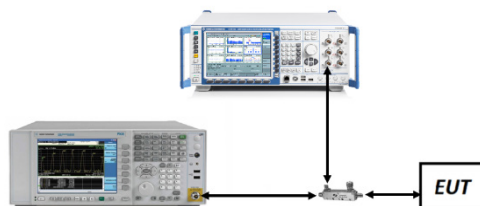


Figure 7-3. Test Instrument & Measurement Setup

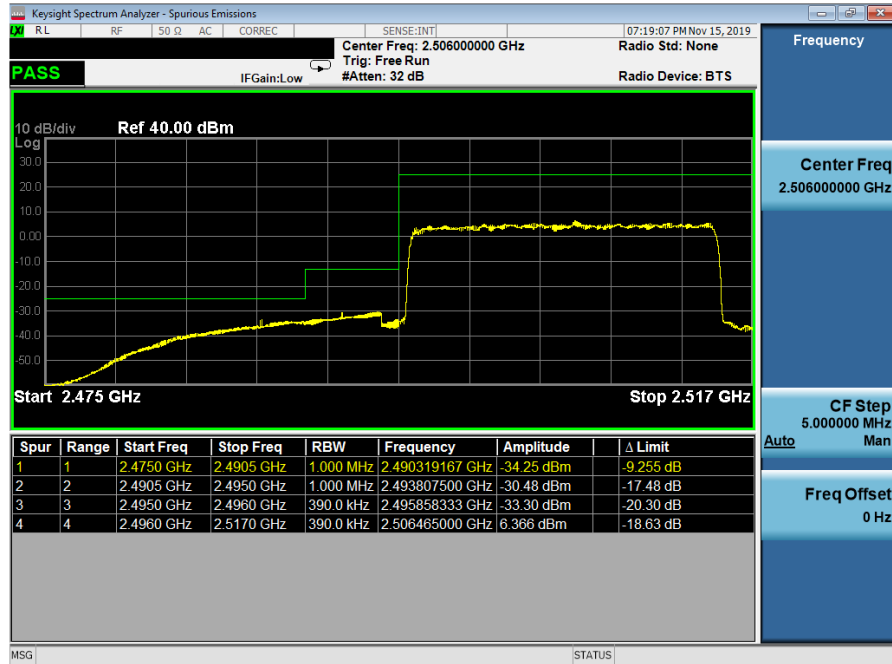
FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 34 of 54

Test Notes

Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz.

FCC ID: A3LSMN976U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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Band n41

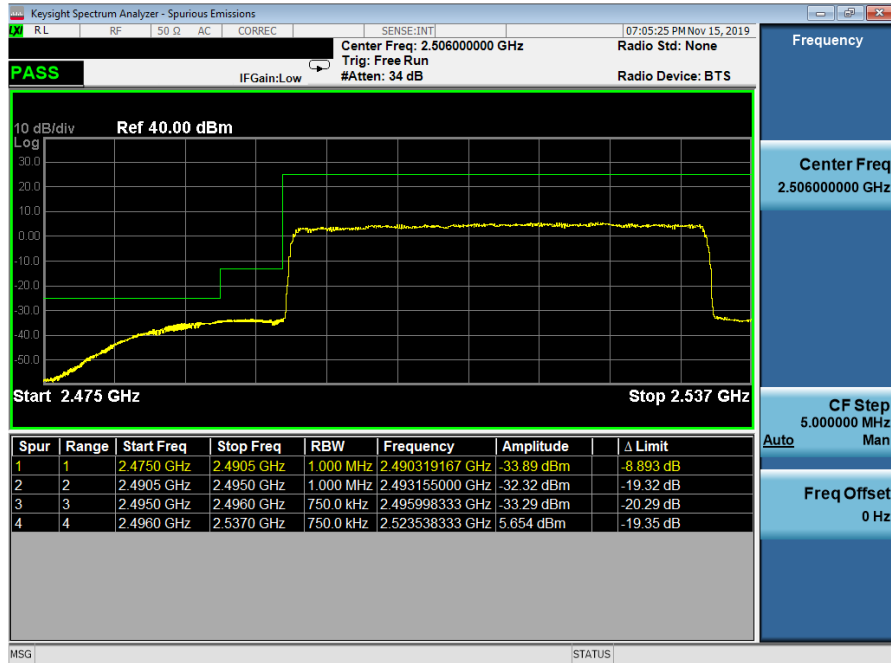


Plot 7-38. Lower ACP Plot at 2496 MHz (n41 - 20MHz DFT-QPSK - Full RB Configuration)



Plot 7-39. Upper ACP Plot (n41 - 20MHz DFT-QPSK - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 36 of 54

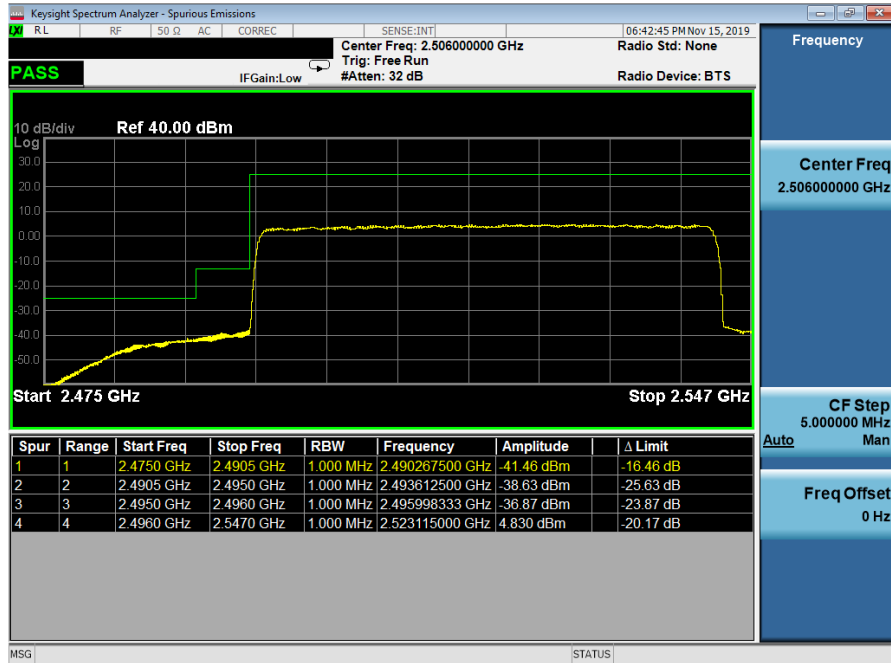


Plot 7-40. Lower ACP Plot at 2496 MHz (n41 - 40MHz DFT-QPSK - Full RB Configuration)



Plot 7-41. Upper ACP Plot (n41 - 40MHz DFT-QPSK - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 37 of 54

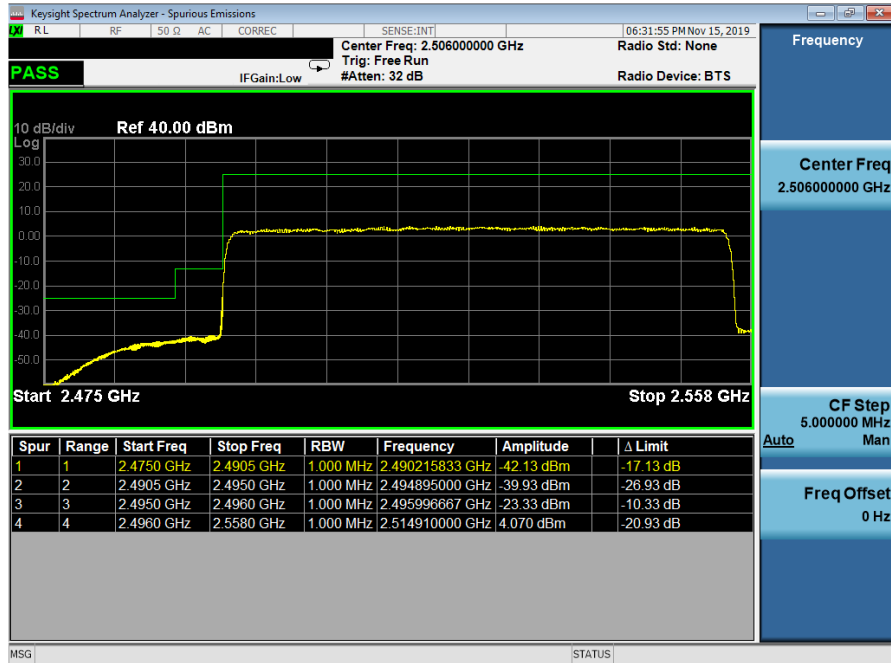


Plot 7-42. Lower ACP Plot at 2496 MHz (n41 - 50MHz DFT-QPSK - Full RB Configuration)



Plot 7-43. Upper ACP Plot (n41 - 50MHz DFT-QPSK - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 38 of 54

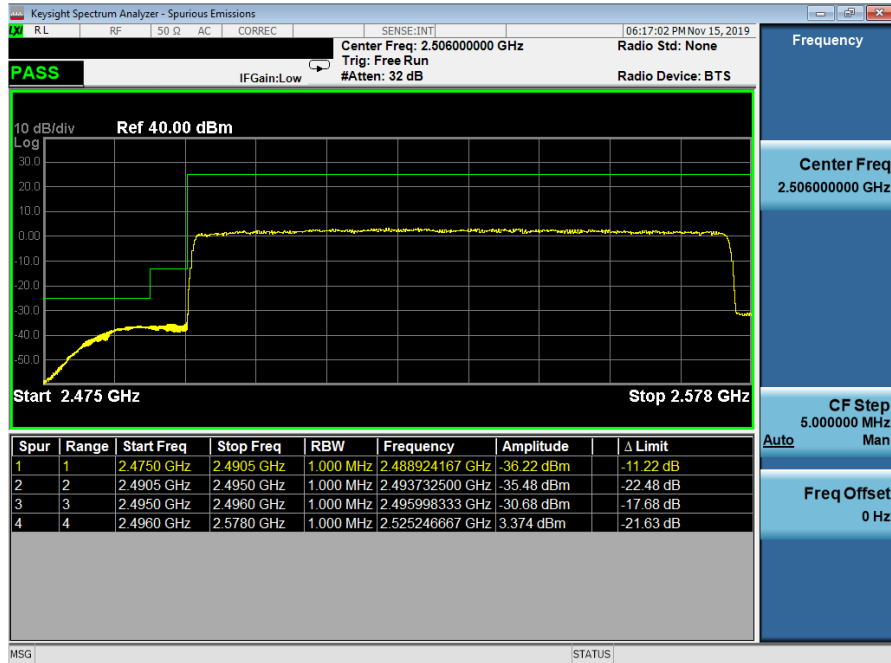


Plot 7-44. Lower ACP Plot at 2496 MHz (n41 - 60MHz DFT-QPSK - Full RB Configuration)



Plot 7-45. Upper ACP Plot (n41 - 60MHz DFT-QPSK - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 39 of 54

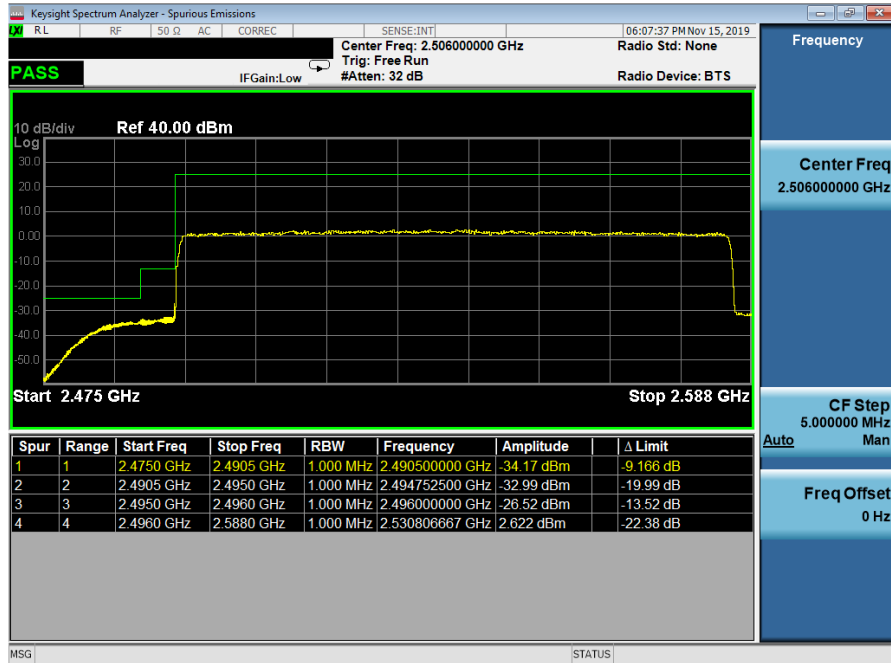


Plot 7-46. Lower ACP Plot at 2496 MHz (n41 - 80MHz DFT-QPSK - Full RB Configuration)



Plot 7-47. Upper ACP Plot (n41 - 80MHz DFT-QPSK - Full RB Configuration)

FCC ID: A3LSMN976U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 40 of 54

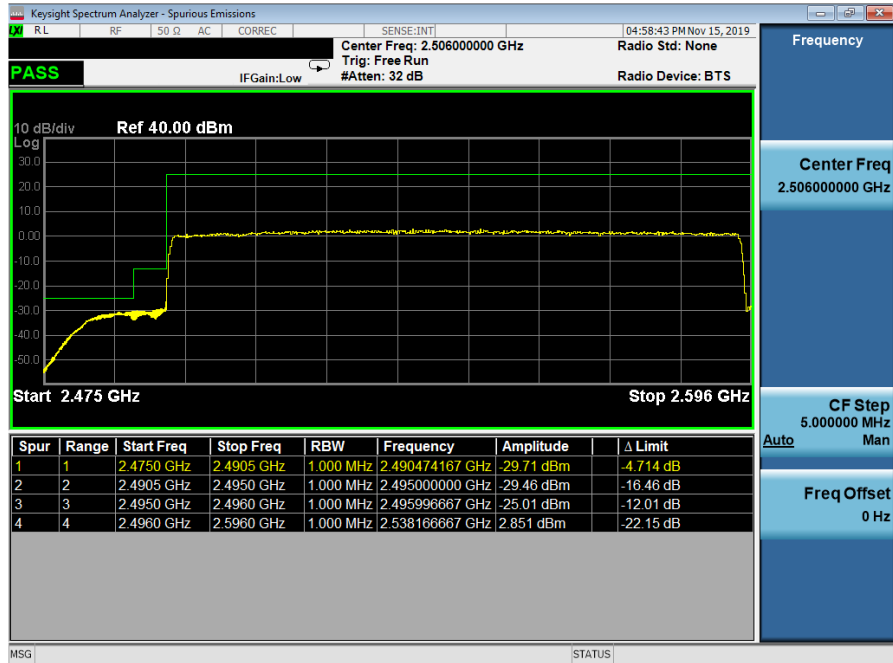


Plot 7-48. Lower ACP Plot at 2496 MHz (n41 - 90MHz DFT-QPSK - Full RB Configuration)



Plot 7-49. Upper ACP Plot (n41 - 90MHz DFT-QPSK - Full RB Configuration)

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Plot 7-50. Lower ACP Plot at 2496 MHz (n41 - 100MHz DFT-QPSK - Full RB Configuration)



Plot 7-51. Upper ACP Plot (n41 - 100MHz DFT-QPSK - Full RB Configuration)

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7.5 Radiated Power (EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW $\geq 3 \times$ RBW
4. Span = 1.5 times the OBW
5. No. of sweep points $\geq 2 \times$ span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

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Test Setup

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

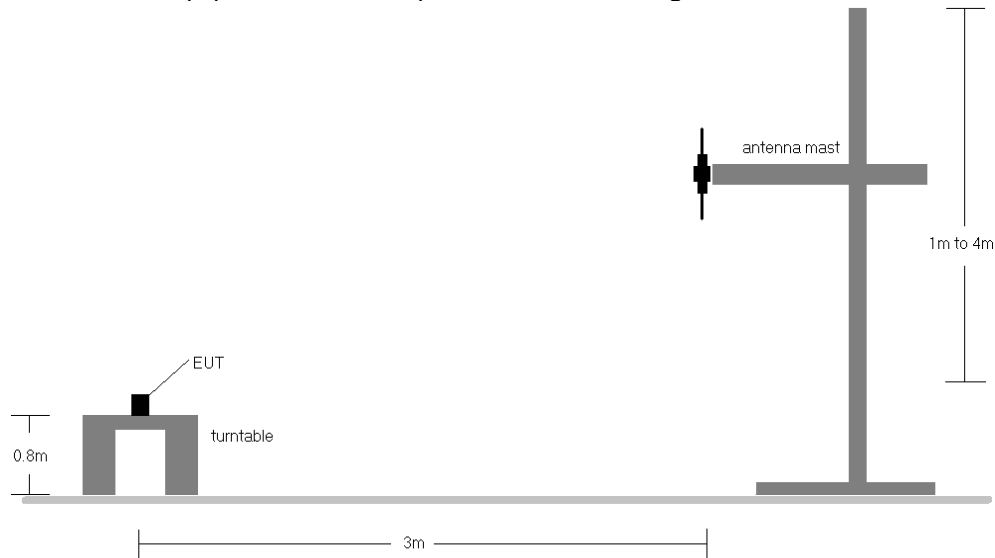


Figure 7-4. Radiated Test Setup <1GHz

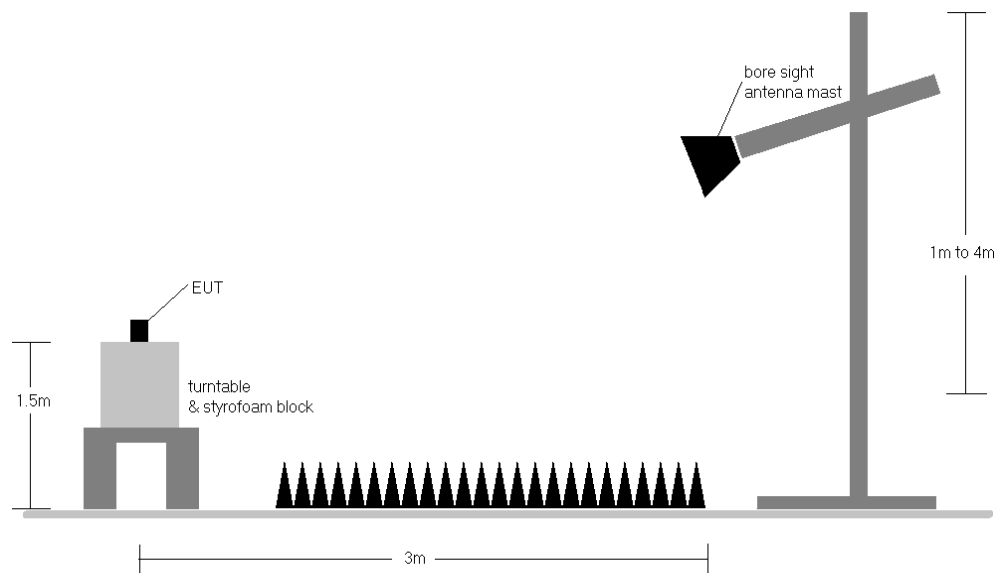


Figure 7-5. Radiated Test Setup >1GHz

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.

FCC ID: A3LSMN976U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2506.02	20	QPSK	H	125	324	1 / 24	13.93	9.42	23.35	0.217	33.01	-9.66
2593.20	20	QPSK	H	110	316	1 / 24	11.25	9.55	20.80	0.120	33.01	-12.21
2679.99	20	QPSK	H	166	315	12 / 6	10.26	9.83	20.09	0.102	33.01	-12.92
2506.02	20	16-QAM	H	125	324	1 / 24	13.36	9.42	22.78	0.190	33.01	-10.23
2506.02	20	64-QAM	H	125	324	1 / 24	12.26	9.42	21.68	0.147	33.01	-11.33
2506.02	20	256-QAM	H	125	324	1 / 24	9.92	9.42	19.34	0.086	33.01	-13.67
2516.01	40	QPSK	H	122	316	25 / 12	14.33	9.41	23.74	0.237	33.01	-9.27
2593.20	40	QPSK	H	114	312	1 / 49	11.75	9.55	21.30	0.135	33.01	-11.71
2670.00	40	QPSK	H	157	316	1 / 49	10.65	9.86	20.51	0.112	33.01	-12.50
2516.01	40	16-QAM	H	122	316	25 / 12	13.76	9.41	23.17	0.208	33.01	-9.84
2516.01	40	64-QAM	H	122	316	25 / 12	12.66	9.41	22.07	0.161	33.01	-10.94
2516.01	40	256-QAM	H	122	316	25 / 12	10.32	9.41	19.73	0.094	33.01	-13.28
2521.02	50	QPSK	H	122	321	1 / 74	13.91	9.41	23.32	0.215	33.01	-9.69
2593.02	50	QPSK	H	110	315	36 / 18	11.32	9.55	20.87	0.122	33.01	-12.14
2664.99	50	QPSK	H	145	310	36 / 18	10.46	9.87	20.33	0.108	33.01	-12.68
2521.02	50	16-QAM	H	122	321	1 / 74	13.34	9.41	22.75	0.188	33.01	-10.26
2521.02	50	64-QAM	H	122	321	1 / 74	12.24	9.41	21.65	0.146	33.01	-11.36
2521.02	50	256-QAM	H	122	321	1 / 74	9.90	9.41	19.31	0.085	33.01	-13.70
2526.00	60	QPSK	H	121	320	50 / 25	13.69	9.40	23.09	0.204	33.01	-9.92
2593.02	60	QPSK	H	107	320	50 / 25	11.34	9.55	20.89	0.123	33.01	-12.12
2659.98	60	QPSK	H	147	313	50 / 25	10.30	9.88	20.18	0.104	33.01	-12.83
2526.00	60	16-QAM	H	121	320	50 / 25	13.12	9.40	22.52	0.179	33.01	-10.49
2526.00	60	64-QAM	H	121	320	50 / 25	12.02	9.40	21.42	0.139	33.01	-11.59
2526.00	60	256-QAM	H	121	320	50 / 25	9.68	9.40	19.08	0.081	33.01	-13.93
2536.02	80	QPSK	H	123	319	50 / 25	12.85	9.39	22.24	0.168	33.01	-10.77
2593.02	80	QPSK	H	115	318	1 / 0	12.60	9.55	22.15	0.164	33.01	-10.86
2649.99	80	QPSK	H	147	339	1 / 0	11.31	9.90	21.21	0.132	33.01	-11.80
2536.02	80	16-QAM	H	123	319	50 / 25	12.42	9.39	21.81	0.152	33.01	-11.20
2536.02	80	64-QAM	H	123	319	50 / 25	10.76	9.39	20.15	0.104	33.01	-12.86
2536.02	80	256-QAM	H	123	319	50 / 25	9.48	9.39	18.87	0.077	33.01	-14.14
2541.00	90	QPSK	H	112	321	1 / 0	13.15	9.39	22.54	0.179	33.01	-10.47
2593.02	90	QPSK	H	107	323	1 / 0	12.23	9.55	21.78	0.151	33.01	-11.23
2644.98	90	QPSK	H	109	320	1 / 0	11.37	9.87	21.24	0.133	33.01	-11.77
2541.00	90	16-QAM	H	112	321	1 / 0	12.43	9.39	21.82	0.152	33.01	-11.19
2541.00	90	64-QAM	H	112	321	1 / 0	11.89	9.39	21.28	0.134	33.01	-11.73
2541.00	90	256-QAM	H	112	321	1 / 0	10.00	9.39	19.39	0.087	33.01	-13.62
2546.01	100	QPSK	H	117	315	50 / 25	13.26	9.38	22.64	0.184	33.01	-10.37
2593.02	100	QPSK	H	111	316	1 / 0	12.44	9.55	21.99	0.158	33.01	-11.02
2640.00	100	QPSK	H	102	315	1 / 0	11.33	9.84	21.17	0.131	33.01	-11.84
2546.01	100	16-QAM	H	117	315	50 / 25	12.88	9.38	22.26	0.168	33.01	-10.75
2546.01	100	64-QAM	H	117	315	50 / 25	11.75	9.38	21.13	0.130	33.01	-11.88
2546.01	100	256-QAM	H	117	315	50 / 25	9.90	9.38	19.28	0.085	33.01	-13.73
2516.01	40	QPSK	V	126	37	25 / 12	12.52	9.38	21.90	0.155	33.01	-11.11
2516.01	40 (WCP)	QPSK	H	251	338	25 / 12	13.18	9.41	22.59	0.182	33.01	-10.42

Table 7-3. EIRP Data (n41)

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7.6 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

FCC ID: A3LSMN976U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 46 of 54

Test Setup

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

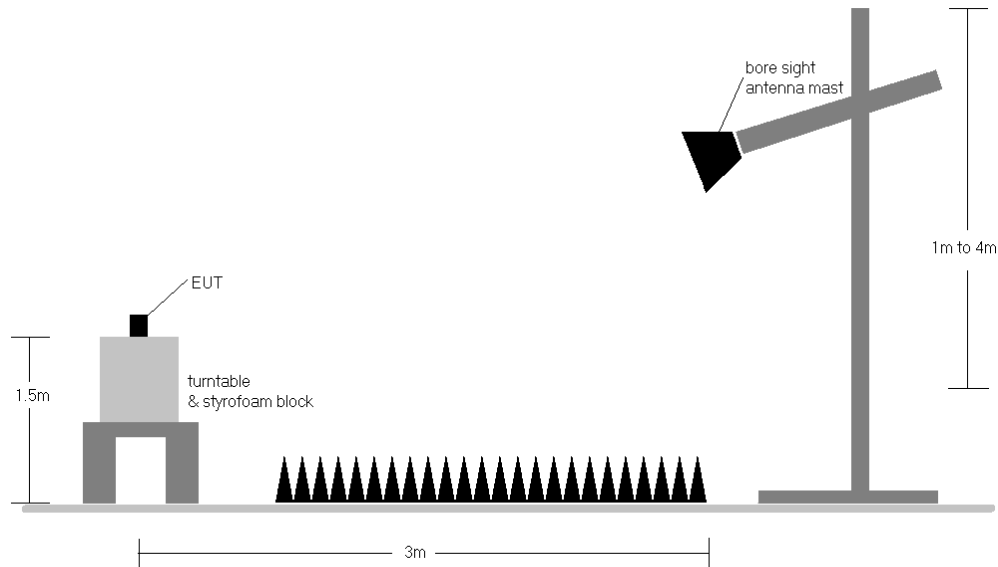


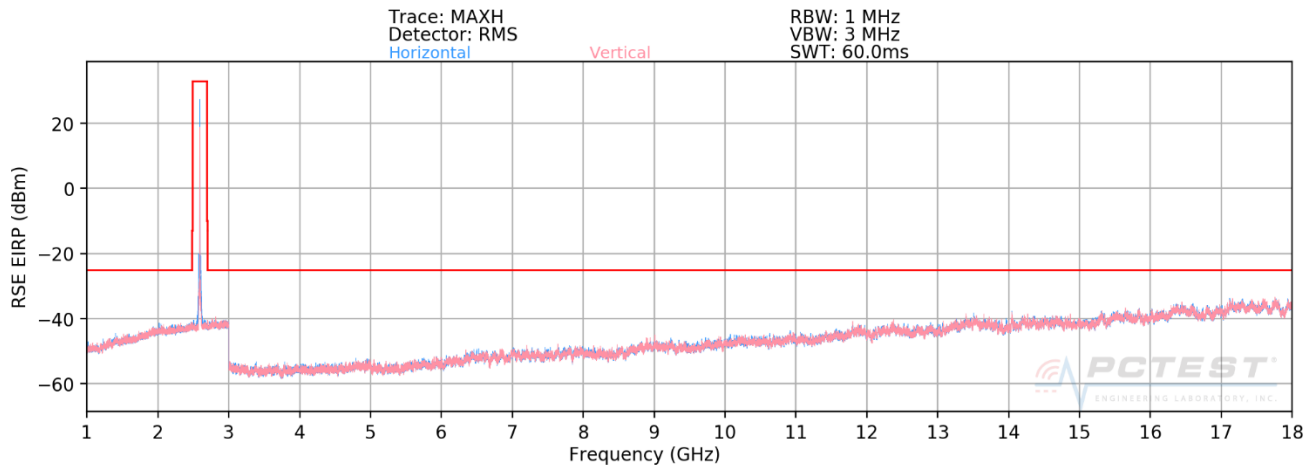
Figure 7-6. Test Instrument & Measurement Setup

Test Notes

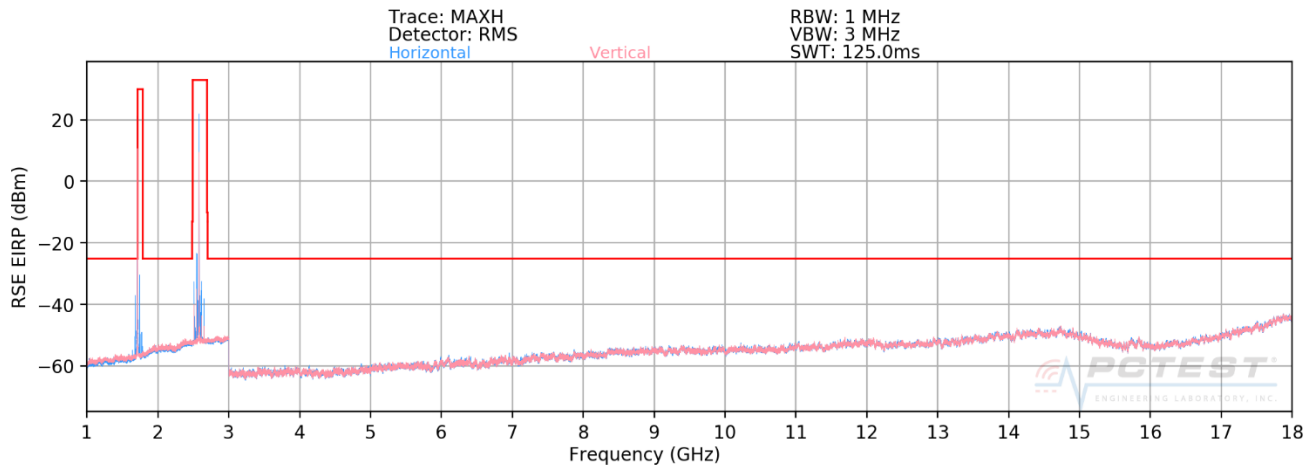
- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) 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.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: A3LSMN976U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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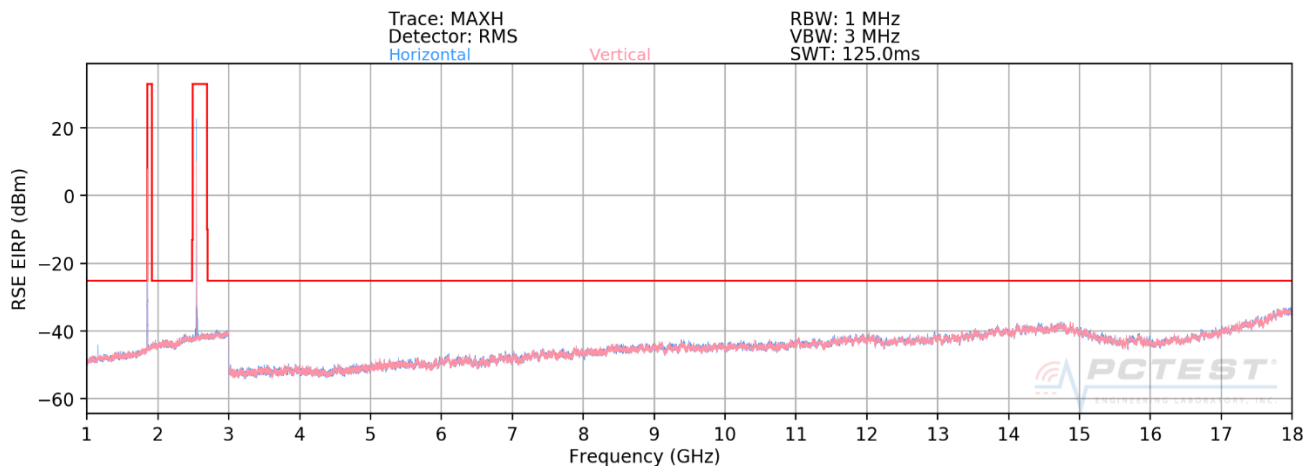
Band n41



Plot 7-52. Radiated Spurious Plot 1GHz - 18GHz (n41 EN-DC)



Plot 7-53. Radiated Spurious Plot 1GHz - 18GHz (n41 EN-DC - Anchor LTE Band 66)



Plot 7-54. Radiated Spurious Plot 1GHz - 18GHz (n41 EN-DC - Anchor LTE Band 2)

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OPERATING FREQUENCY: 2546.01 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 100.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5092.02	H	-	-	-59.98	8.88	-51.10	-26.1
7638.03	H	-	-	-55.59	9.29	-46.30	-21.3
10184.04	H	-	-	-53.42	9.72	-43.70	-18.7

Table 7-4. Radiated Spurious Data (n41 – Low Channel)

OPERATING FREQUENCY: 2593.02 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 100.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.04	H	-	-	-61.00	9.03	-51.98	-27.0
7779.06	H	-	-	-56.26	9.29	-46.97	-22.0
10372.08	H	-	-	-53.54	9.50	-44.04	-19.0
12965.10	H	-	-	-50.27	8.75	-41.52	-16.5
15558.12	H	-	-	-45.53	8.47	-37.06	-12.1

Table 7-5. Radiated Spurious Data (n41 – Mid Channel)

FCC ID: A3LSMN976U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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OPERATING FREQUENCY: 2640.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 100.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5280.00	H	-	-	-60.53	9.04	-51.49	-26.5
7920.00	H	-	-	-56.36	9.30	-47.06	-22.1
10560.00	H	-	-	-52.88	9.50	-43.37	-18.4

Table 7-6. Radiated Spurious Data (n41 – High Channel)

OPERATING FREQUENCY: 2593.02 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 100.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.04	H	-	-	-68.62	10.74	-57.87	-32.9
7779.06	H	-	-	-67.83	11.44	-56.39	-31.4
10372.08	H	-	-	-66.82	12.42	-54.40	-29.4

Table 7-7. Radiated Spurious Data with WCP (n41 – Mid Channel)

FCC ID: A3LSMN976U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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7.7 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 24, Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

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n41 Frequency Stability Measurements

OPERATING FREQUENCY: 2,593,000,000 Hz
 CHANNEL: 518598
 REFERENCE VOLTAGE: 4.10 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.10	- 30	2,592,999,761	-239	-0.0000092
100 %		- 20	2,593,000,208	208	0.0000080
100 %		- 10	2,593,000,030	30	0.0000012
100 %		0	2,592,999,942	-58	-0.0000022
100 %		+ 10	2,592,999,687	-313	-0.0000121
100 %		+ 20	2,593,000,029	29	0.0000011
100 %		+ 30	2,593,000,087	87	0.0000034
100 %		+ 40	2,593,000,149	149	0.0000057
100 %		+ 50	2,592,999,773	-227	-0.0000088
BATT. ENDPOINT	3.42	+ 20	2,593,000,060	60	0.0000023

Table 7-8. Frequency Stability Data (n41)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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n41 Frequency Stability Measurements

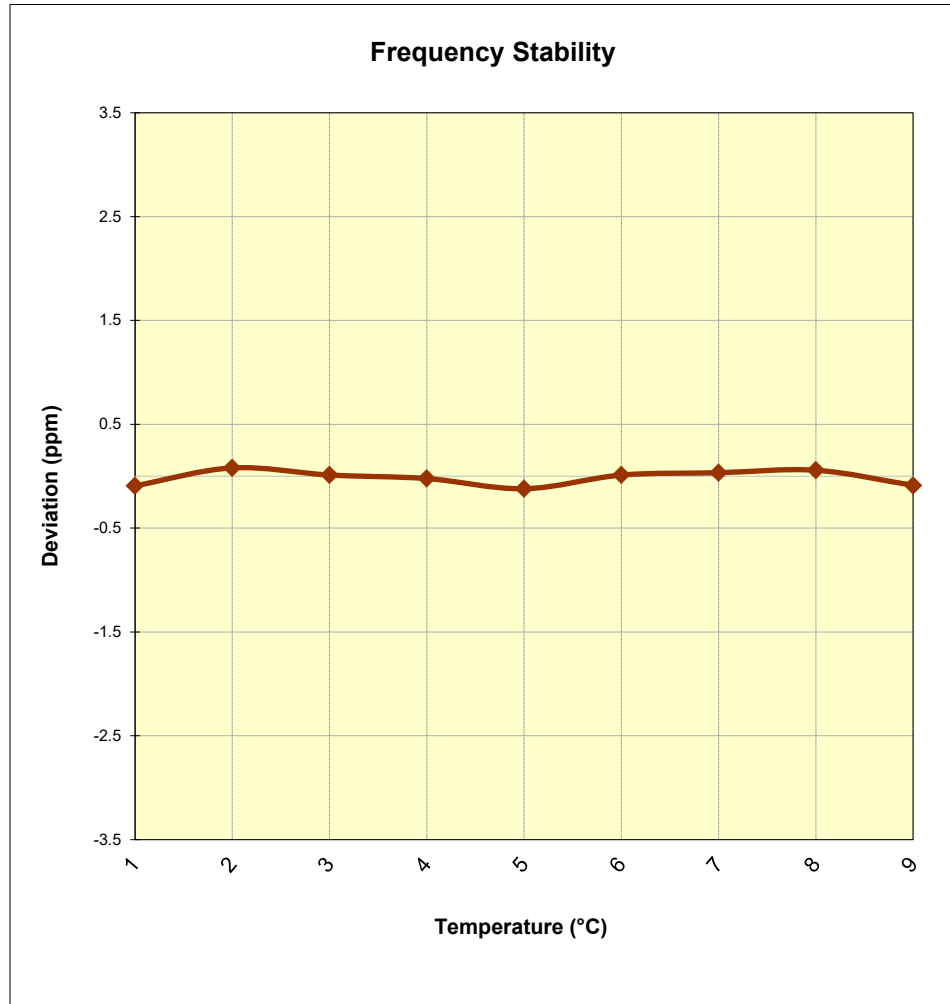


Figure 7-7. Frequency Stability Graph (n41)

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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: A3LSMN976U** complies with all the requirements of Part 27 of the FCC Rules for LTE operation only.

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Test Report S/N: 1M1911080182-02.A3L	Test Dates: 11/11 - 12/03/2019	EUT Type: Portable Handset		Page 54 of 54