

**MEASUREMENT REPORT**
FCC Part 30 5G mmWave**Applicant Name:**

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

Date of Testing:

1/2-2/3/2018

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M1712270338-01-R1.A3L

FCC ID:

A3LSFG-AA100DC

APPLICANT:

Samsung Electronics Co., Ltd.

Model:

SFG-AA100DC

Application Type:

Certification

EUT Type:

5G Access Unit

FCC Classification:

Part 30 Fixed Transmitter (5GB)

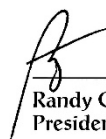
Test Procedure(s):

ANSI C63.26-2015, KDB 971168 D01 v03

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.

This revised Test Report (S/N: 1M1712270338-01-R1.A3L) supersedes and replaces the previously issued test report (S/N: 1M1712270338-01.A3L) on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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.

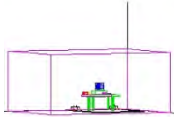

Randy Ortanez
President

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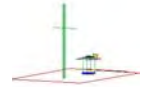
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FCC Part 30



Mode	FCC Rule Part	Antenna	Tx Frequency (MHz)	EIRP Density		Emission Designator	Modulation
				Max. Power (W)	Max. Power (dBm)		
TDD	30	A	27500 - 28350	255.270	54.07	91M0G7D	QPSK
TDD	30	A	27500 - 28350	252.930	54.03	90M2W7D	16QAM
TDD	30	A	27500 - 28350	249.459	53.97	91M0W7D	64QAM
TDD	30	A	27500 - 28350	36.141	45.58	781MG7D	QPSK
TDD	30	A	27500 - 28350	34.356	45.36	780MW7D	16QAM
TDD	30	A	27500 - 28350	35.892	45.55	780MW7D	64QAM
TDD	30	B	27500 - 28350	301.301	54.79	90M8G7D	QPSK
TDD	30	B	27500 - 28350	308.319	54.89	90M8W7D	16QAM
TDD	30	B	27500 - 28350	302.691	54.81	90M5W7D	64QAM
TDD	30	B	27500 - 28350	32.734	45.15	782MG7D	QPSK
TDD	30	B	27500 - 28350	32.734	45.15	781MW7D	16QAM
TDD	30	B	27500 - 28350	33.806	45.29	782MW7D	64QAM
TDD	30	C	27500 - 28350	294.442	54.69	89M4G7D	QPSK
TDD	30	C	27500 - 28350	277.332	54.43	89M0W7D	16QAM
TDD	30	C	27500 - 28350	287.740	54.59	90M8W7D	64QAM
TDD	30	C	27500 - 28350	38.371	45.84	783MG7D	QPSK
TDD	30	C	27500 - 28350	37.068	45.69	783MW7D	16QAM
TDD	30	C	27500 - 28350	38.107	45.81	783MW7D	64QAM
TDD	30	D	27500 - 28350	306.196	54.86	91M2G7D	QPSK
TDD	30	D	27500 - 28350	302.691	54.81	90M7W7D	16QAM
TDD	30	D	27500 - 28350	301.995	54.80	91M1W7D	64QAM
TDD	30	D	27500 - 28350	33.497	45.25	783MG7D	QPSK
TDD	30	D	27500 - 28350	36.728	45.65	782MW7D	16QAM
TDD	30	D	27500 - 28350	38.107	45.81	782MW7D	64QAM
TDD	30	A+C	27500 - 28350	541.975	57.34	91M0G7D	QPSK
TDD	30	A+C	27500 - 28350	508.343	57.06	90M2W7D	16QAM
TDD	30	A+C	27500 - 28350	526.868	57.22	90M8W7D	64QAM
TDD	30	A+C	27500 - 28350	73.579	48.67	783MG7D	QPSK
TDD	30	A+C	27500 - 28350	70.307	48.47	783MW7D	16QAM
TDD	30	A+C	27500 - 28350	73.073	48.64	783MW7D	64QAM
TDD	30	B+D	27500 - 28350	593.707	57.74	91M2G7D	QPSK
TDD	30	B+D	27500 - 28350	610.775	57.86	90M8W7D	16QAM
TDD	30	B+D	27500 - 28350	569.692	57.56	91M1W7D	64QAM
TDD	30	B+D	27500 - 28350	66.205	48.21	783MG7D	QPSK
TDD	30	B+D	27500 - 28350	65.518	48.16	782MW7D	16QAM
TDD	30	B+D	27500 - 28350	71.885	48.57	782MW7D	64QAM

EUT EIRP Density Overview

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Mode	FCC Rule Part	Antenna	Tx Frequency (MHz)	Conducted Power		Number of CC's	Modulation
				Max. Power (W)	Max. Power (dBm)		
TDD	30	A	27500 - 28350	0.395	25.97	1	QPSK
TDD	30	A	27500 - 28350	0.383	25.84	1	16QAM
TDD	30	A	27500 - 28350	0.369	25.67	1	64QAM
TDD	30	A	27500 - 28350	0.451	26.55	8	QPSK
TDD	30	A	27500 - 28350	0.445	26.49	8	16QAM
TDD	30	A	27500 - 28350	0.446	26.50	8	64QAM
TDD	30	B	27500 - 28350	0.463	26.66	1	QPSK
TDD	30	B	27500 - 28350	0.485	26.86	1	16QAM
TDD	30	B	27500 - 28350	0.489	26.90	1	64QAM
TDD	30	B	27500 - 28350	0.399	26.01	8	QPSK
TDD	30	B	27500 - 28350	0.399	26.01	8	16QAM
TDD	30	B	27500 - 28350	0.384	25.85	8	64QAM
TDD	30	C	27500 - 28350	0.450	26.54	1	QPSK
TDD	30	C	27500 - 28350	0.432	26.36	1	16QAM
TDD	30	C	27500 - 28350	0.451	26.55	1	64QAM
TDD	30	C	27500 - 28350	0.458	26.61	8	QPSK
TDD	30	C	27500 - 28350	0.431	26.35	8	16QAM
TDD	30	C	27500 - 28350	0.472	26.74	8	64QAM
TDD	30	D	27500 - 28350	0.431	26.35	1	QPSK
TDD	30	D	27500 - 28350	0.466	26.69	1	16QAM
TDD	30	D	27500 - 28350	0.478	26.80	1	64QAM
TDD	30	D	27500 - 28350	0.404	26.07	8	QPSK
TDD	30	D	27500 - 28350	0.416	26.19	8	16QAM
TDD	30	D	27500 - 28350	0.437	26.41	8	64QAM
TDD	30	A+B+C+D	27500 - 28350	1.703	32.31	1	QPSK
TDD	30	A+B+C+D	27500 - 28350	1.678	32.25	1	16QAM
TDD	30	A+B+C+D	27500 - 28350	1.687	32.27	1	64QAM
TDD	30	A+B+C+D	27500 - 28350	1.662	32.21	8	QPSK
TDD	30	A+B+C+D	27500 - 28350	1.615	32.08	8	16QAM
TDD	30	A+B+C+D	27500 - 28350	1.712	32.34	8	64QAM

EUT Conducted Power 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 5G Access Unit FCC ID: A3LSFG-AA100DC**. The test data contained in this report pertains only to the emissions due to the EUT's 5G mmWave function.

The EUT operates as a 4X4 MIMO system that consists of four antenna arrays (denoted herein as "Antenna A", "Antenna B", "Antenna C" and "Antenna D". Each of the four antenna arrays has 256 antenna elements for a total of 1024 antenna elements. Of the 4 antenna arrays, Antenna A and Antenna C have the same polarization (135 degrees from horizontal) and Antenna B and Antenna D have the same polarization (45 degrees from horizontal). Beamforming is used with Antenna A and Antenna C and it is also used with Antenna B and Antenna D. Signal correlation is possible between the outputs of all four antenna arrays. The EUT is powered by a -48V DC power supply.

See Section 3.2 for the antenna polarization of the 5G Access Unit and the measurement antenna.

Test Device Serial No.: DC001, 15710

2.2 Device Capabilities

This device contains the following capabilities:

TDD

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015 and KDB 971168 D01 v03. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

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 "American National Standard for Compliance Testing of Transmitter Used in Licensed Radio Service" (ANSI C63.26-2015) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03) were used in the measurement of the EUT.

3.2 Radiated Power and Radiated Spurious Emissions

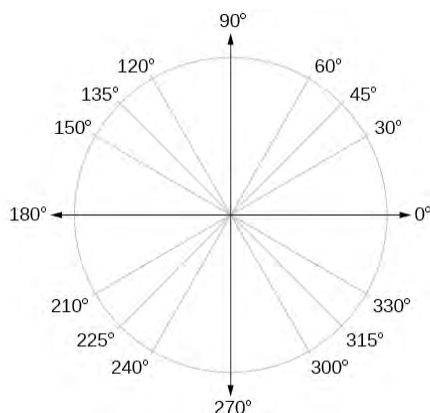
§30.202, §30.203, §30.404, §30.405

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.

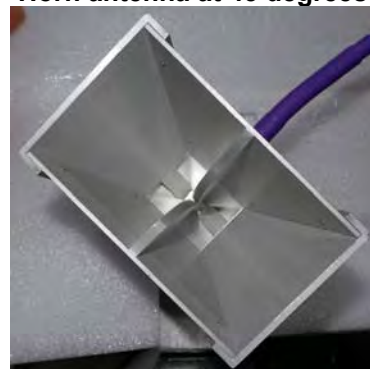
The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable. The receive measurement antenna is in the far field of the EUT per formula $(2 \cdot D^2) / \text{wavelength}$. The EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

Radiated power levels are investigated with the receive antenna horizontally and vertically polarized. Additionally, the receive antenna was rotated on various angles to investigate worst case emissions on each EUT antenna array. The EUT antenna array polarization and horn antennas angle are denoted as follows:

Horn antenna at 135 degrees

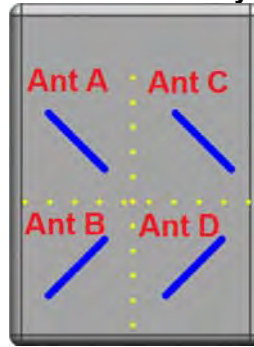


Horn antenna at 45 degrees



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5G Access Unit Antenna Array Polarization



The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration band set to the emissions’ occupied bandwidth.

Effective Isotropic Radiated Power Sample Calculation

The measured e.i.r.p is converted to E-field in V/m. Then the distance correction is applied before converted back to calculated e.i.r.p.

$$\text{e.i.r.p [dBm]} = \text{Measured Value [dBm]} + \text{AFCL [dB/m]} + 107$$

$$\text{Conversion to E-Field} = -5.28 \text{ dBm} + (47.07 \text{ dB/m} + 5.73 \text{ dB}) + 107 = 154.52 \text{ dBuV/m}$$

$$= 10^{(154.52/20)/1000000} = 53.21 \text{ V/m}$$

$$\text{Distance Correction} = 10 * \log((\text{E-Field} * D_m)^2/30) + 30$$

$$= 10 * \log((53.21 \text{ V/m} * 1.51 \text{ m})^2/30) + 30$$

$$= 53.33 \text{ dBm e.i.r.p.}$$

Sample MIMO e.i.r.p. Calculation:

The e.i.r.p at Antenna A, Antenna B, Antenna C and Antenna D were first measured individually. The measured values were then summed in linear power units then converted back to dBm per co-polarized antenna.

$$\text{Conversion to linear value} = 10^{(\text{e.i.r.p}/10)} = 10^{(54.07/10)} = 255270 \text{ mW}$$

$$\text{MIMO e.i.r.p.} = \text{e.i.r.p.A} + \text{e.i.r.p.c}$$

$$= 208369 \text{ mW} + 198076 \text{ mW}$$

$$= 10 * \log(406445 \text{ mW})$$

$$= 56.09 \text{ dBm}$$

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Conducted Power Sample Calculation

Conducted Power (dBm) = e.i.r.p._A (dBm) - Antenna Gain (dBi)

$$= 53.25 \text{ dBm} - 28.15 \text{ dBi}$$

$$= 25.10 \text{ dBm}$$

Summed Conducted Power (dBm) = [Conducted Power_A (dBm) + Conducted Power_C (dBm)] + [Conducted Power_B (dBm) + Conducted Power_D (dBm)]

$$= (25.10 \text{ dBm} + 24.97 \text{ dBm}) + (25.32 \text{ dBm} + 25.90 \text{ dBm})$$

$$= (323.28 \text{ mW} + 313.75 \text{ mW}) + (340.08 \text{ mW} + 388.67 \text{ mW})$$

$$= (1365.78 \text{ mW})$$

$$= 31.35 \text{ dBm}$$

Note:

D_m = Measurement Distance

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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
-	WL25-1	Conducted Cable Set (25GHz)	6/14/2017	Annual	6/14/2018	WL25-1
-	WL40-1	Conducted Cable Set (40GHz)	6/14/2017	Annual	6/14/2018	WL40-1
Agilent	N9030A	PXA Signal Analyzer (44GHz)	3/27/2017	Annual	3/27/2018	MY52350166
Agilent	N5183A	MXG Analog Signal Generator	2/24/2016	Biennial	2/24/2018	MY50141900
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	6/21/2017	Annual	6/21/2018	441119
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/23/2016	Biennial	8/23/2018	135427
EMCO	3160-10	Small Horn (26.5 - 40GHz)	8/23/2016	Biennial	8/23/2018	130993
Emco	3116	Horn Antenna (18 - 40GHz)	3/27/2015	Triennial	3/27/2018	9203-2178
Espec	ESX-2CA	Environmental Chamber	4/11/2017	Annual	4/11/2018	17620
Espec	SCP-220	Controller	4/11/2017	Annual	4/11/2018	OCPS5H06121505
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	5/19/2017	Annual	5/19/2018	251425001
OML	M19HWA	40 - 60GHz Mixer/Antenna	1/16/2018	Biennial	1/16/2020	U00228-1
OML	M12HWA	60 - 90GHz Mixer/Antenna	1/16/2018	Biennial	1/16/2020	E00228-1
OML	M08HWA	90 - 140GHz Mixer/Antenna	1/16/2018	Biennial	1/16/2020	F00228-1
OML	M08RH	Horn Antenna + Multiplier Source Module	11/16/2017	Annual	11/16/2018	17111701
OML	M12RH	Horn Antenna + Multiplier Source Module	11/16/2017	Annual	11/16/2018	17111701
OML	M19RH	Horn Antenna + Multiplier Source Module	11/16/2017	Annual	11/16/2018	17111701
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/31/2017	Annual	7/31/2018	100348
Rohde & Schwarz	TS-PR8	Preamplifier-Antenna SYS; 30MHz-8GHz	10/19/2017	Annual	10/19/2018	102324
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102133
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	3/7/2017	Annual	3/7/2018	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100037
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/11/2017	Annual	8/11/2018	103200
Rohde & Schwarz	FS-Z110	Harmonic Mixer (75-110 GHz)	1/12/2017	Biennial	1/12/2019	101466
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/14/2016	Biennial	3/14/2018	A051107
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol Sciences	JB6	JB6 Antenna	9/27/2016	Biennial	9/27/2018	A082816

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.

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

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7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSFG-AA100DC
 FCC Classification: Part 30 Fixed Transmitter (5GB)
 Mode(s): TDD

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	RADIATED	PASS	Section 7.2
30.202	EIRP Density	EIRP Density of 75dBm/100MHz		PASS	Section 7.3
2.1046	RF Output Power	N/A		PASS	Section 7.4
2.1051 30.203	Out-of-Band Spurious Emissions	-13dBm/MHz		PASS	Section 0
2.1051 30.203	Out-of-Band Emissions at the Band Edge	-13dBm/MHz for all out-of-band emissions, -5dBm/MHz from the band edge up to 10% of the channel BW		PASS	Section 7.6
2.1055	Frequency Stability	Fundamental emissions stay within authorized frequency block		PASS	Section 7.7

Table 7-1. Summary of Radiated Test Results

Notes:

- 1) All modes of operation and modulations were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) Per 2.1057(a)(2), spurious emissions were investigated up to 100GHz.
- 3) All radiated emission measurements in the band edge and in the out-of-band spurious domain are converted to an equivalent conductive power by subtracting the known antenna gain from the EIRP measured at each frequency of interest. These emissions are compared to the 30.203 spurious emission limits as conductive power levels.
- 4) The fundamental band consists of 1 – 8 component carriers, referred as “CC” in this report. Lowest frequency CC is CC0 and highest frequency CC is CC7.
- 5) In the following tables, the term “CCs Active” refers to which component carrier is transmitting for a particular test.

FCC ID: A3LSFG-AA100DC		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 13 of 222

7.2 Occupied Bandwidth

\$2.1049

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

ANSI C63.25-2015 Section 5.4.3

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 Notes

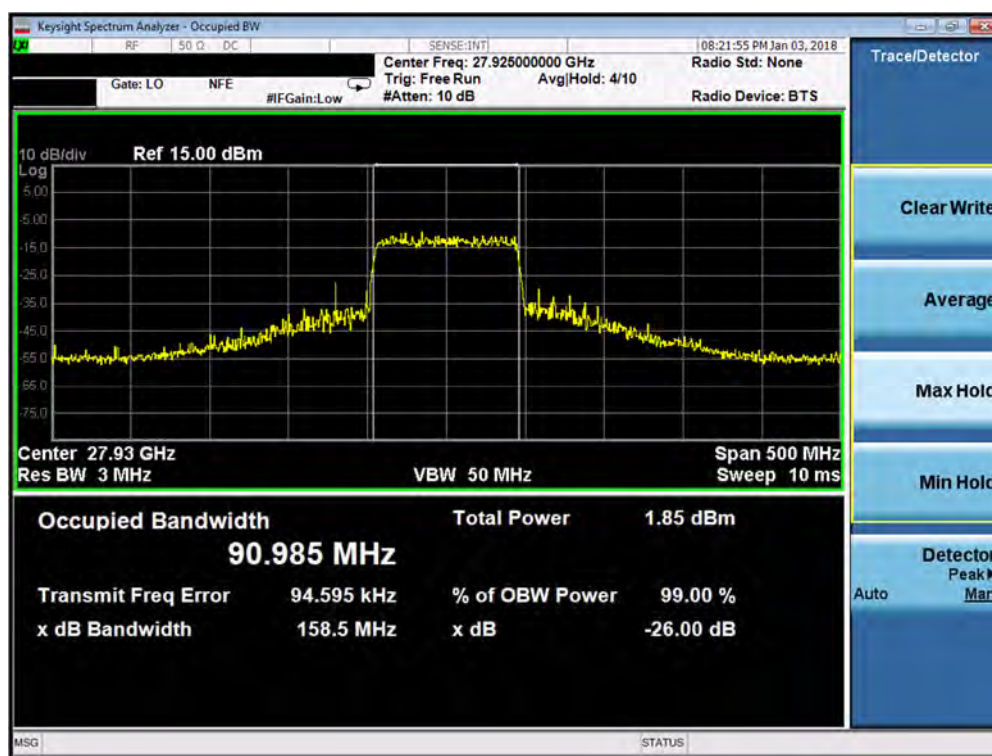
None.

FCC ID: A3LSFG-AA100DC		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 14 of 222

7.2.1 Antenna A Occupied Bandwidth

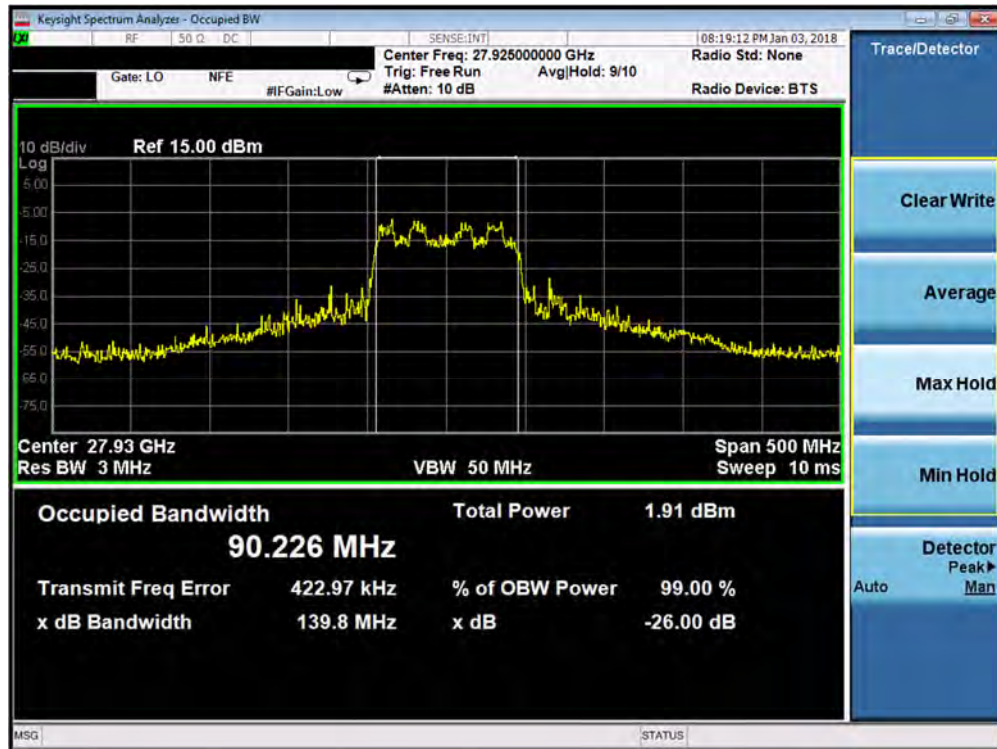
Chan.	Channel Freq [GHz]	CCs active	Modulation	OBW [MHz]
Mid	27.925	4	QPSK	90.99
Mid	27.925	4	16QAM	90.23
Mid	27.925	4	64QAM	90.97
Mid	27.925	0-7	QPSK	780.67
Mid	27.925	0-7	16QAM	779.47
Mid	27.925	0-7	64QAM	780.15

Table 7-2. Antenna A Occupied Bandwidth Summary Data

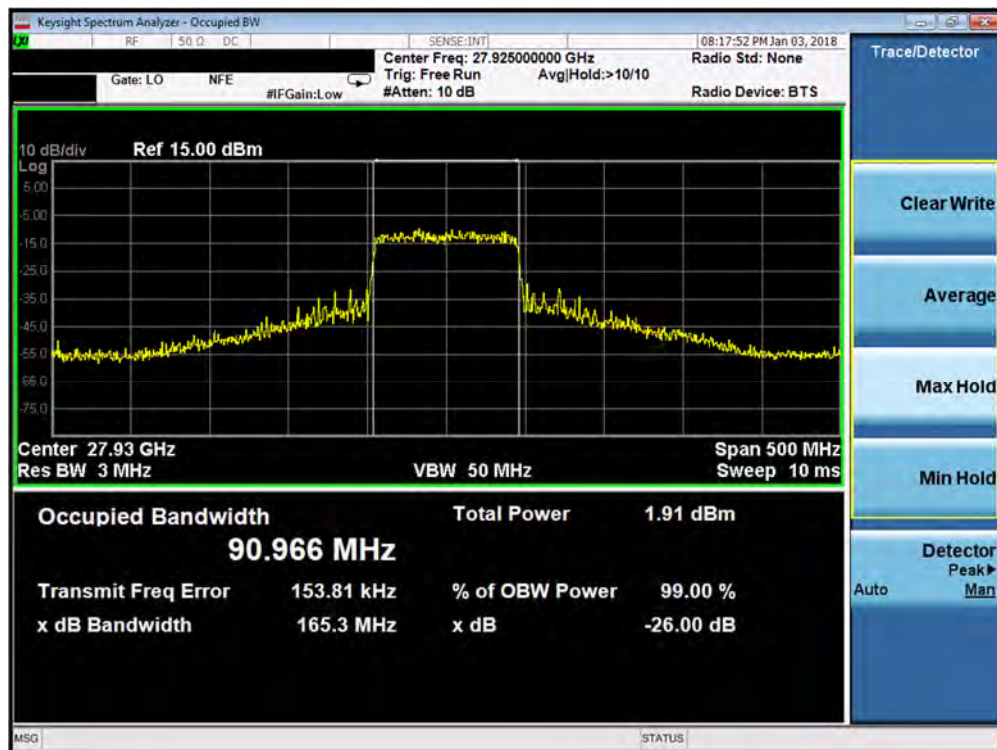


Plot 7-1. Occupied Bandwidth Plot (1CC QPSK Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-2. Occupied Bandwidth Plot (1CC 16QAM Mid Channel)



Plot 7-3. Occupied Bandwidth Plot (1CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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19:26:36 03.02.2018

Plot 7-4. Occupied Bandwidth Plot (8CC QPSK Mid Channel)



19:27:25 03.02.2018

Plot 7-5. Occupied Bandwidth Plot (8CC 16QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit	Page 17 of 222



19:28:00 03.02.2018

Plot 7-6. Occupied Bandwidth Plot (8CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit	Page 18 of 222

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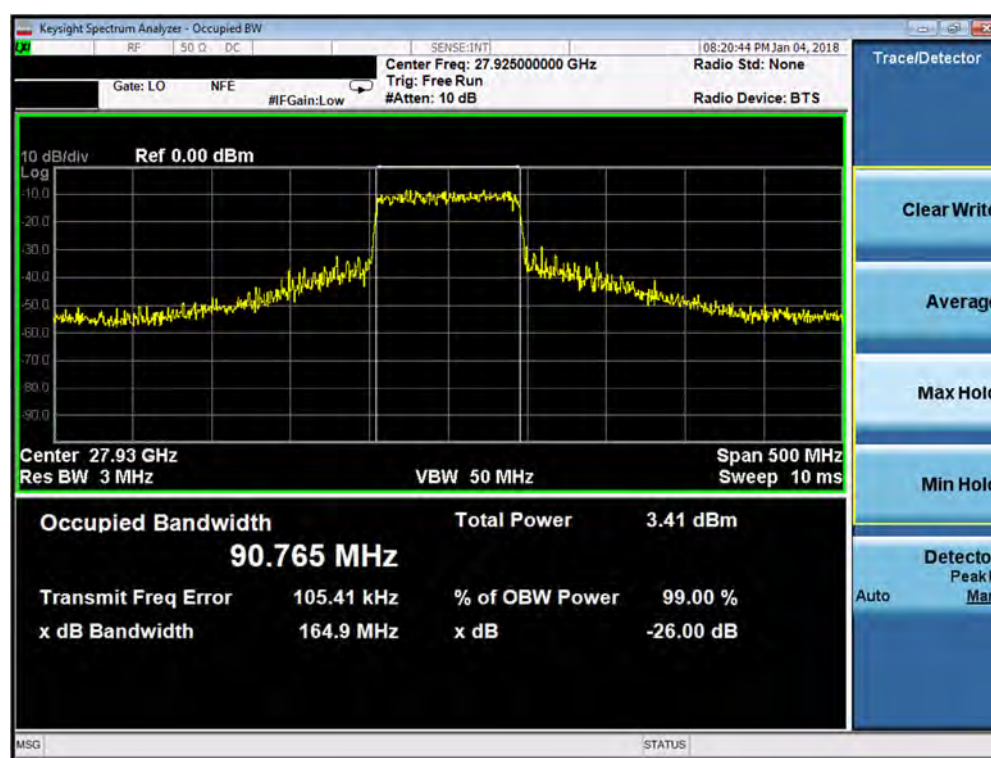
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7.2.2 Antenna B Occupied Bandwidth

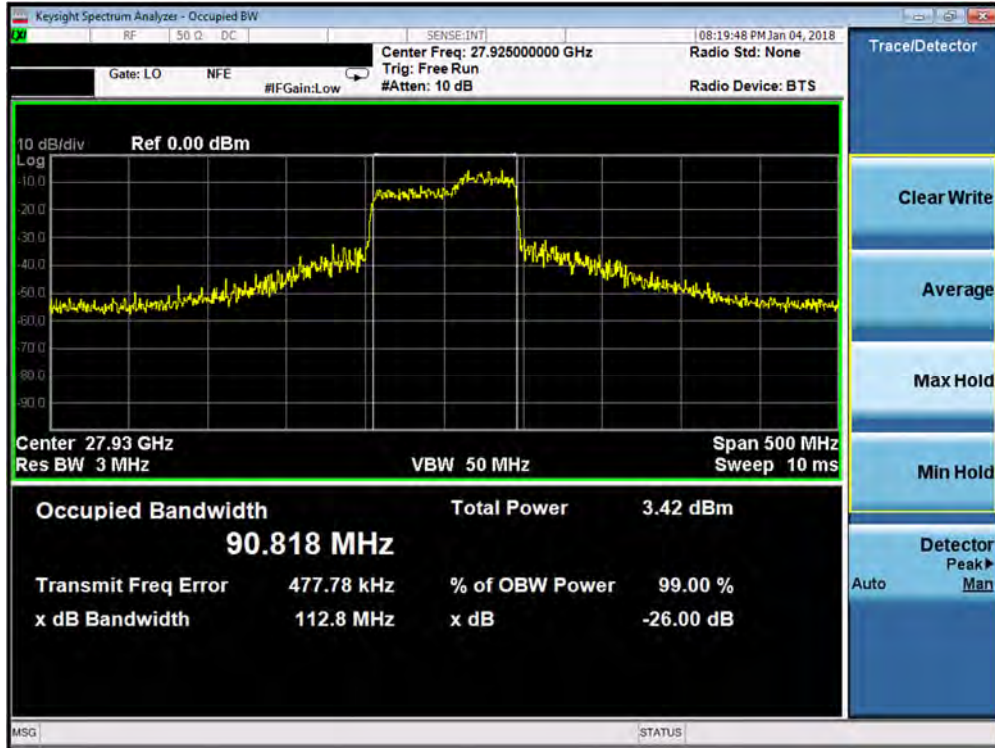
Chan.	Channel Freq [GHz]	CCs active	Modulation	OBW [MHz]
Mid	27.925	4	QPSK	90.77
Mid	27.925	4	16QAM	90.82
Mid	27.925	4	64QAM	90.47
Mid	27.925	0-7	QPSK	781.81
Mid	27.925	0-7	16QAM	781.29
Mid	27.925	0-7	64QAM	781.55

Table 7-3. Antenna B Occupied Bandwidth Summary Data

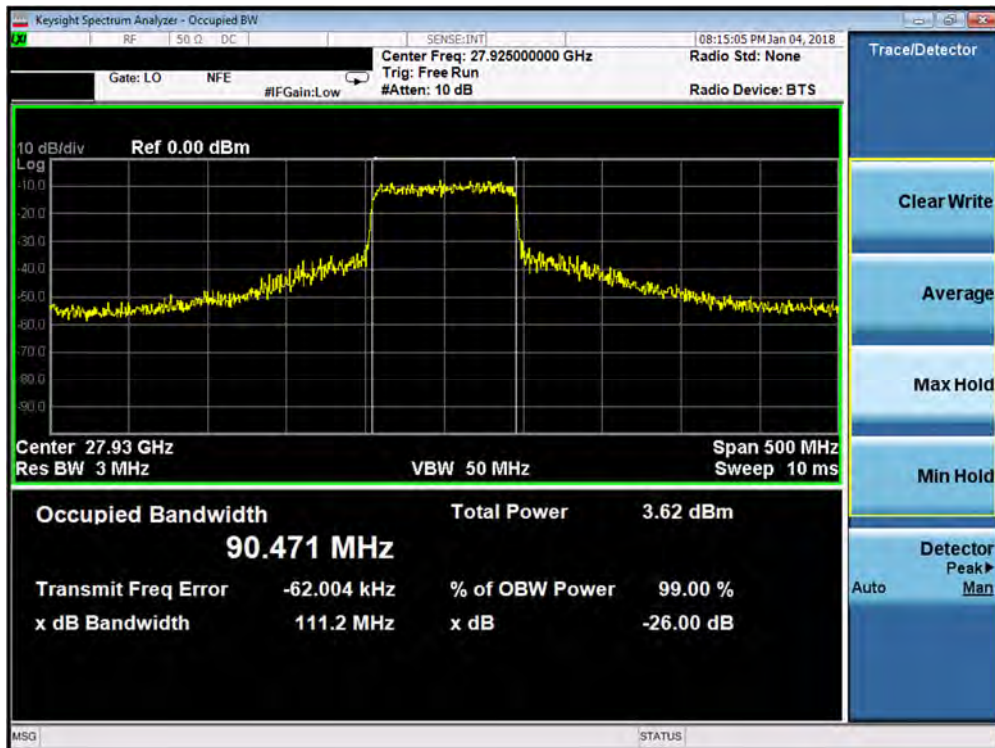


Plot 7-7. Occupied Bandwidth Plot (1CC QPSK Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 19 of 222



Plot 7-8. Occupied Bandwidth Plot (1CC 16QAM Mid Channel)



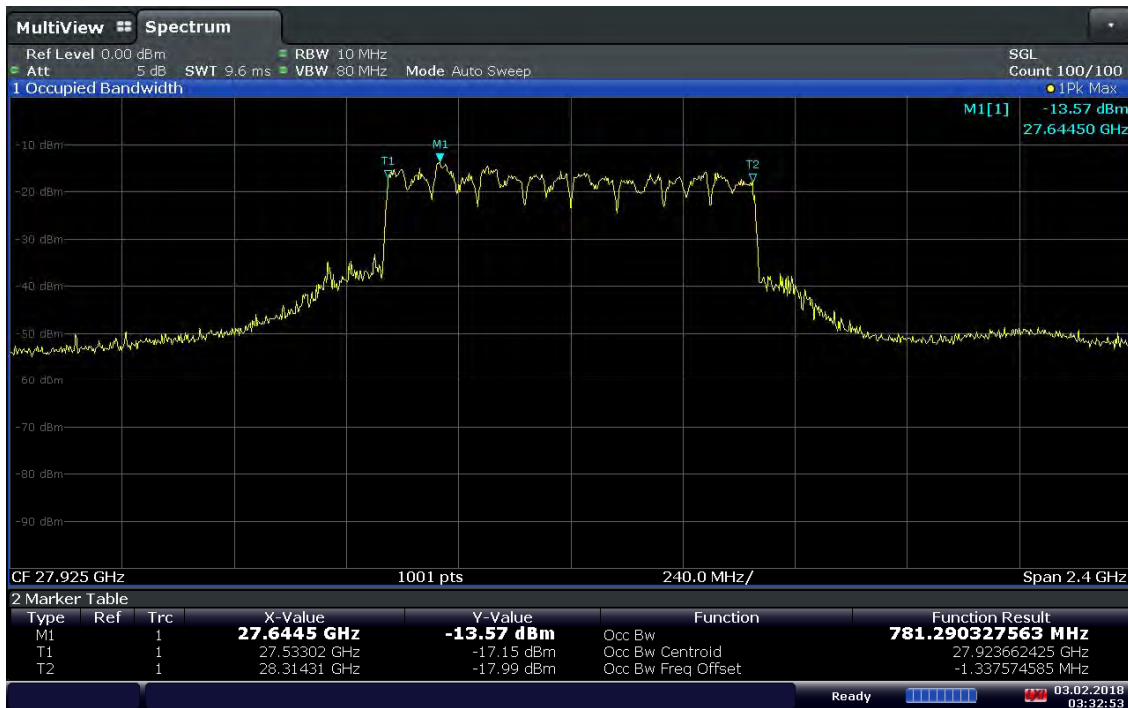
Plot 7-9. Occupied Bandwidth Plot (1CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 20 of 222



03:32:06 03.02.2018

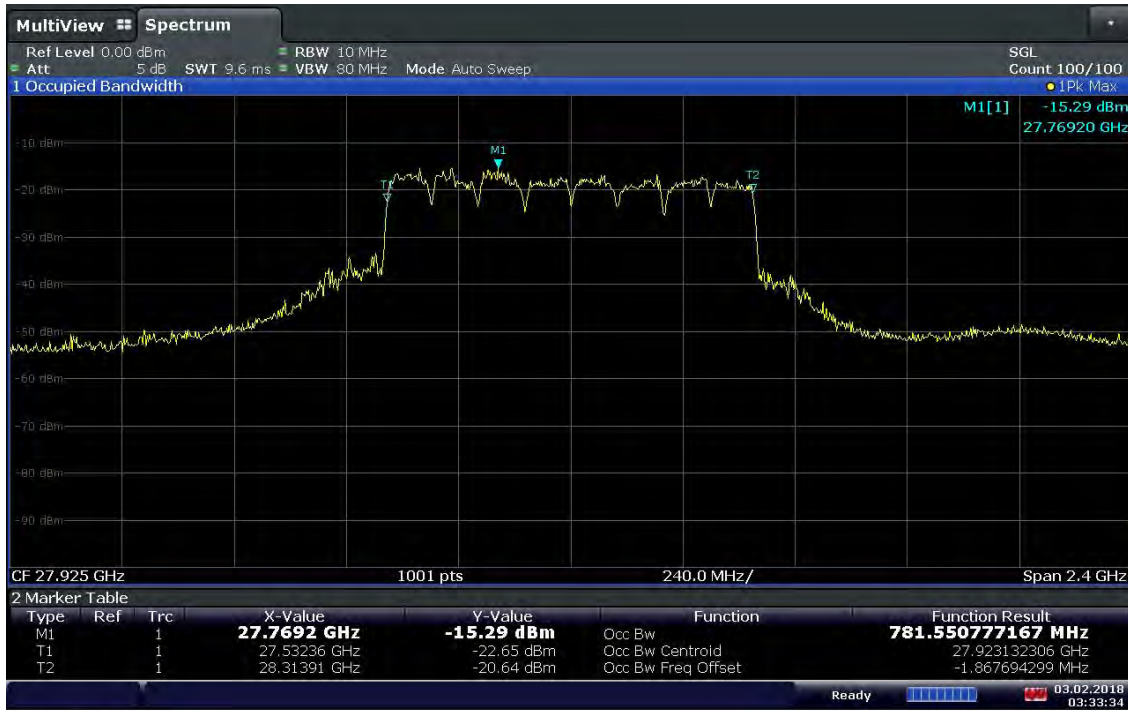
Plot 7-10. Occupied Bandwidth Plot (8CC QPSK Mid Channel)



03:32:53 03.02.2018

Plot 7-11. Occupied Bandwidth Plot (8CC 16QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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03:33:35 03.02.2018

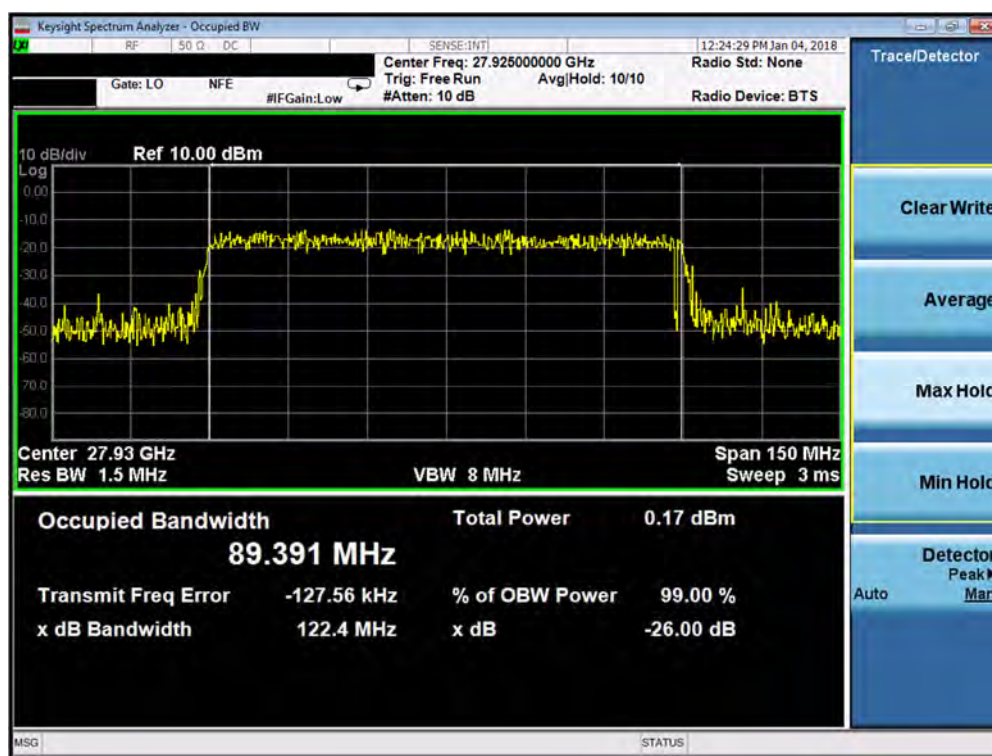
Plot 7-12. Occupied Bandwidth Plot (8CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit	Page 22 of 222

7.2.3 Antenna C Occupied Bandwidth

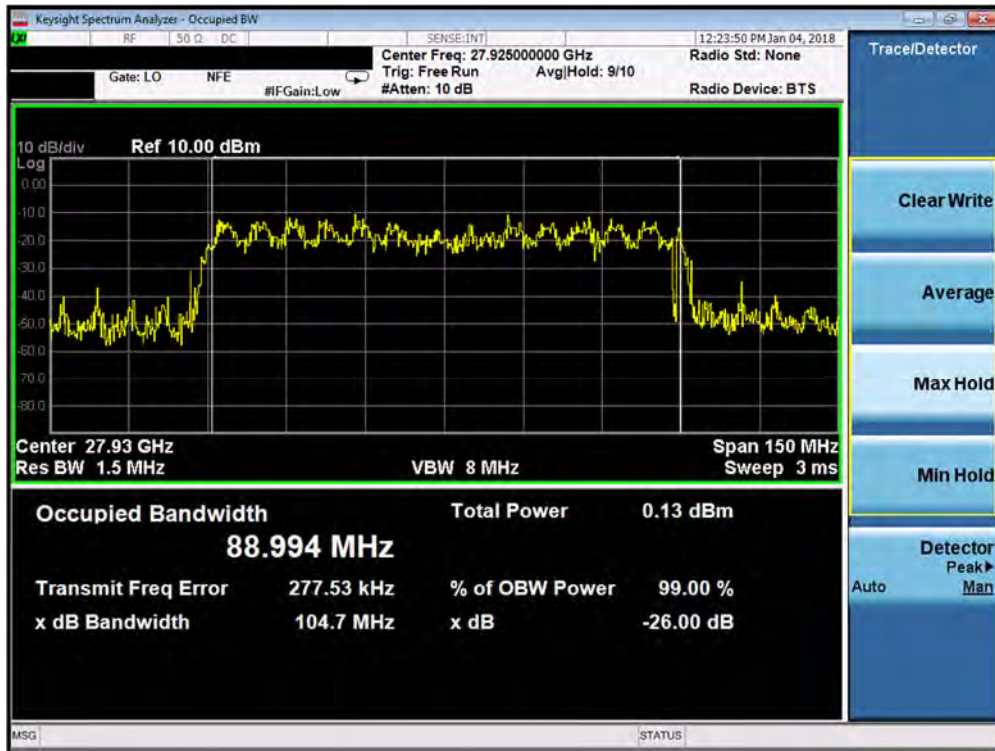
Chan.	Channel Freq [GHz]	CCs active	Modulation	OBW [MHz]
Mid	27.925	4	QPSK	89.39
Mid	27.925	4	16QAM	88.99
Mid	27.925	4	64QAM	90.82
Mid	27.925	0-7	QPSK	782.64
Mid	27.925	0-7	16QAM	782.92
Mid	27.925	0-7	64QAM	782.74

Table 7-4. Antenna C Occupied Bandwidth Summary Data

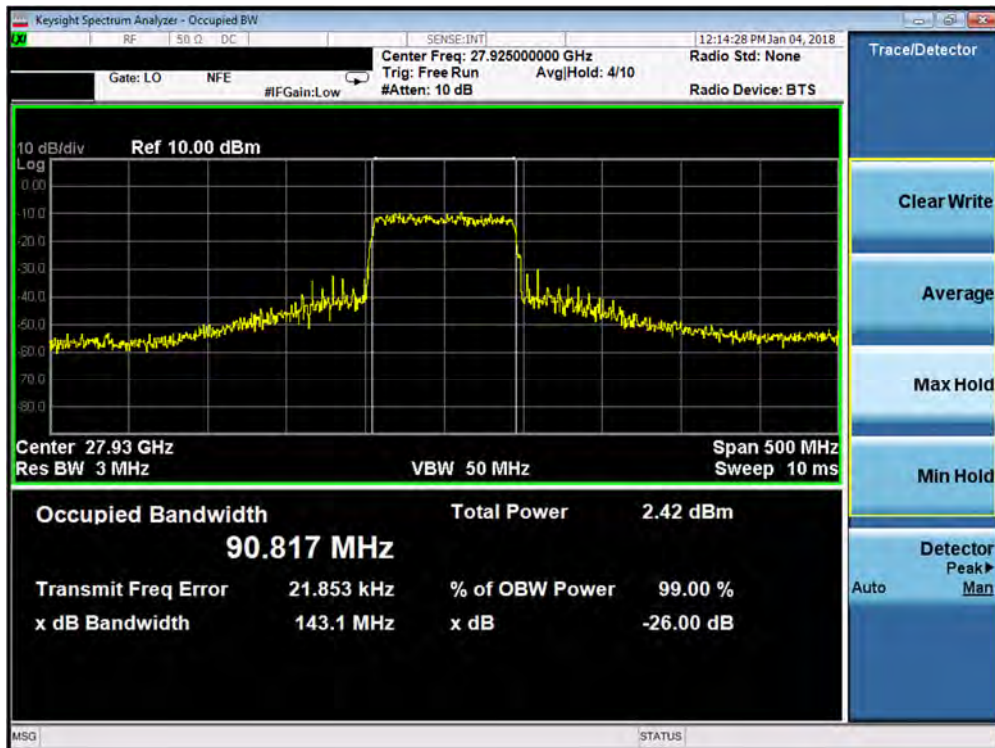


Plot 7-13. Occupied Bandwidth Plot (1CC QPSK Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Plot 7-14. Occupied Bandwidth Plot (1CC 16QAM Mid Channel)



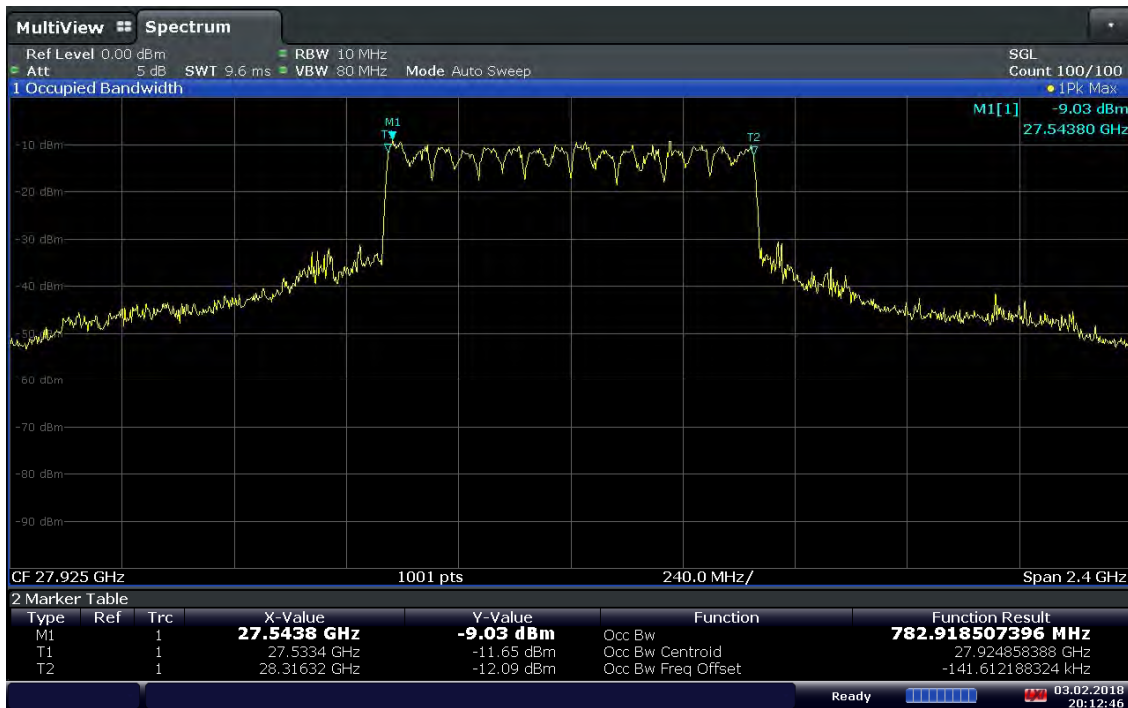
Plot 7-15. Occupied Bandwidth Plot (1CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 24 of 222



20:12:02 03.02.2018

Plot 7-16. Occupied Bandwidth Plot (8CC QPSK Mid Channel)



20:12:47 03.02.2018

Plot 7-17. Occupied Bandwidth Plot (8CC 16QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit	Page 25 of 222



20:13:23 03.02.2018

Plot 7-18. Occupied Bandwidth Plot (8CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit	Page 26 of 222

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7.2.4 Antenna D Occupied Bandwidth

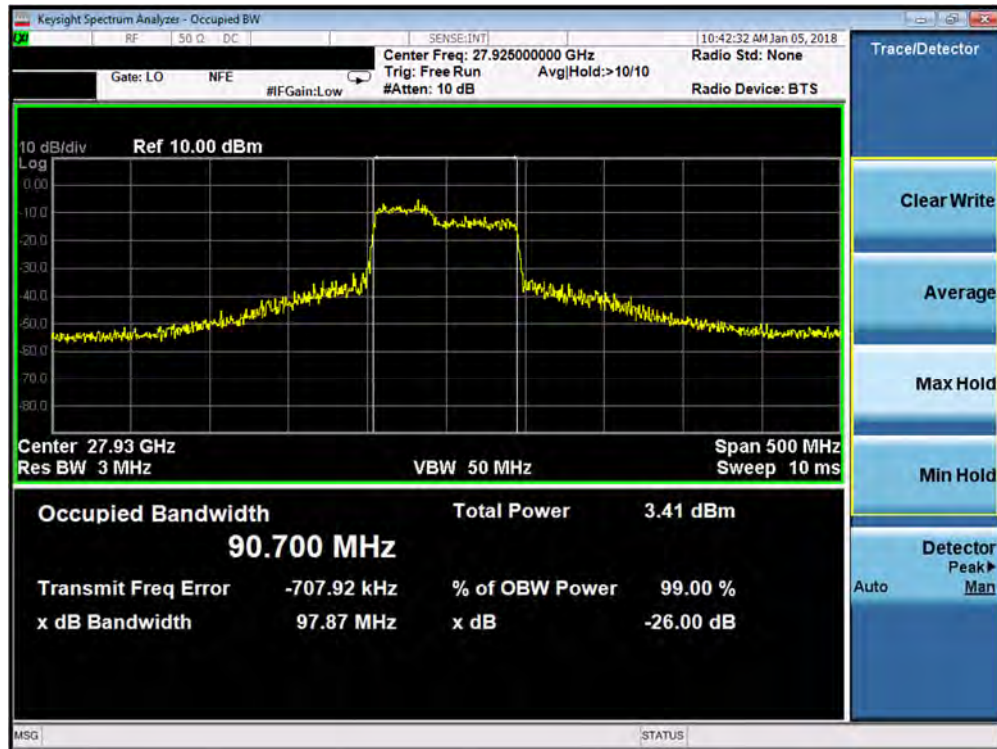
Chan.	Channel Freq [GHz]	CCs active	Modulation	OBW [MHz]
Mid	27.925	4	QPSK	91.16
Mid	27.925	4	16QAM	90.70
Mid	27.925	4	64QAM	91.05
Mid	27.925	0-7	QPSK	782.59
Mid	27.925	0-7	16QAM	782.14
Mid	27.925	0-7	64QAM	781.56

Table 7-5. Antenna D Occupied Bandwidth Summary Data

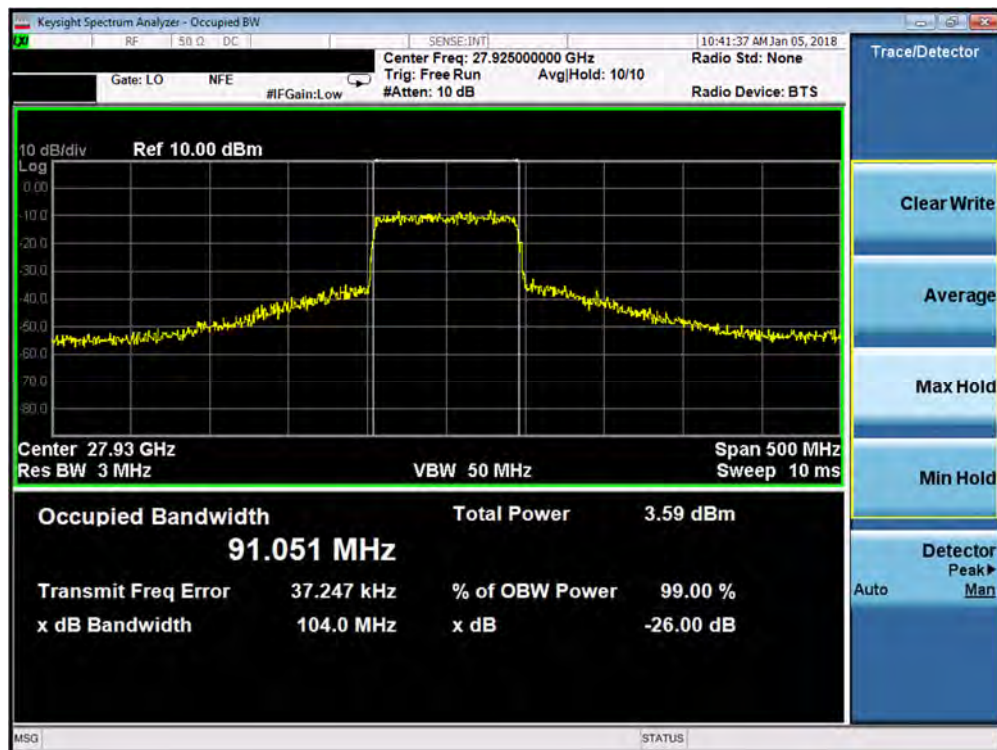


Plot 7-19. Occupied Bandwidth Plot (1CC QPSK Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 27 of 222



Plot 7-20. Occupied Bandwidth Plot (1CC 16QAM Mid Channel)



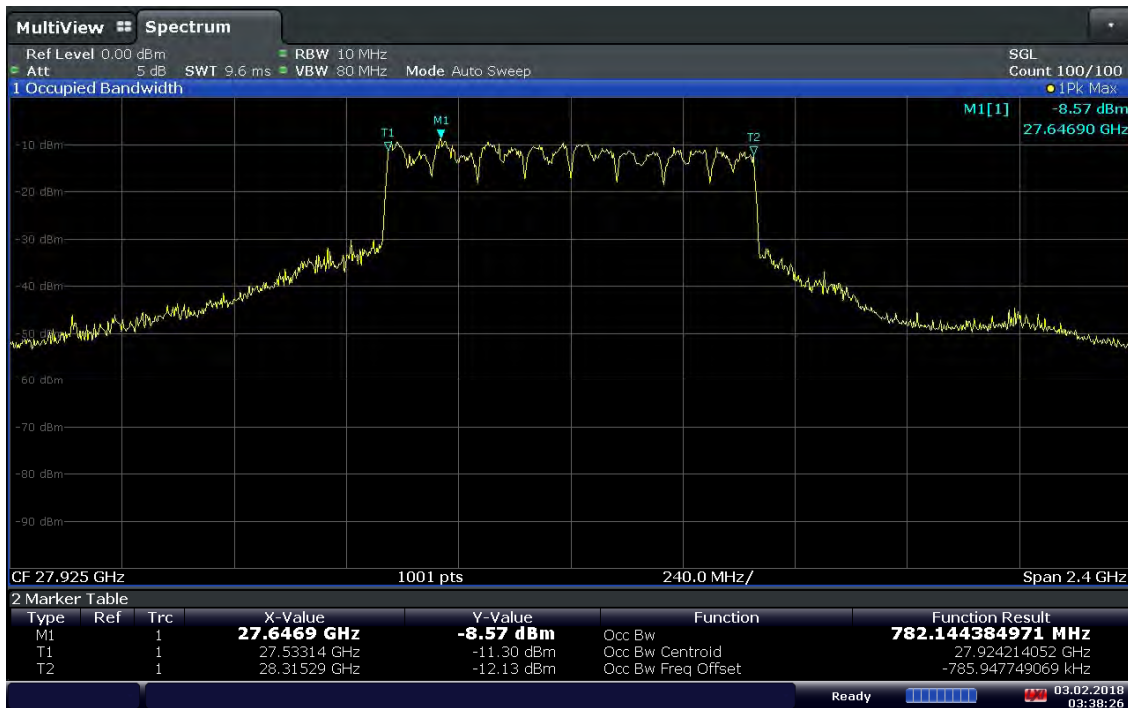
Plot 7-21. Occupied Bandwidth Plot (1CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 28 of 222



03:37:46 03.02.2018

Plot 7-22. Occupied Bandwidth Plot (8CC QPSK Mid Channel)



03:38:26 03.02.2018

Plot 7-23. Occupied Bandwidth Plot (8CC 16QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit	Page 29 of 222



03:39:06 03.02.2018

Plot 7-24. Occupied Bandwidth Plot (8CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit	Page 30 of 222

7.3 Equivalent Isotropic Radiated Power (EIRP) Density

§2.1046 §30.202

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using 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.

The average power of the sum of all antenna elements is limited to an equivalent isotopically radiated power (EIRP) density of +75dBm/100 MHz.

Test Procedures Used

ANSI C63.26-2015 Section 5.2.4.4.1
ANSI C63.26-2015 Section 6.4

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Span = 2x to 3x 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

FCC ID: A3LSFG-AA100DC		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Test Notes

- 1) The EUT was tested while positioned upright and mounted on a mast at 1.5m height. The worst case emissions are reported with the EUT in this fixed position and with the modulations and active component carriers shown in the tables below.
- 2) The EIRP measurements of the co-polarized antenna arrays (Antenna A/C and Antenna B/D) were added together to address MIMO concerns referenced in ANSI C63.26-2015 Section 6.4.
- 3) Elements within the same antenna array are correlated to produce beamforming array gain.
- 4) Measurements were taken in the far field of the mmWave signal based on the formula: $R \geq 2D^2/\text{wavelength}$.
- 5) The test case with only 1 CC active, "CC0" representing the component carrier with the lowest frequency, was selected for the worst case emission testing as it created the highest EIRP within a 100MHz bandwidth.
- 6) The average EIRP reported below is calculated per formula specified in d) of ANSI C63.26-2015 Section 5.2.7:

$\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.

For this section, all EIRP density measurements were performed at a distance of 1.51m, so, the effective correction is:

$$\begin{aligned} \text{EIRP (dBm)} &= E \text{ (dB}\mu\text{V/m)} - 101.22\text{dB} \\ &= \text{Analyzer Level (dBm)} + \text{AFCL (dB/m)} + 107 \text{ dB} - 101.22\text{dB} \\ &= \text{Analyzer Level (dBm)} + \text{AFCL (dB/m)} + 5.78\text{dB} \end{aligned}$$

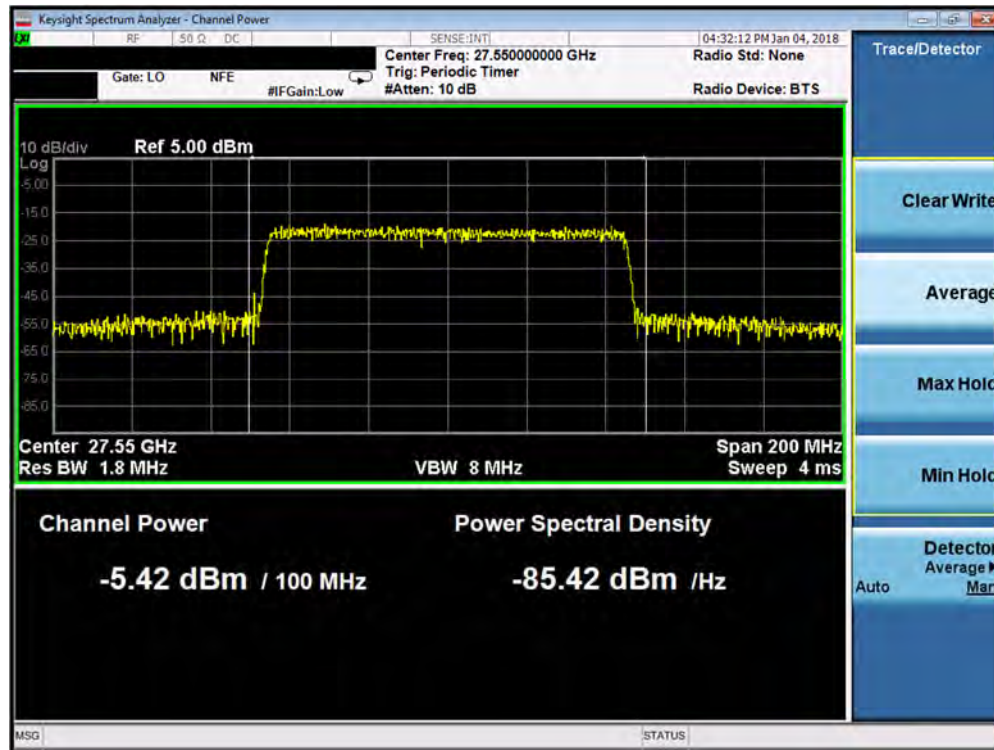
- 7) The conducted average power density over a 100MHz BW is calculated as follows:
 $\text{Conducted Average PSD (dBm)} = \text{Average EIRP Density (dBm)} - \text{Antenna Gain (dBi)}$
- 8) Per ANSI C63.26-2015 Section 6.4, individual EIRPs are also summed before compared to the limit.
- 9) The angle of the horn antenna was rotated to maximize and find the worst case emissions. Worst case EIRP is reported below.

FCC ID: A3LSFG-AA100DC		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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7.3.1 Antenna A EIRP Density

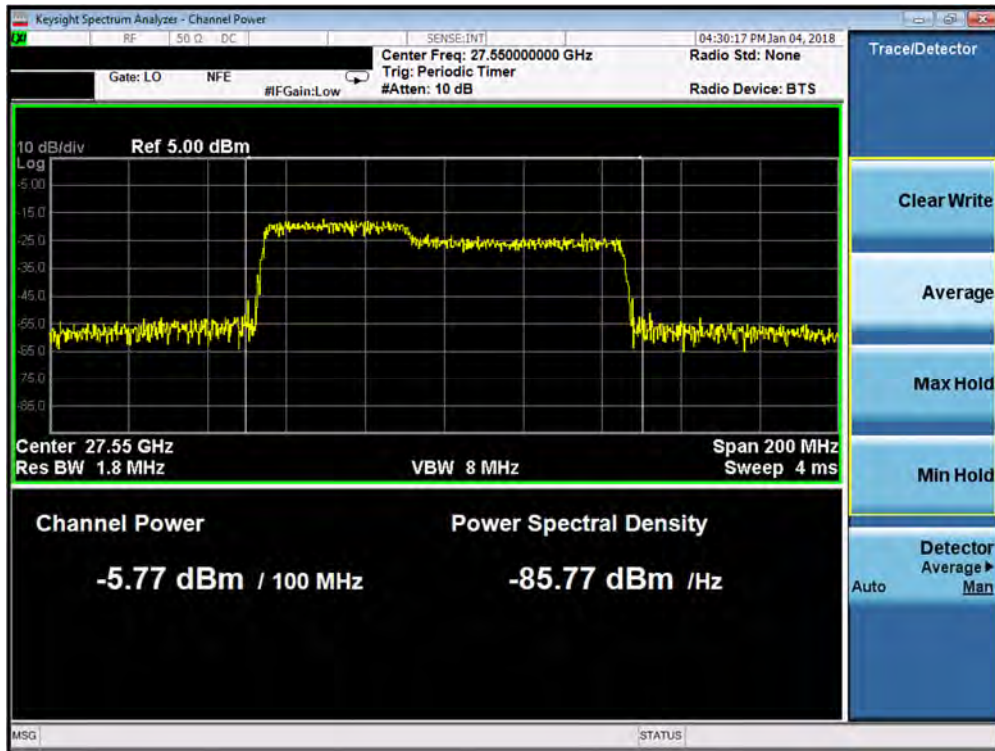
Chan.	Channel Freq [GHz]	CCs active	Modulation	Horn Angle [degrees]	Horn Height [cm]	Turntable Azimuth [degrees]	Analyzer Level [dBm]	AFCL [dB/m]	EUT Antenna Gain [dBi]	Average e.i.r.p. PSD [dBm]	Conducted Average PSD [dBm]	PSD Limit [dBm/100 MHz]	Margin [dB]
Low	27.9	0	QPSK	135.0	153	347	-5.42	52.80	28.15	53.19	25.04	75.00	-21.81
Low	27.9	0	16QAM	135.0	153	347	-5.77	52.80	28.15	52.84	24.69	75.00	-22.16
Low	27.9	0	64QAM	135.0	153	347	-5.84	52.80	28.15	52.77	24.62	75.00	-22.23
Mid	27.925	4	QPSK	135.0	153	347	-4.54	52.80	28.15	54.07	25.92	75.00	-20.93
Mid	27.925	4	16QAM	135.0	153	347	-4.58	52.80	28.15	54.03	25.88	75.00	-20.97
Mid	27.925	4	64QAM	135.0	153	347	-4.64	52.80	28.15	53.97	25.82	75.00	-21.03
High	27.95	7	QPSK	135.0	153	347	-4.67	52.80	28.15	53.94	25.79	75.00	-21.06
High	27.95	7	16QAM	135.0	153	347	-4.97	52.80	28.15	53.64	25.49	75.00	-21.36
High	27.95	7	64QAM	135.0	153	347	-4.82	52.80	28.15	53.79	25.64	75.00	-21.21
Low	27.9	0-7	QPSK	135.0	153	347	-13.03	52.80	28.15	45.58	17.43	75.00	-29.42
Low	27.9	0-7	16QAM	135.0	153	347	-13.25	52.80	28.15	45.36	17.21	75.00	-29.64
Low	27.9	0-7	64QAM	135.0	153	347	-13.06	52.80	28.15	45.55	17.40	75.00	-29.45
Mid	27.925	0-7	QPSK	135.0	153	347	-13.14	52.80	28.15	45.47	17.32	75.00	-29.53
Mid	27.925	0-7	16QAM	135.0	153	347	-13.39	52.80	28.15	45.22	17.07	75.00	-29.78
Mid	27.925	0-7	64QAM	135.0	153	347	-13.17	52.80	28.15	45.44	17.29	75.00	-29.56
High	27.95	0-7	QPSK	135.0	153	347	-13.20	52.80	28.15	45.41	17.26	75.00	-29.59
High	27.95	0-7	16QAM	135.0	153	347	-13.39	52.80	28.15	45.22	17.07	75.00	-29.78
High	27.95	0-7	64QAM	135.0	153	347	-13.27	52.80	28.15	45.34	17.19	75.00	-29.66

Table 7-6. Antenna A Power Density Summary Data

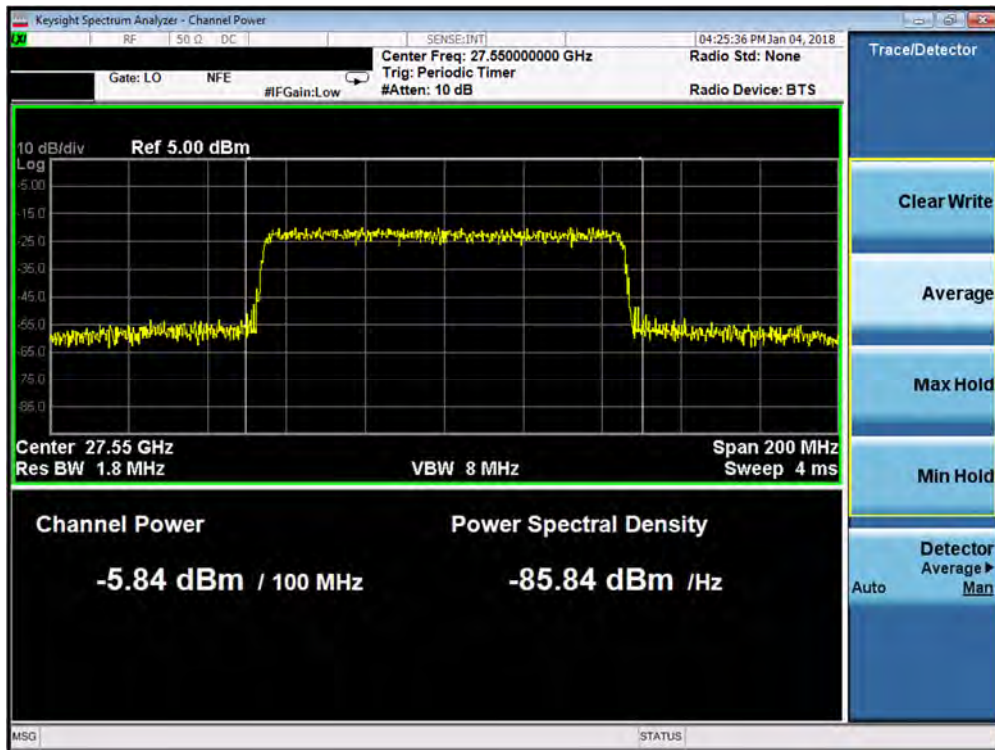


Plot 7-25. Antenna A EIRP Density Plot (1CC QPSK Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 33 of 222

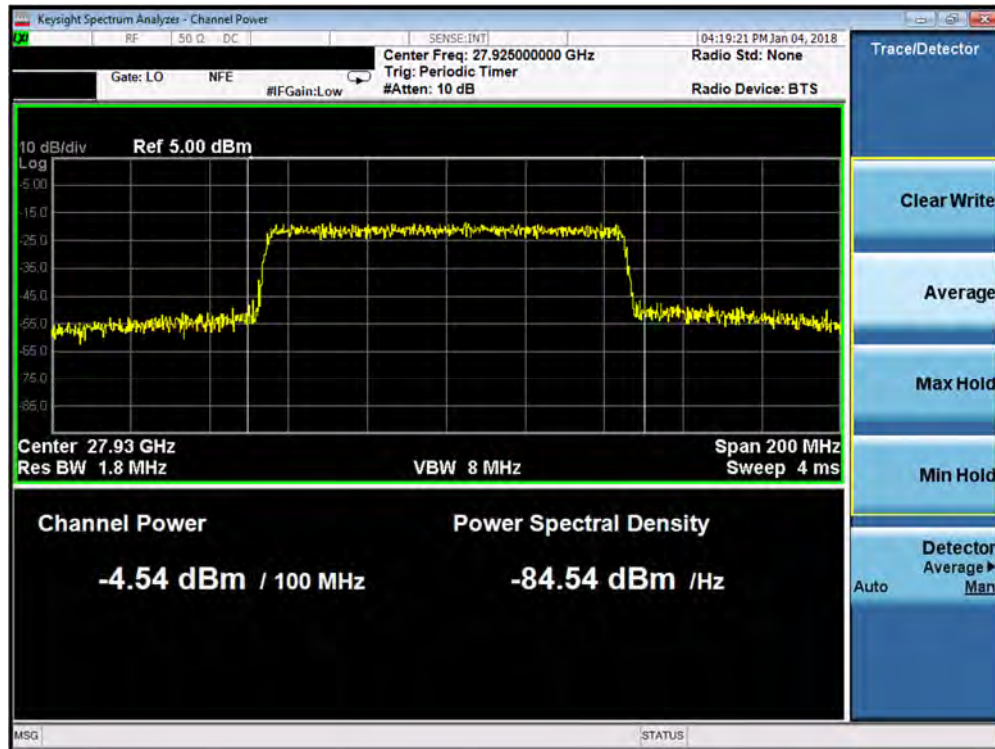


Plot 7-26. Antenna A EIRP Density Plot (1CC 16QAM Low Channel)

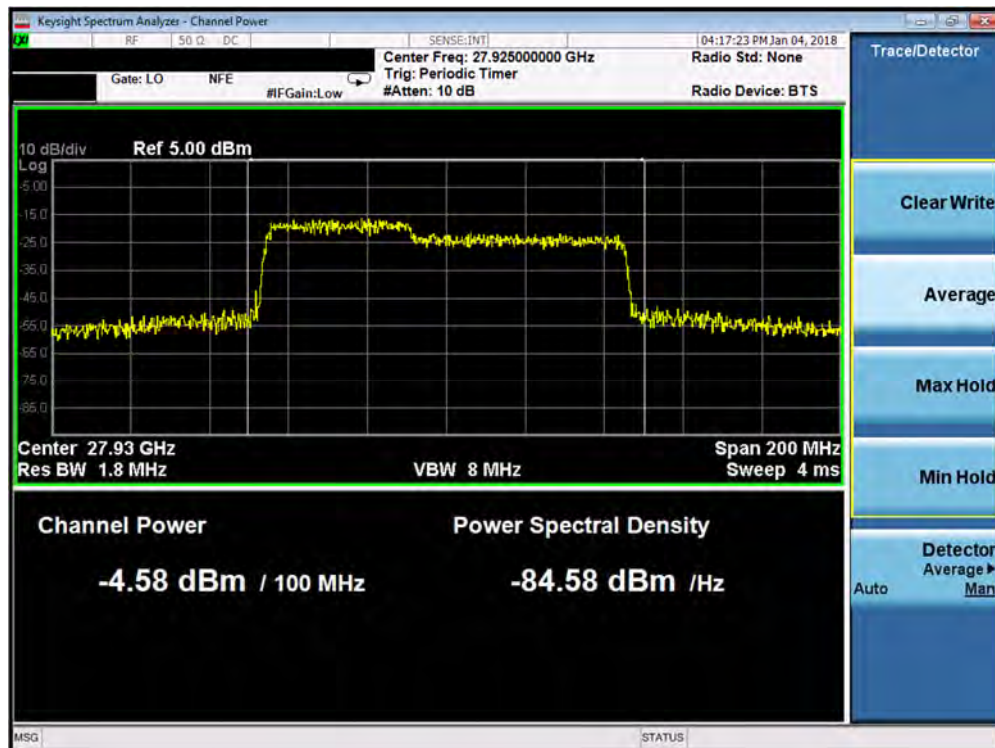


Plot 7-27. Antenna A EIRP Density Plot (1CC 64QAM Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 34 of 222

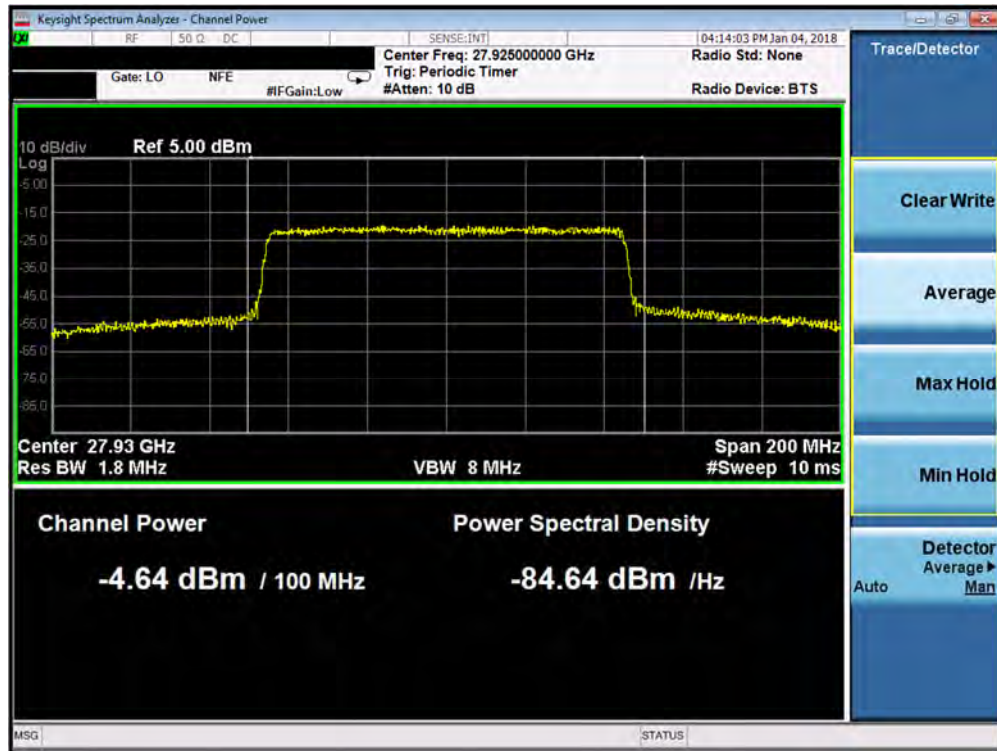


Plot 7-28. Antenna A EIRP Density Plot (1CC QPSK Mid Channel)

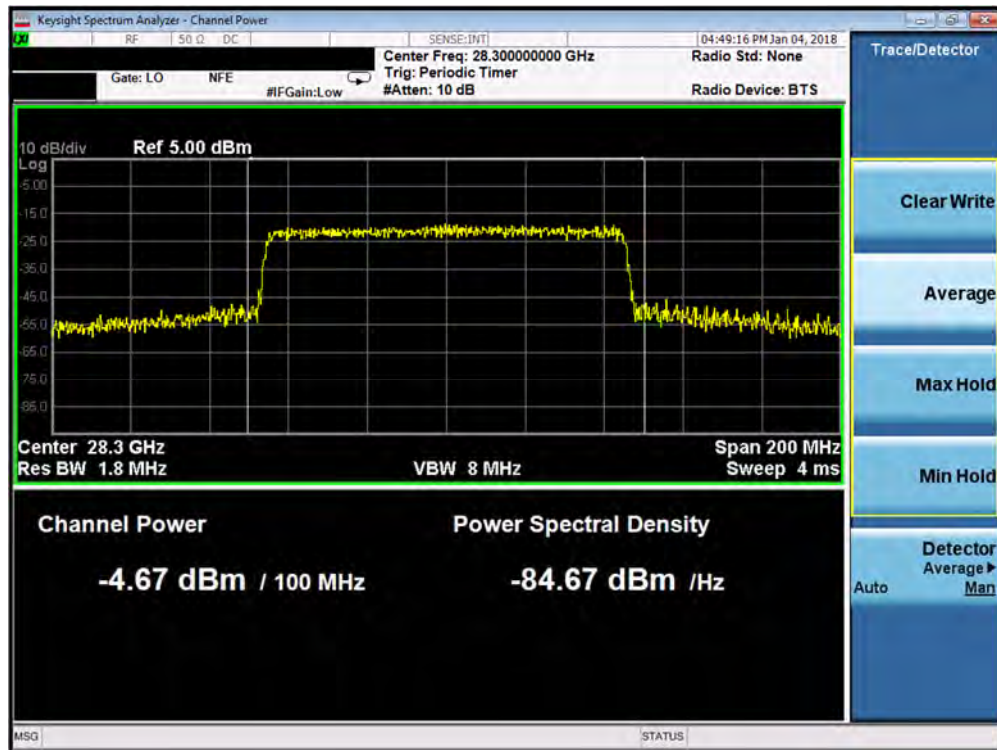


Plot 7-29. Antenna A EIRP Density Plot (1CC 16QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 35 of 222

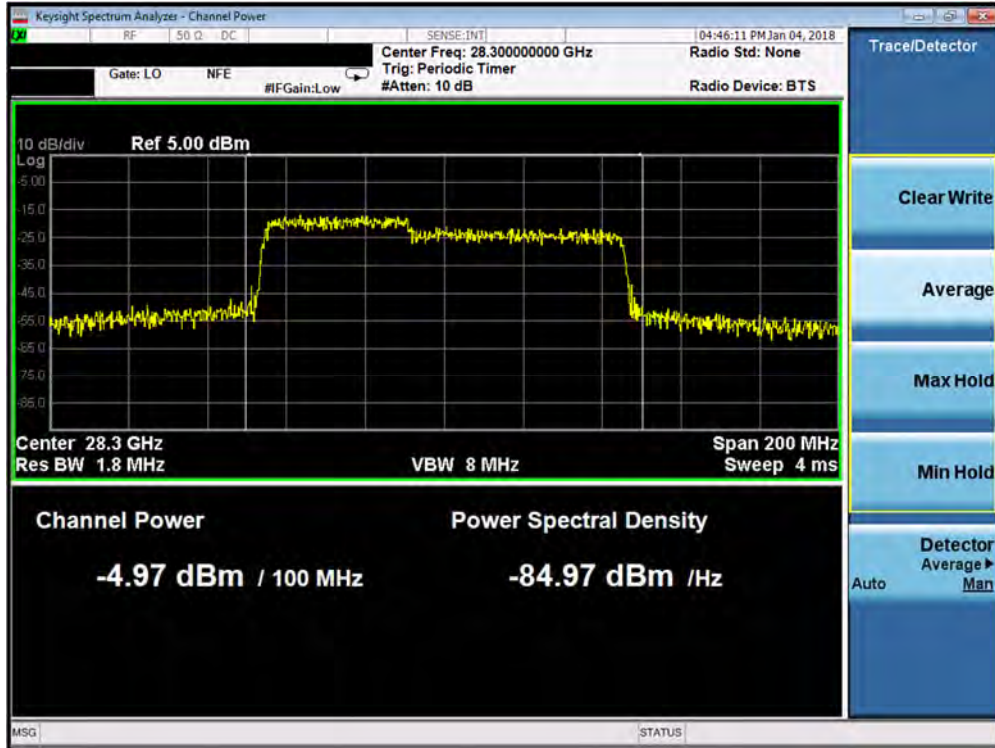


Plot 7-30. Antenna A EIRP Density Plot (1CC 64QAM Mid Channel)

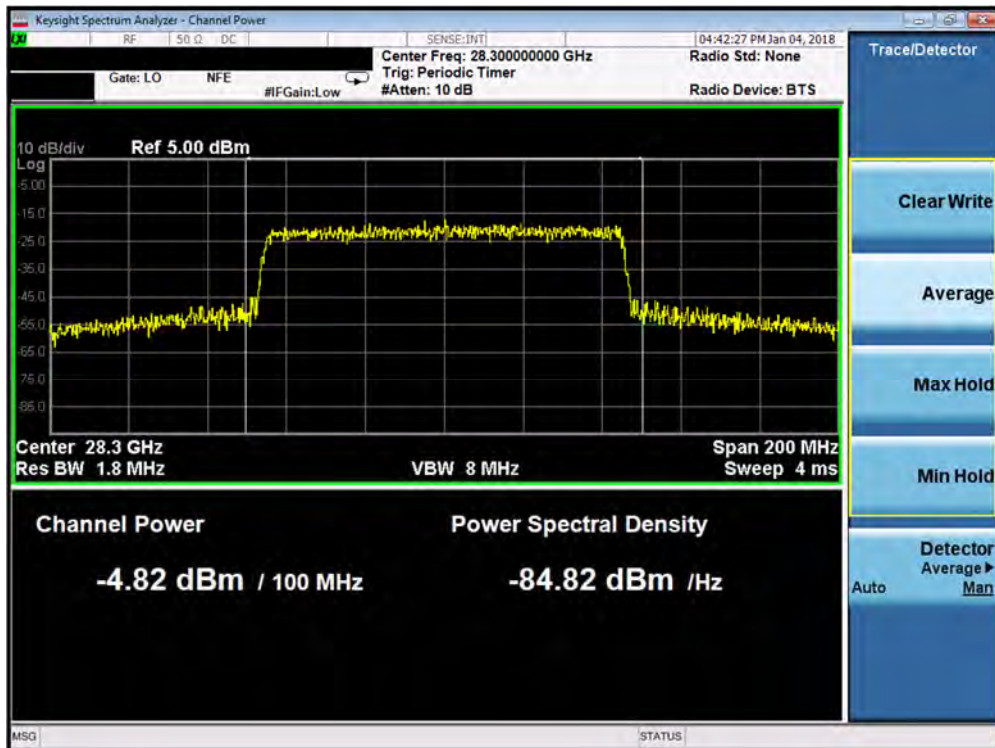


Plot 7-31. Antenna A EIRP Density Plot (1CC QPSK High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 36 of 222

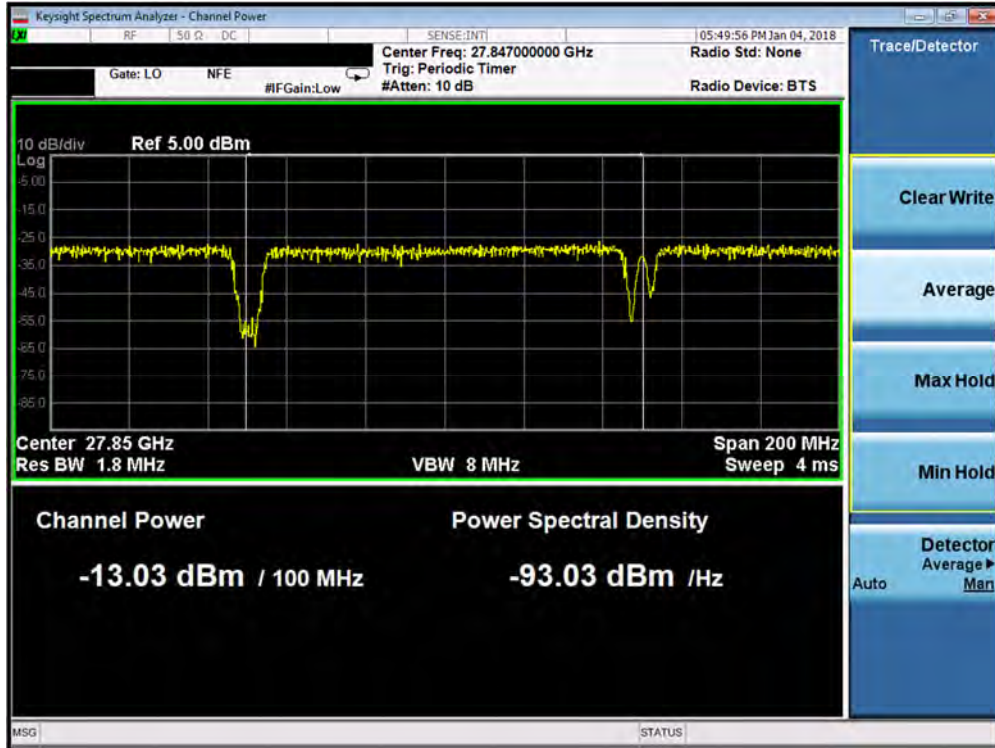


Plot 7-32. Antenna A EIRP Density Plot (1CC 16QAM High Channel)

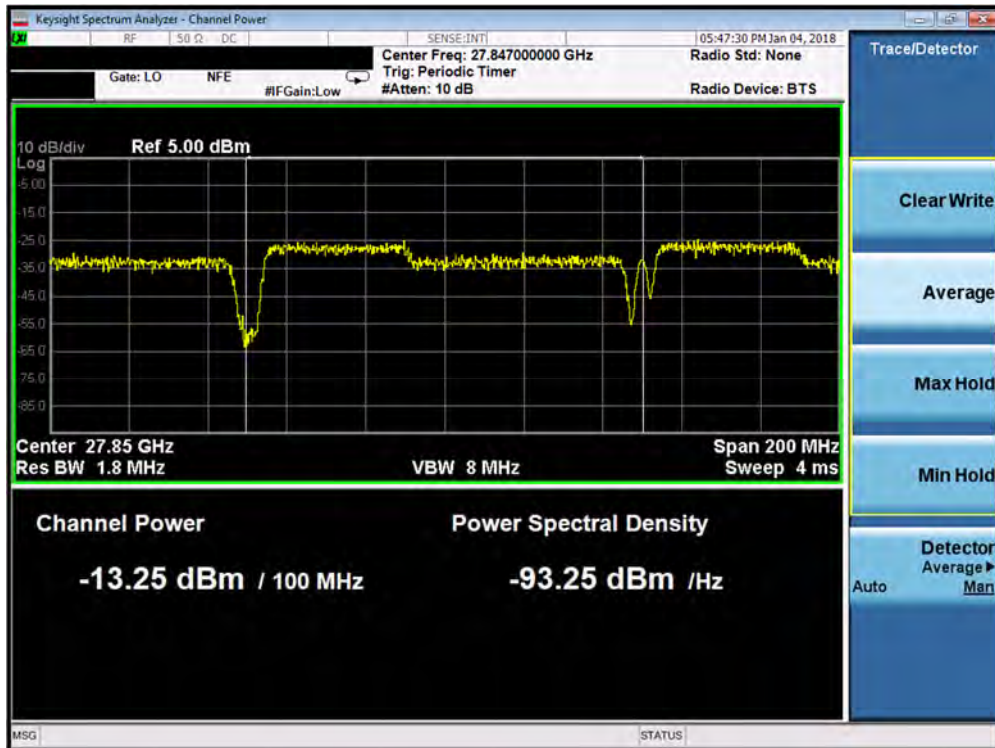


Plot 7-33. Antenna A EIRP Density Plot (1CC 64QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 37 of 222

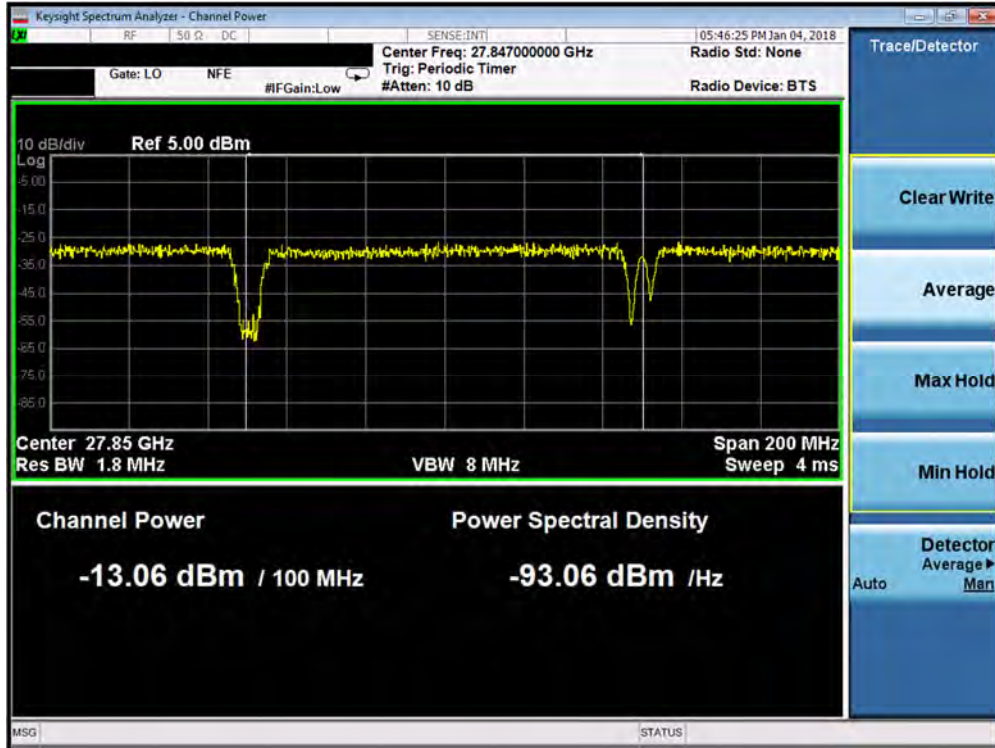


Plot 7-34. Antenna A EIRP Density Plot (8CC QPSK Low Channel)

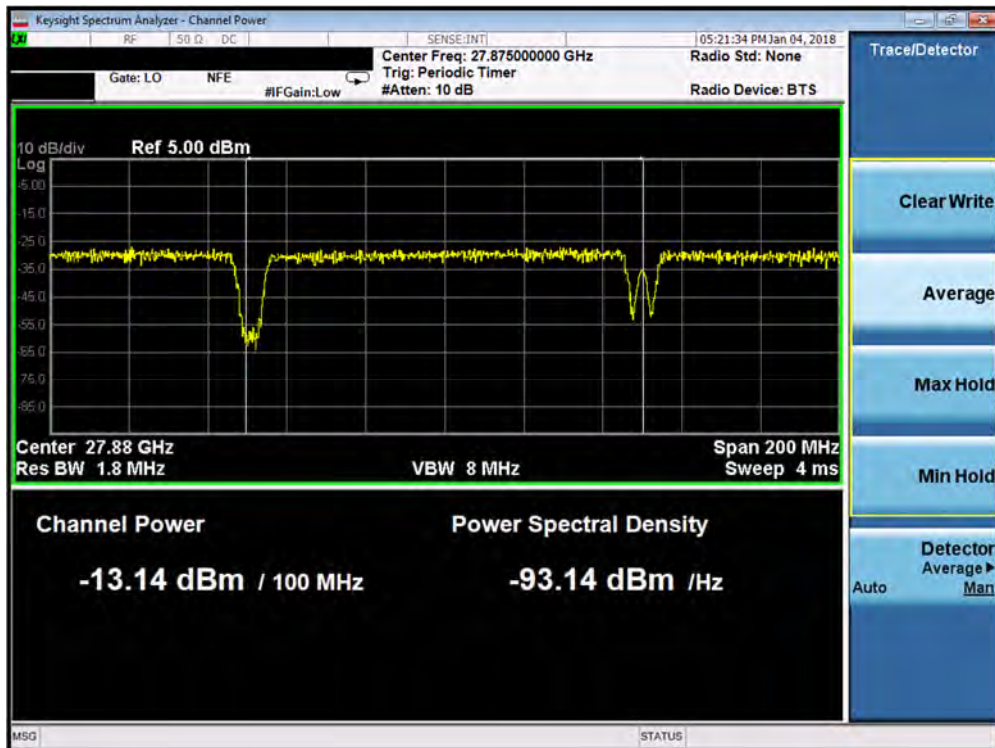


Plot 7-35. Antenna A EIRP Density Plot (8CC 16QAM Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 38 of 222

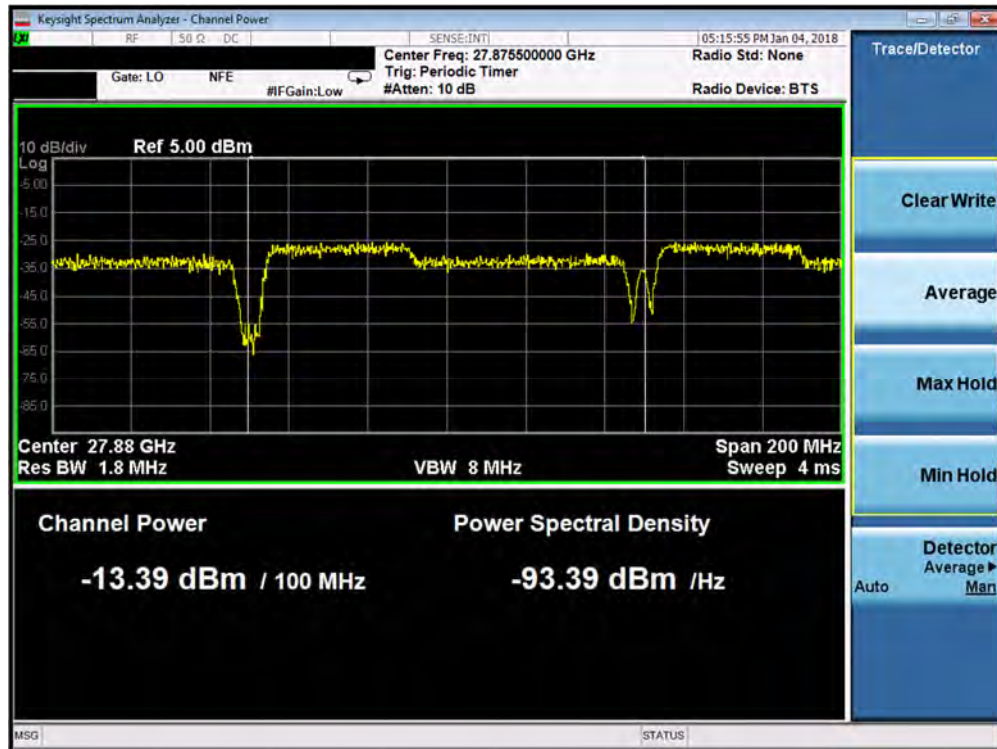


Plot 7-36. Antenna A EIRP Density Plot (8CC 64QAM Low Channel)

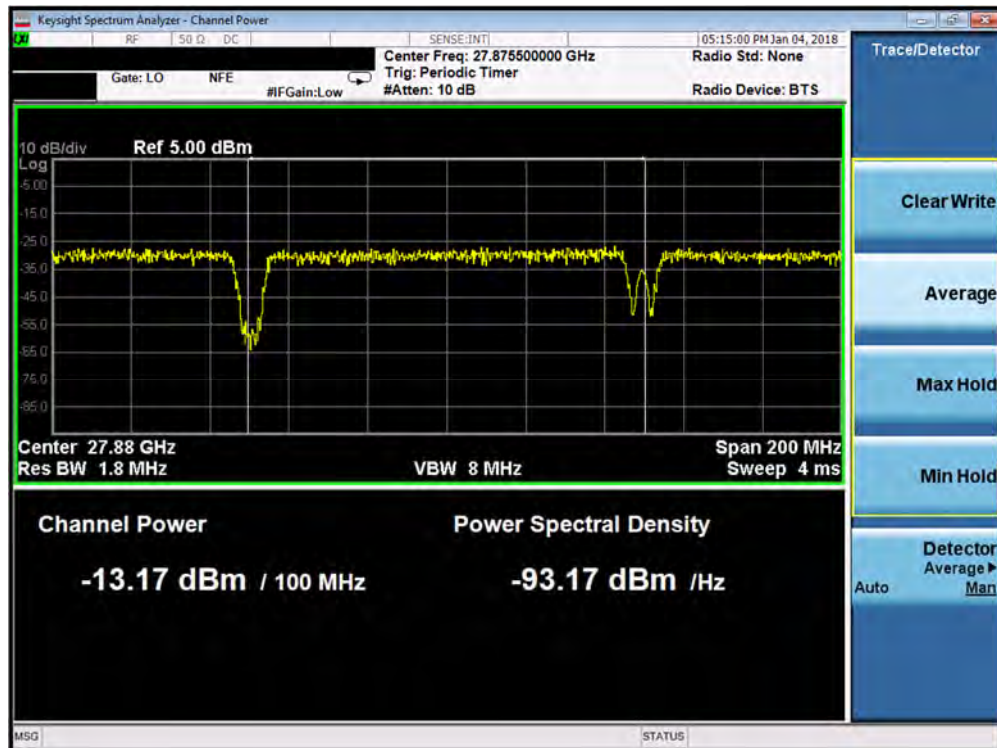


Plot 7-37. Antenna A EIRP Density Plot (8CC QPSK Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 39 of 222

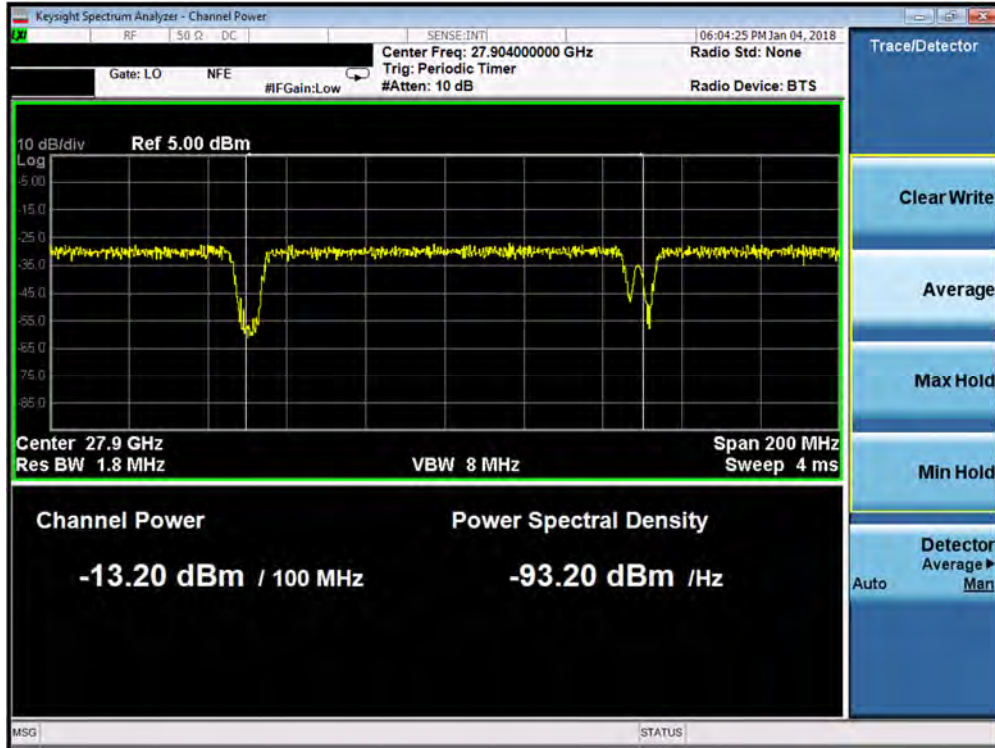


Plot 7-38. Antenna A EIRP Density Plot (8CC 16QAM Mid Channel)

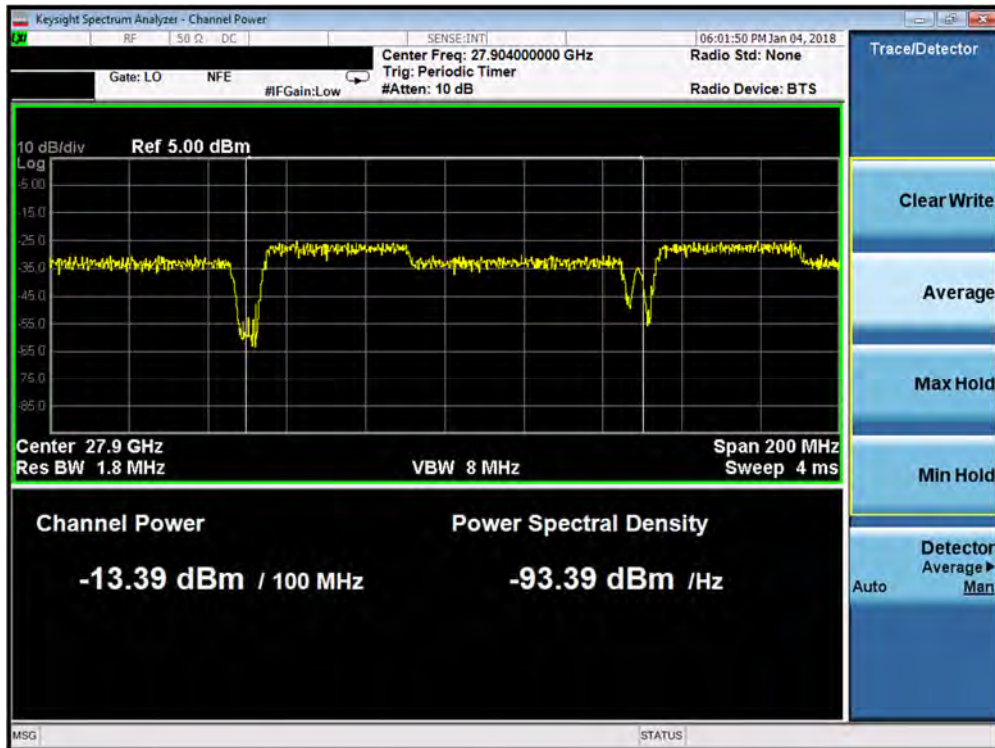


Plot 7-39. Antenna A EIRP Density Plot (8CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 40 of 222

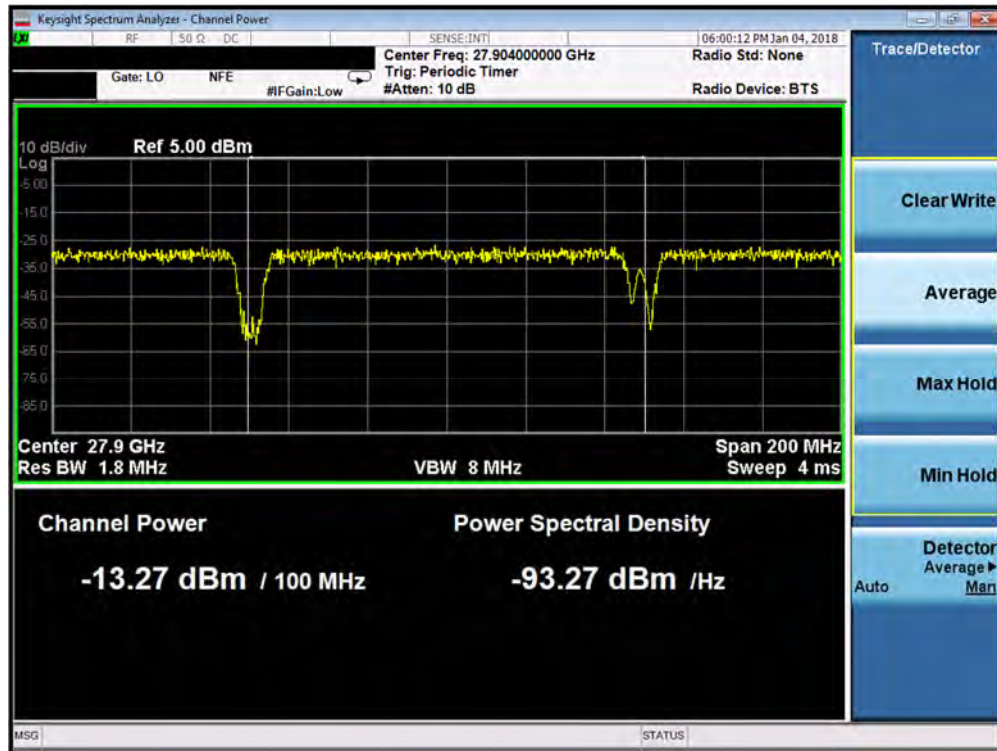


Plot 7-40. Antenna A EIRP Density Plot (8CC QPSK High Channel)



Plot 7-41. Antenna A EIRP Density Plot (8CC 16QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 41 of 222



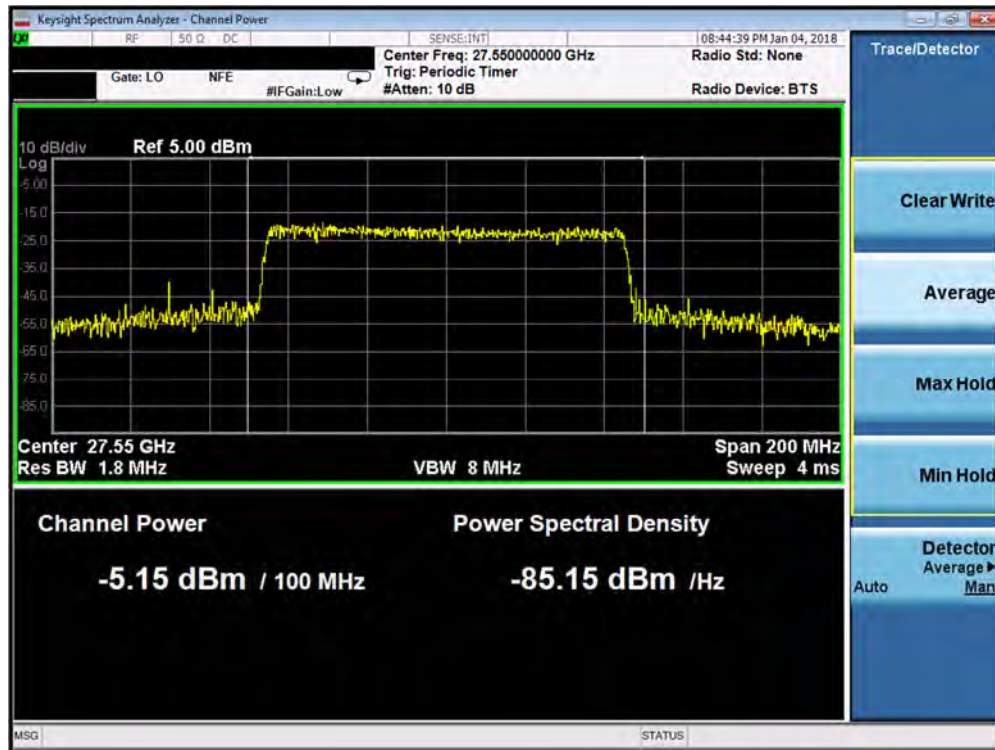
Plot 7-42. Antenna A EIRP Density Plot (8CC 64QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 42 of 222

7.3.2 Antenna B EIRP Density

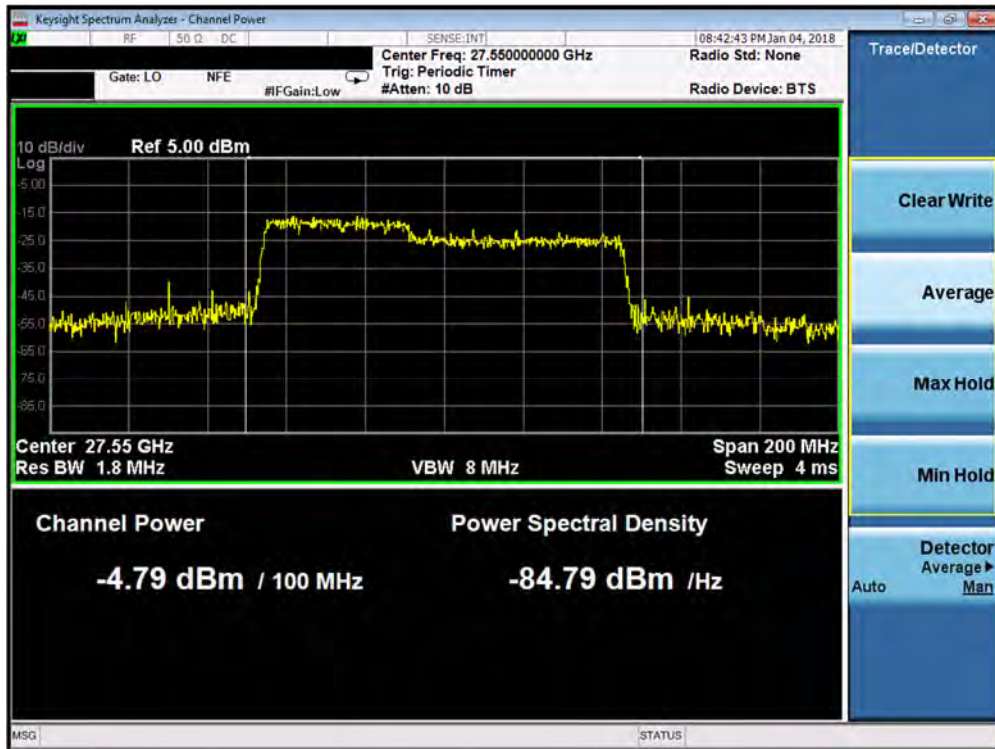
Chan.	Channel Freq [GHz]	CCs active	Modulation	Horn Angle [degrees]	Horn Height [cm]	Turntable Azimuth [degrees]	Analyzer Level [dBm]	AFCL [dB/m]	EUT Antenna Gain [dBi]	Average e.i.r.p. PSD [dBm]	Conducted Average PSD [dBm]	PSD Limit [dBm/100 MHz]	Margin [dB]
Low	27.9	0	QPSK	45.0	146	353	-5.15	52.80	28.15	53.46	25.31	75.00	-21.54
Low	27.9	0	16QAM	45.0	146	353	-4.79	52.80	28.15	53.82	25.67	75.00	-21.18
Low	27.9	0	64QAM	45.0	146	353	-5.15	52.80	28.15	53.46	25.31	75.00	-21.54
Mid	27.925	4	QPSK	45.0	146	353	-4.02	52.80	28.15	54.59	26.44	75.00	-20.41
Mid	27.925	4	16QAM	45.0	146	353	-3.72	52.80	28.15	54.89	26.74	75.00	-20.11
Mid	27.925	4	64QAM	45.0	146	353	-4.33	52.80	28.15	54.28	26.13	75.00	-20.72
High	27.95	7	QPSK	45.0	146	353	-3.82	52.80	28.15	54.79	26.64	75.00	-20.21
High	27.95	7	16QAM	45.0	146	353	-3.94	52.80	28.15	54.67	26.52	75.00	-20.33
High	27.95	7	64QAM	45.0	146	353	-3.80	52.80	28.15	54.81	26.66	75.00	-20.19
Low	27.9	0-7	QPSK	45.0	146	353	-13.82	52.80	28.15	44.79	16.64	75.00	-30.21
Low	27.9	0-7	16QAM	45.0	146	353	-14.13	52.80	28.15	44.48	16.33	75.00	-30.52
Low	27.9	0-7	64QAM	45.0	146	353	-13.82	52.80	28.15	44.79	16.64	75.00	-30.21
Mid	27.925	0-7	QPSK	45.0	146	353	-13.49	52.80	28.15	45.12	16.97	75.00	-29.88
Mid	27.925	0-7	16QAM	45.0	146	353	-13.87	52.80	28.15	44.74	16.59	75.00	-30.26
Mid	27.925	0-7	64QAM	45.0	146	353	-13.84	52.80	28.15	44.77	16.62	75.00	-30.23
High	27.95	0-7	QPSK	45.0	146	353	-13.46	52.80	28.15	45.15	17.00	75.00	-29.85
High	27.95	0-7	16QAM	45.0	146	353	-13.46	52.80	28.15	45.15	17.00	75.00	-29.85
High	27.95	0-7	64QAM	45.0	146	353	-13.32	52.80	28.15	45.29	17.14	75.00	-29.71

Table 7-7. Antenna B Power Density Summary Data

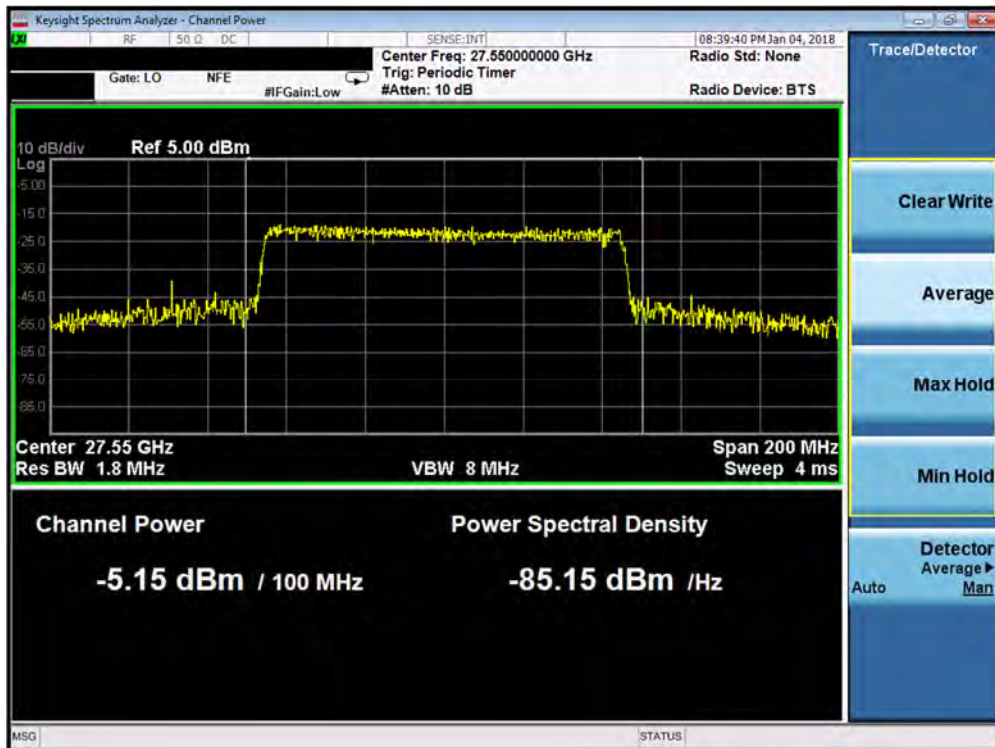


Plot 7-43. Antenna B EIRP Density Plot (1CC QPSK Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit	Page 43 of 222

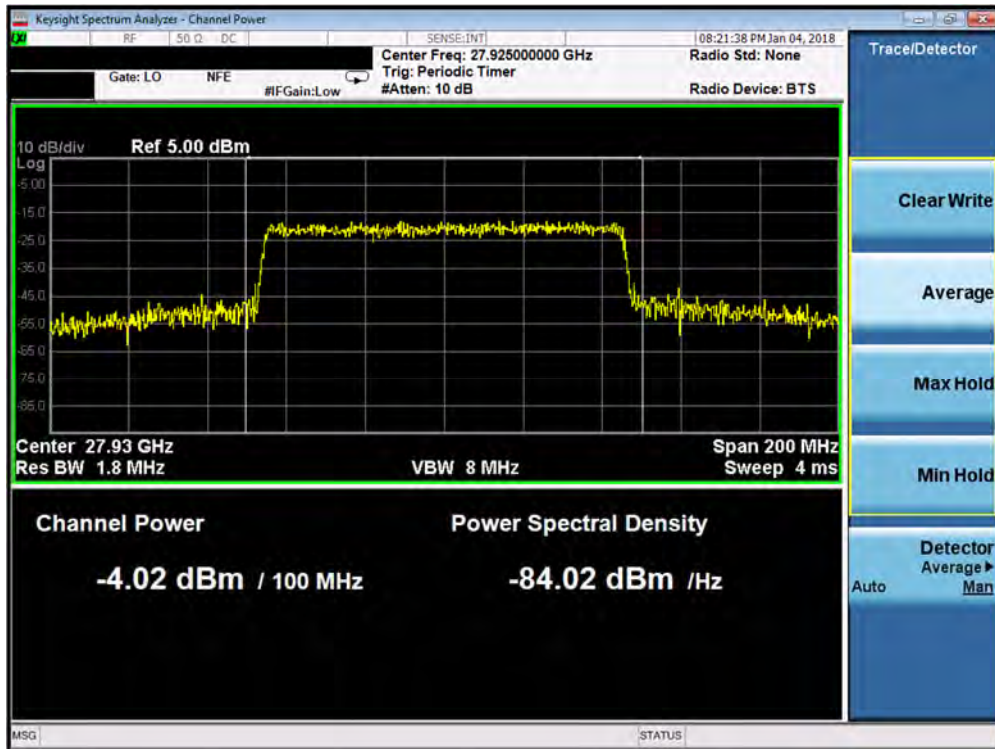


Plot 7-44. Antenna B EIRP Density Plot (1CC 16QAM Low Channel)



Plot 7-45. Antenna B EIRP Density Plot (1CC 64QAM Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 44 of 222

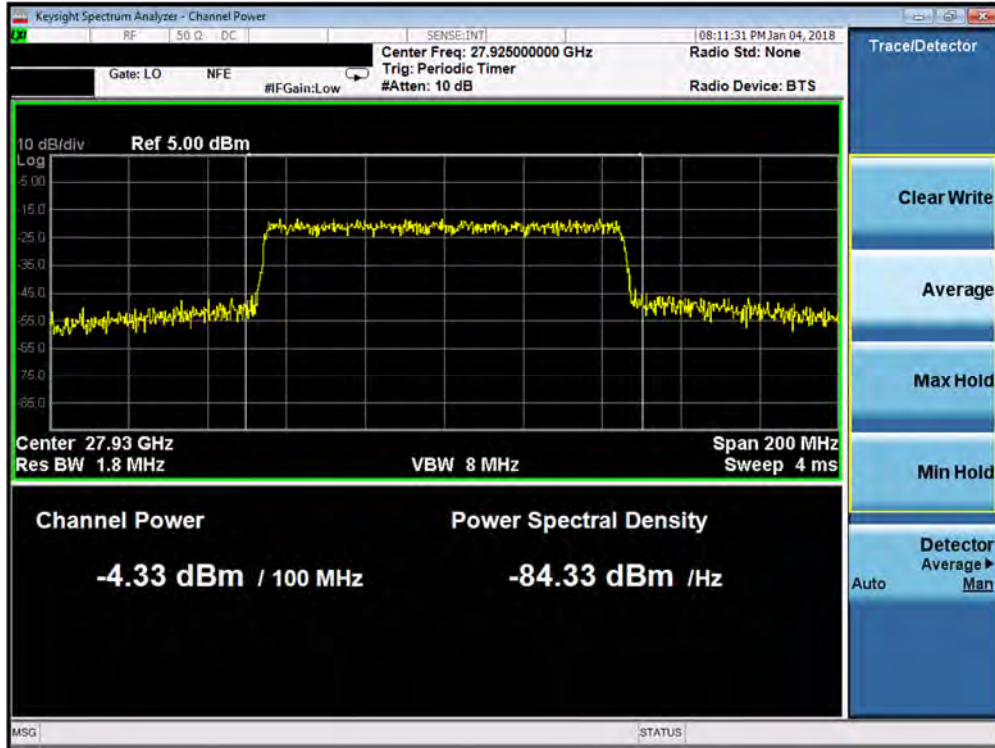


Plot 7-46. Antenna B EIRP Density Plot (1CC QPSK Mid Channel)

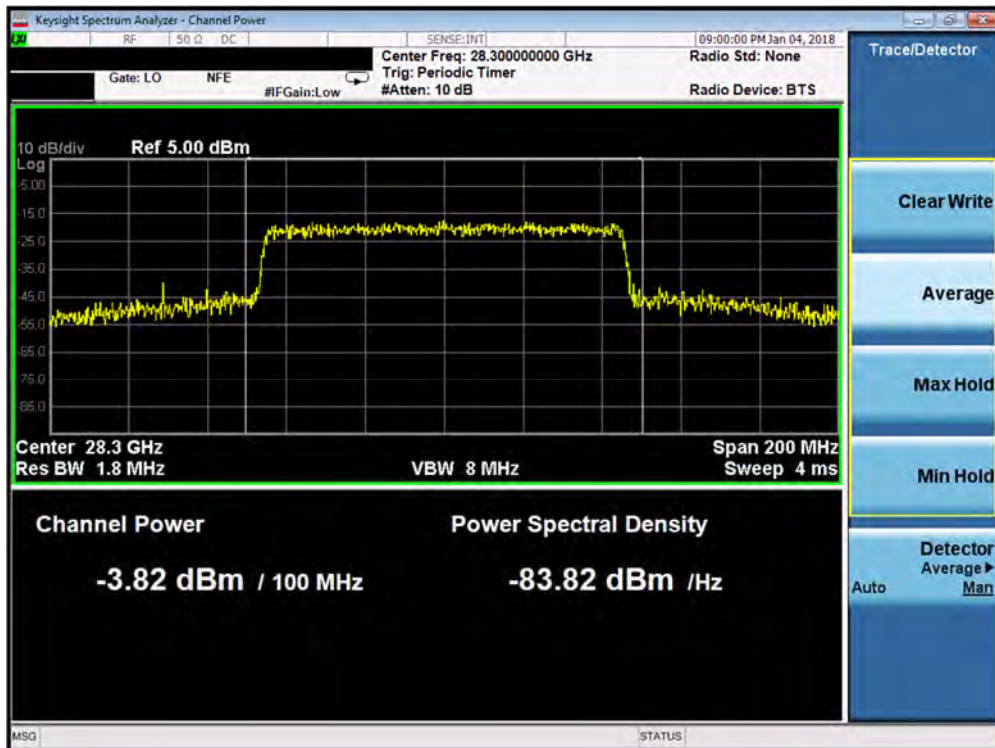


Plot 7-47. Antenna B EIRP Density Plot (1CC 16QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 45 of 222

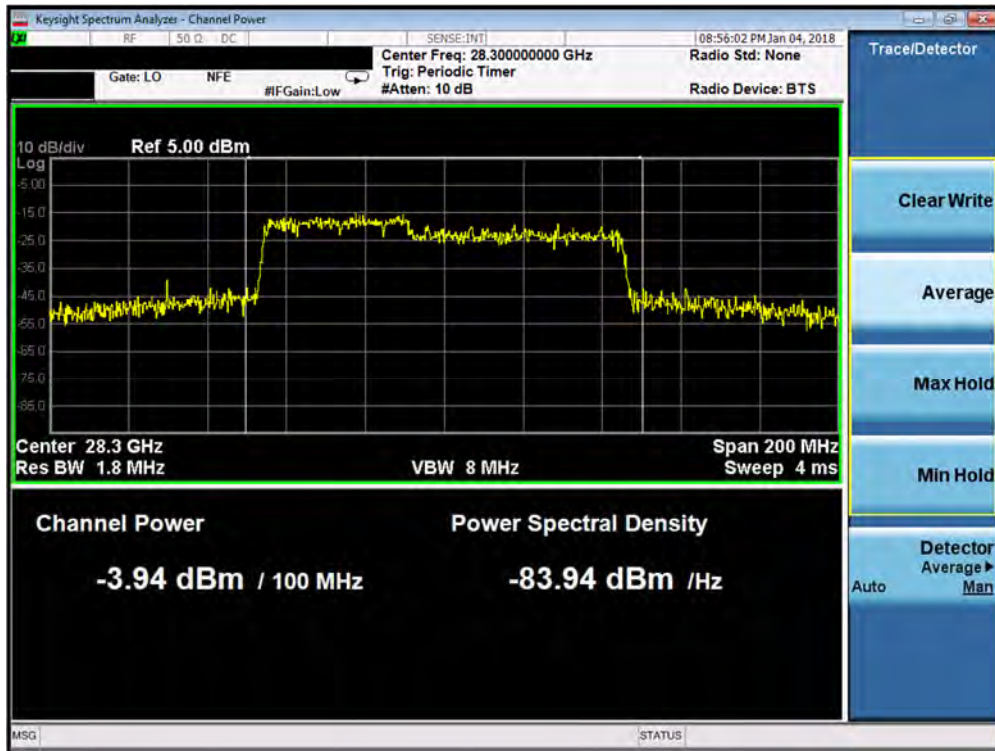


Plot 7-48. Antenna B EIRP Density Plot (1CC 64QAM Mid Channel)



Plot 7-49. Antenna B EIRP Density Plot (1CC QPSK High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 46 of 222

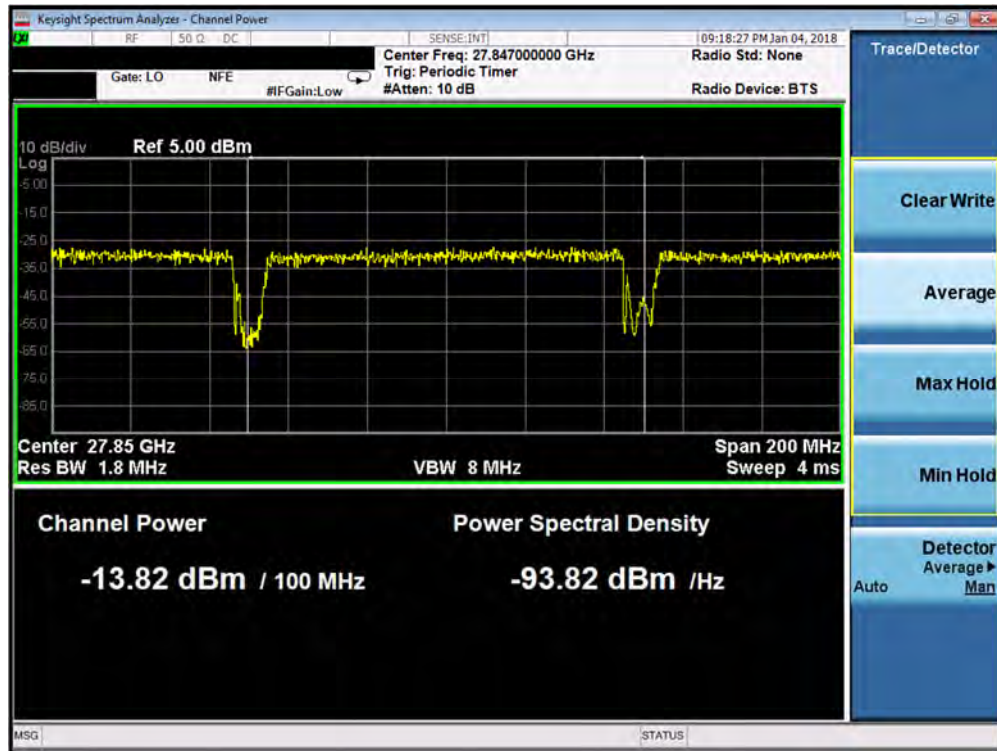


Plot 7-50. Antenna B EIRP Density Plot (1CC 16QAM High Channel)

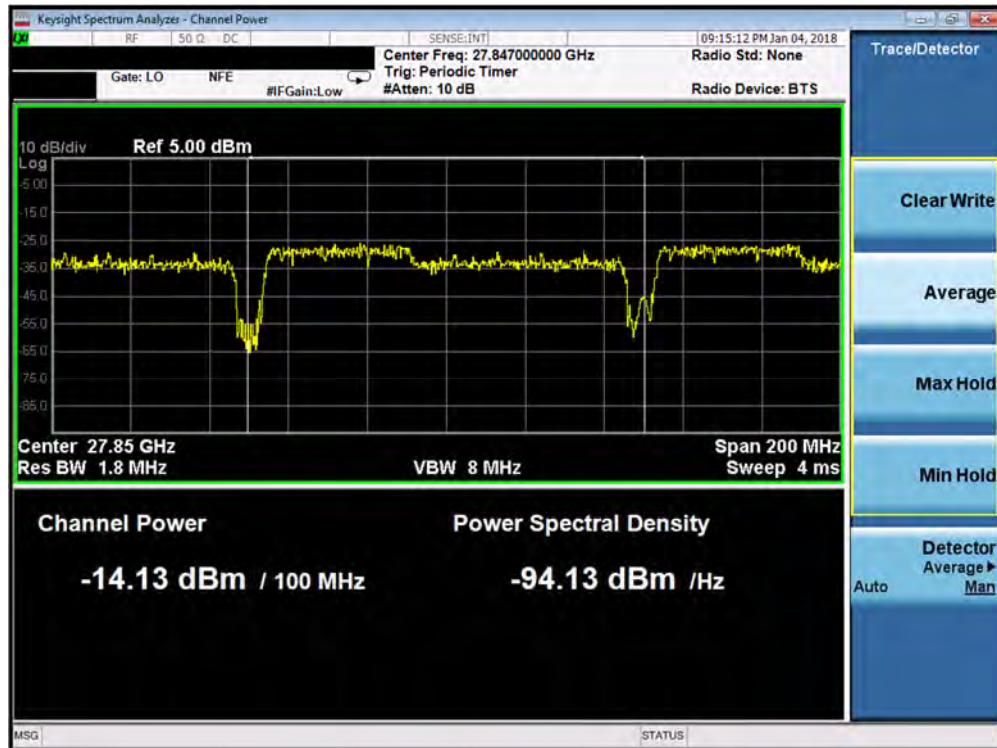


Plot 7-51. Antenna B EIRP Density Plot (1CC 64QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 47 of 222

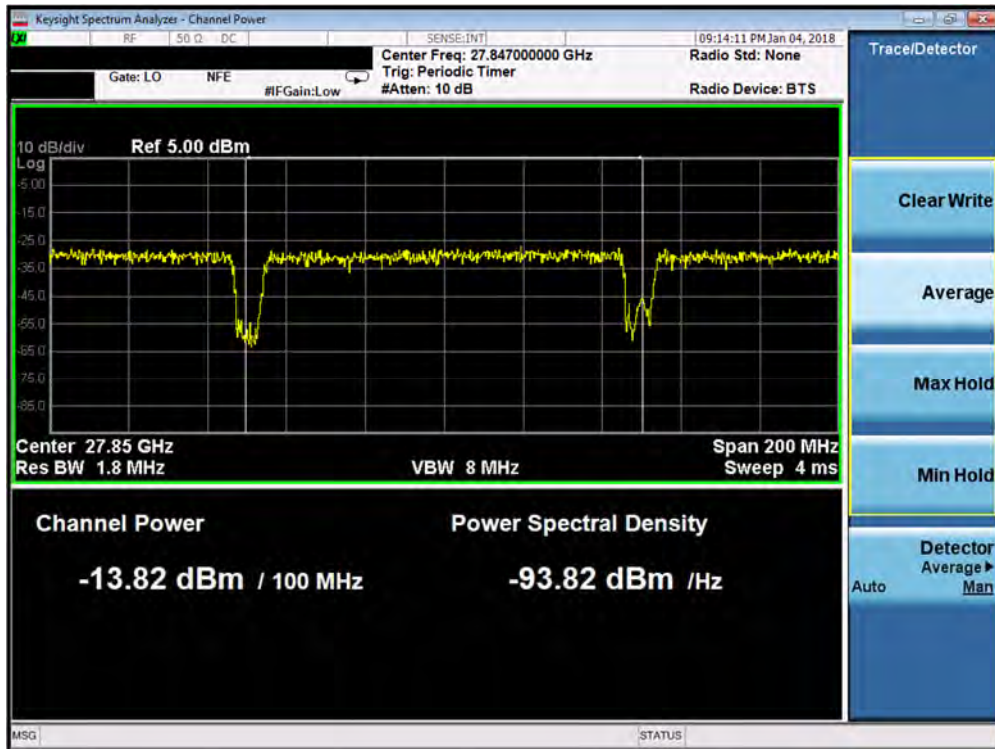


Plot 7-52. Antenna B EIRP Density Plot (8CC QPSK Low Channel)

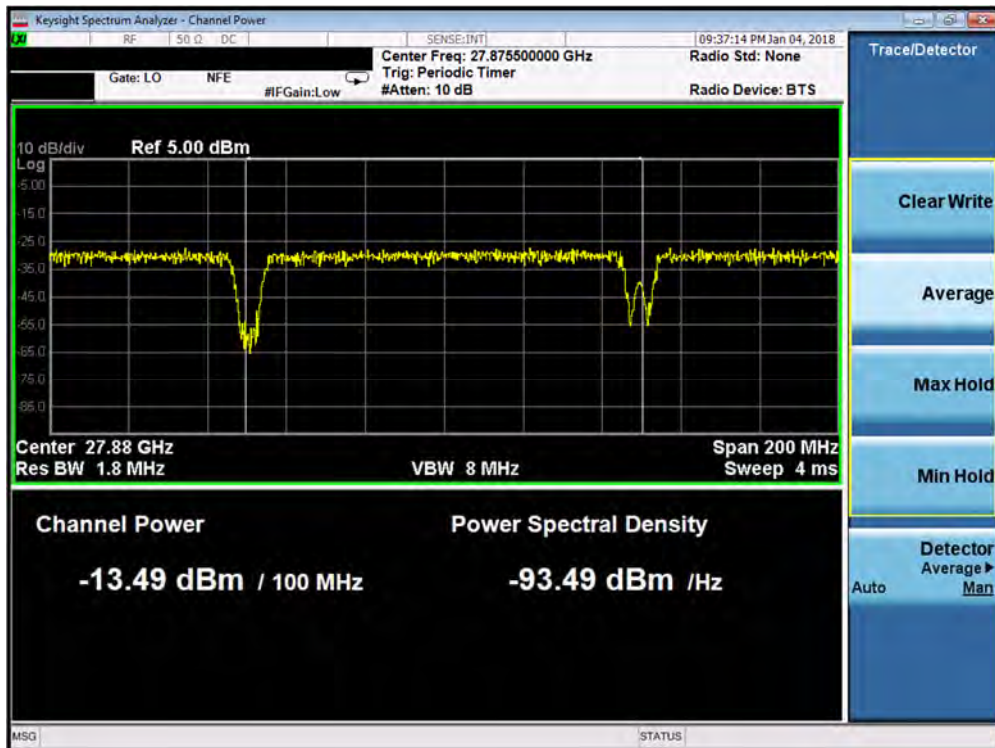


Plot 7-53. Antenna B EIRP Density Plot (8CC 16QAM Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 48 of 222

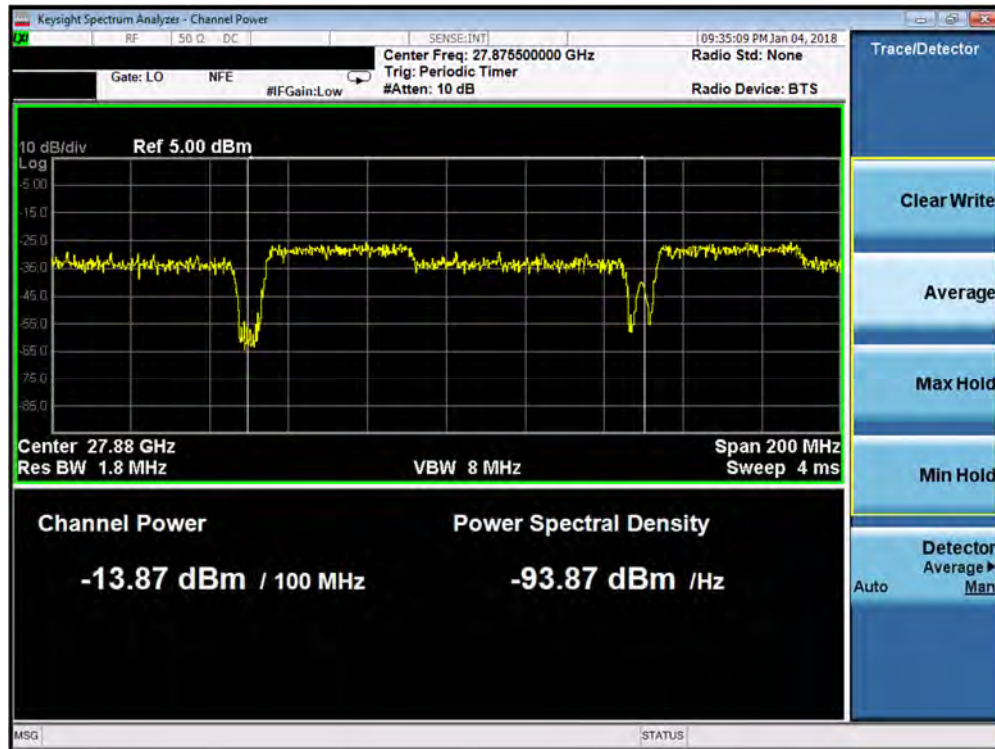


Plot 7-54. Antenna B EIRP Density Plot (8CC 64QAM Low Channel)

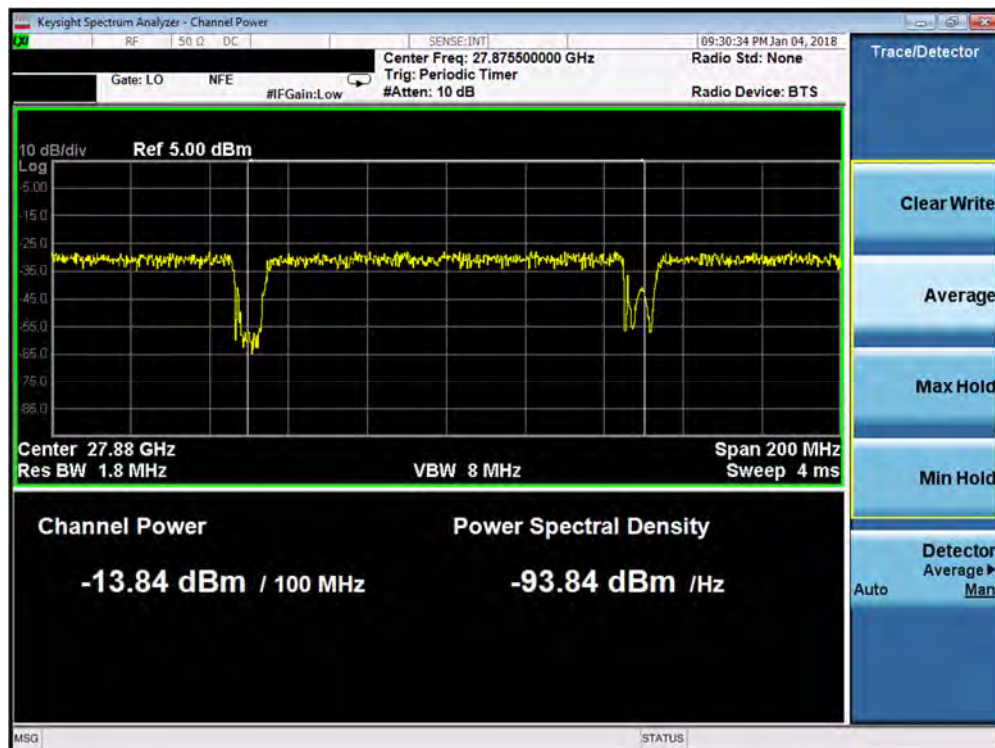


Plot 7-55. Antenna B EIRP Density Plot (8CC QPSK Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 49 of 222

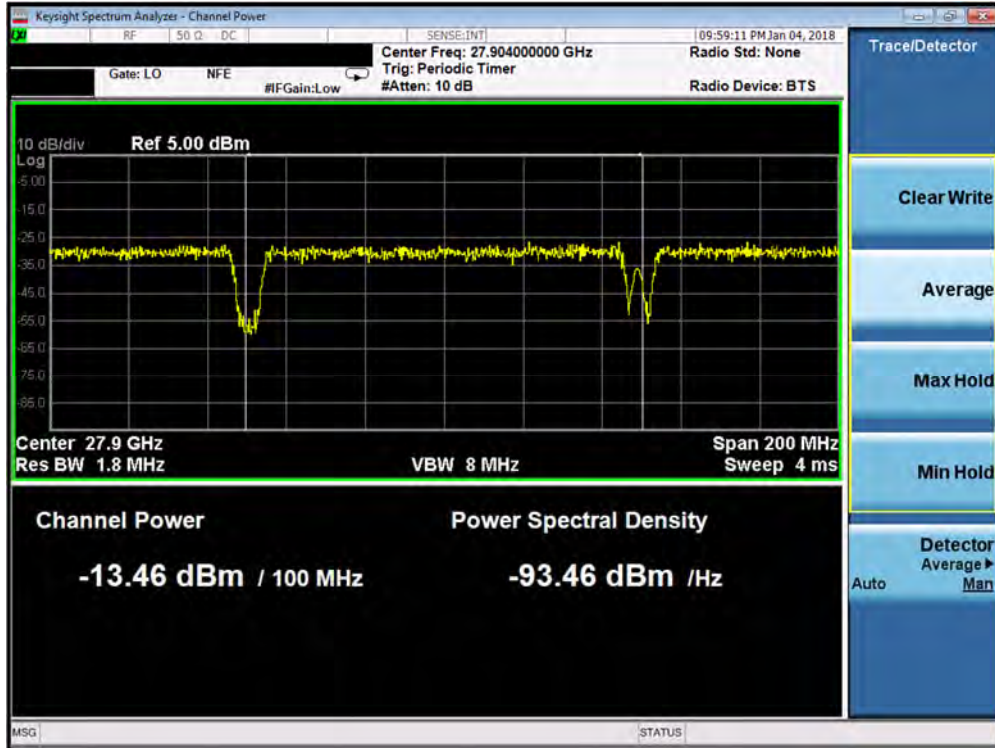


Plot 7-56. Antenna B EIRP Density Plot (8CC 16QAM Mid Channel)

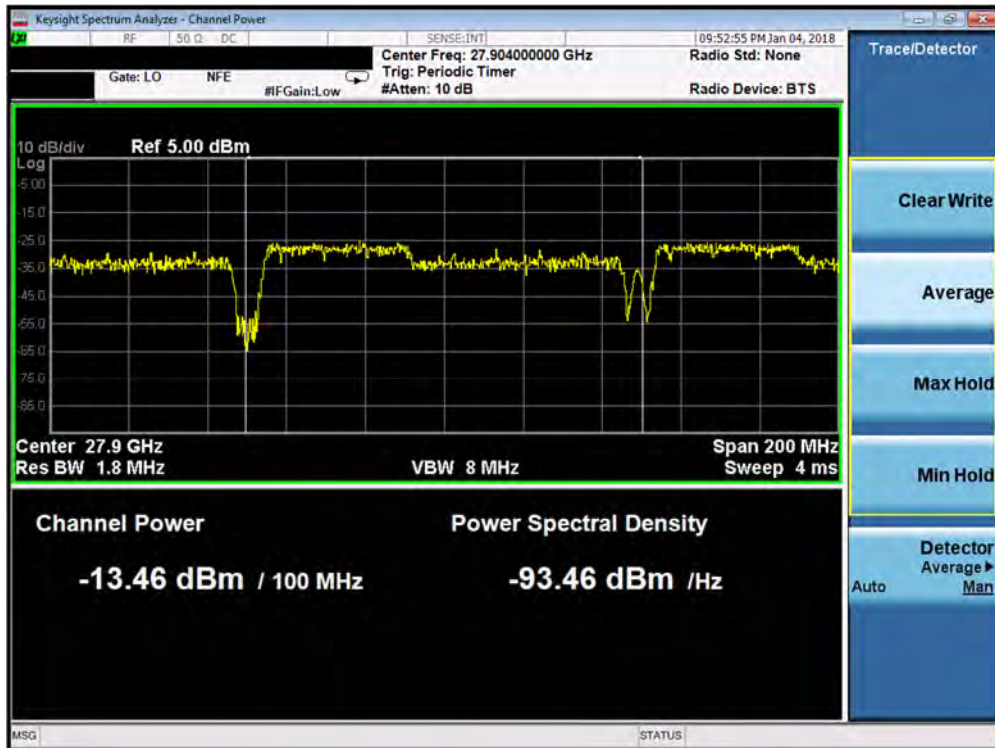


Plot 7-57. Antenna B EIRP Density Plot (8CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 50 of 222

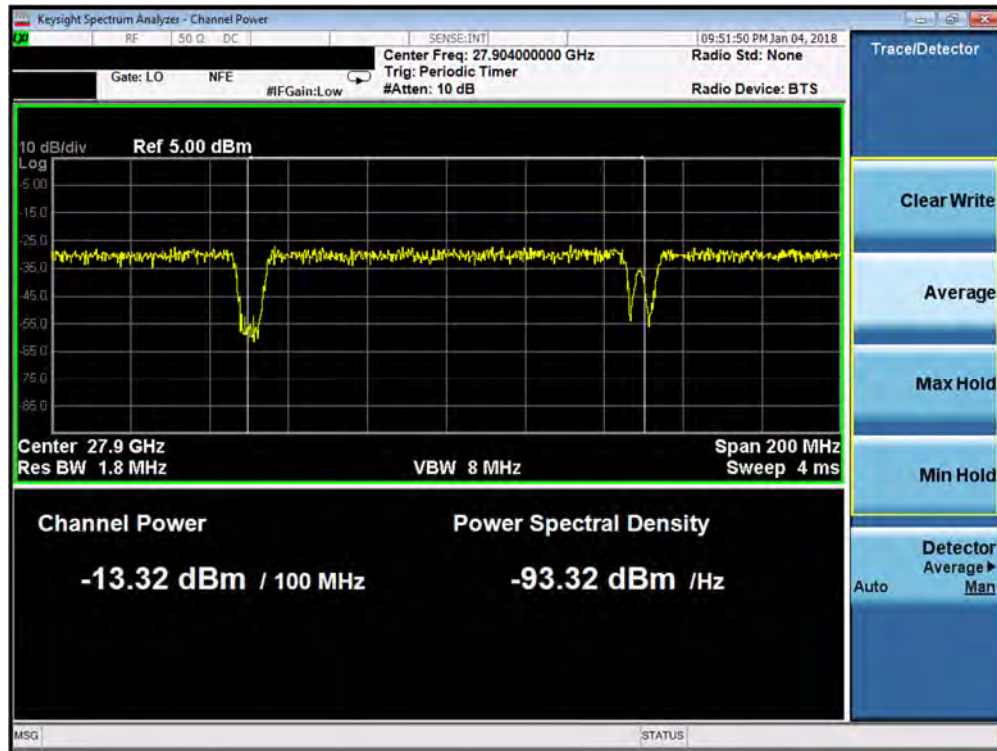


Plot 7-58. Antenna B EIRP Density Plot (8CC QPSK High Channel)



Plot 7-59. Antenna B EIRP Density Plot (8CC 16QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 51 of 222



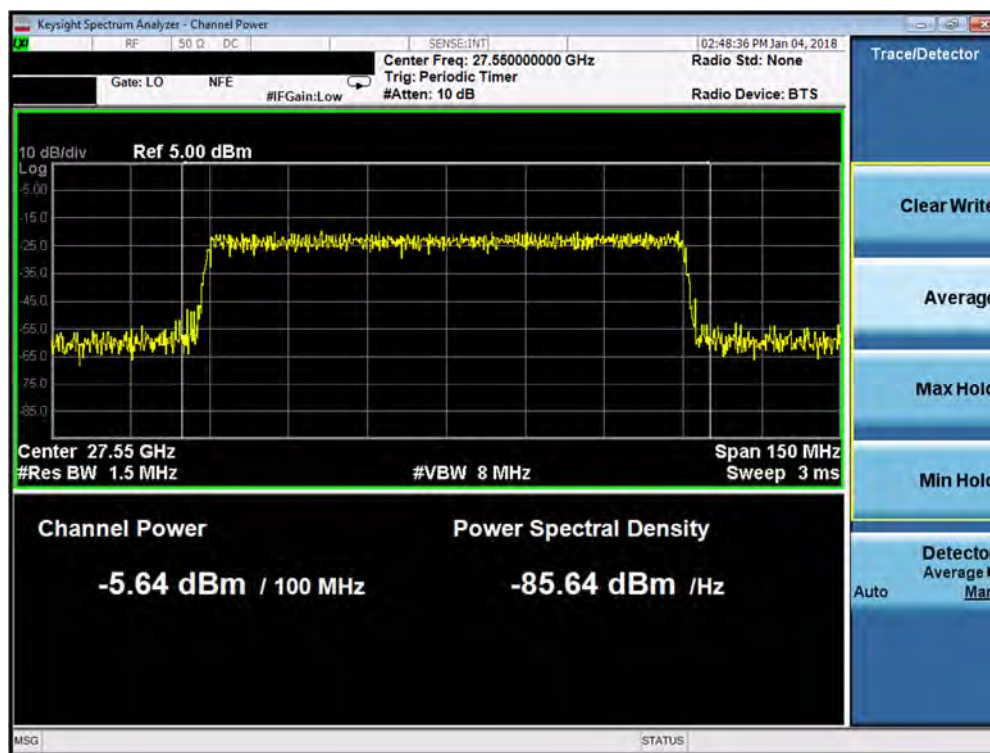
Plot 7-60. Antenna B EIRP Density Plot (8CC 64QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 52 of 222

7.3.3 Antenna C EIRP Density

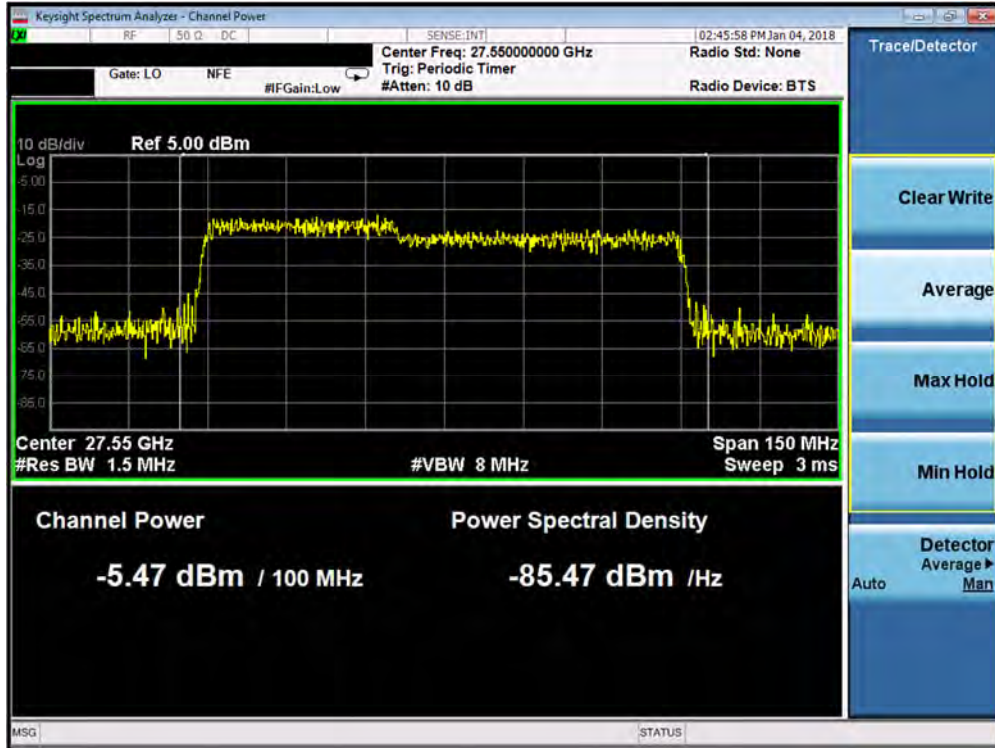
Chan.	Channel Freq [GHz]	CCs active	Modulation	Horn Angle [degrees]	Horn Height [cm]	Turntable Azimuth [degrees]	Analyzer Level [dBm]	AFCL [dB/m]	EUT Antenna Gain [dBi]	Average e.i.r.p. PSD [dBm]	Conducted Average PSD [dBm]	PSD Limit [dBm/100 MHz]	Margin [dB]
Low	27.9	0	QPSK	135.0	153	352	-5.64	52.80	28.15	52.97	24.82	75.00	-22.03
Low	27.9	0	16QAM	135.0	153	352	-5.47	52.80	28.15	53.14	24.99	75.00	-21.86
Low	27.9	0	64QAM	135.0	153	352	-5.08	52.80	28.15	53.53	25.38	75.00	-21.47
Mid	27.925	4	QPSK	135.0	153	352	-5.28	52.80	28.15	53.33	25.18	75.00	-21.67
Mid	27.925	4	16QAM	135.0	153	352	-5.01	52.80	28.15	53.60	25.45	75.00	-21.40
Mid	27.925	4	64QAM	135.0	153	352	-4.46	52.80	28.15	54.15	26.00	75.00	-20.85
High	27.95	7	QPSK	135.0	153	352	-3.92	52.80	28.15	54.69	26.54	75.00	-20.31
High	27.95	7	16QAM	135.0	153	352	-4.18	52.80	28.15	54.43	26.28	75.00	-20.57
High	27.95	7	64QAM	135.0	153	352	-4.02	52.80	28.15	54.59	26.44	75.00	-20.41
Low	27.9	0-7	QPSK	135.0	153	352	-13.22	52.80	28.15	45.39	17.24	75.00	-29.61
Low	27.9	0-7	16QAM	135.0	153	352	-13.09	52.80	28.15	45.52	17.37	75.00	-29.48
Low	27.9	0-7	64QAM	135.0	153	352	-13.31	52.80	28.15	45.30	17.15	75.00	-29.70
Mid	27.925	0-7	QPSK	135.0	153	352	-12.77	52.80	28.15	45.84	17.69	75.00	-29.16
Mid	27.925	0-7	16QAM	135.0	153	352	-12.92	52.80	28.15	45.69	17.54	75.00	-29.31
Mid	27.925	0-7	64QAM	135.0	153	352	-12.80	52.80	28.15	45.81	17.66	75.00	-29.19
High	27.95	0-7	QPSK	135.0	153	352	-14.32	52.80	28.15	44.29	16.14	75.00	-30.71
High	27.95	0-7	16QAM	135.0	153	352	-14.43	52.80	28.15	44.18	16.03	75.00	-30.82
High	27.95	0-7	64QAM	135.0	153	352	-14.00	52.80	28.15	44.61	16.46	75.00	-30.39

Table 7-8. Antenna C Power Density Summary Data

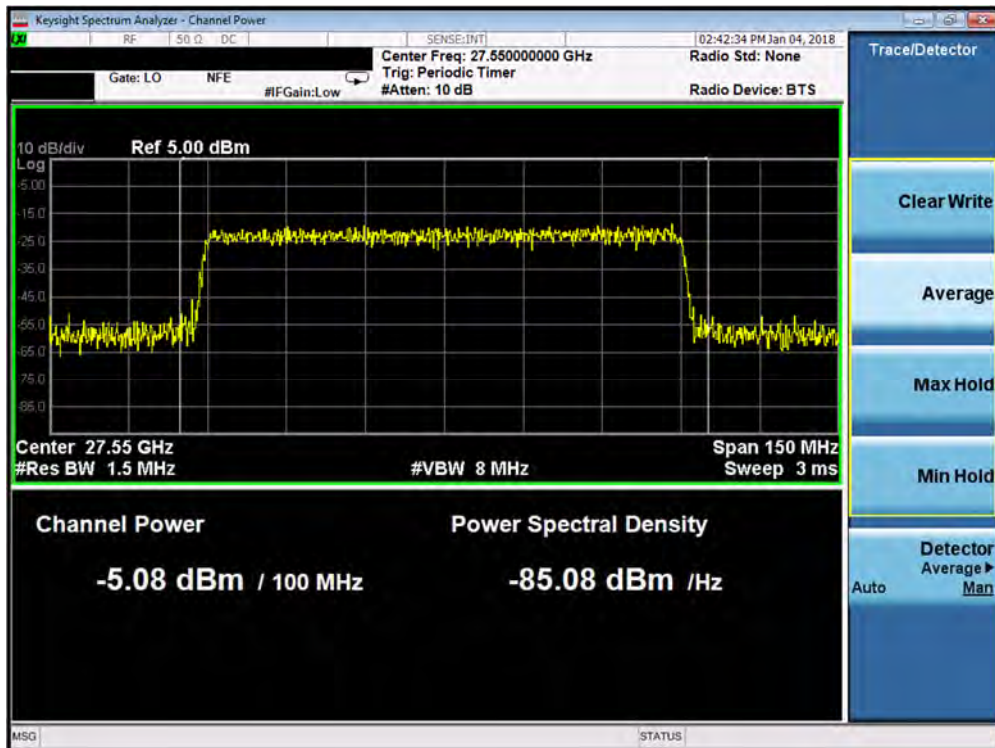


Plot 7-61. Antenna C EIRP Density Plot (1CC QPSK Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 53 of 222

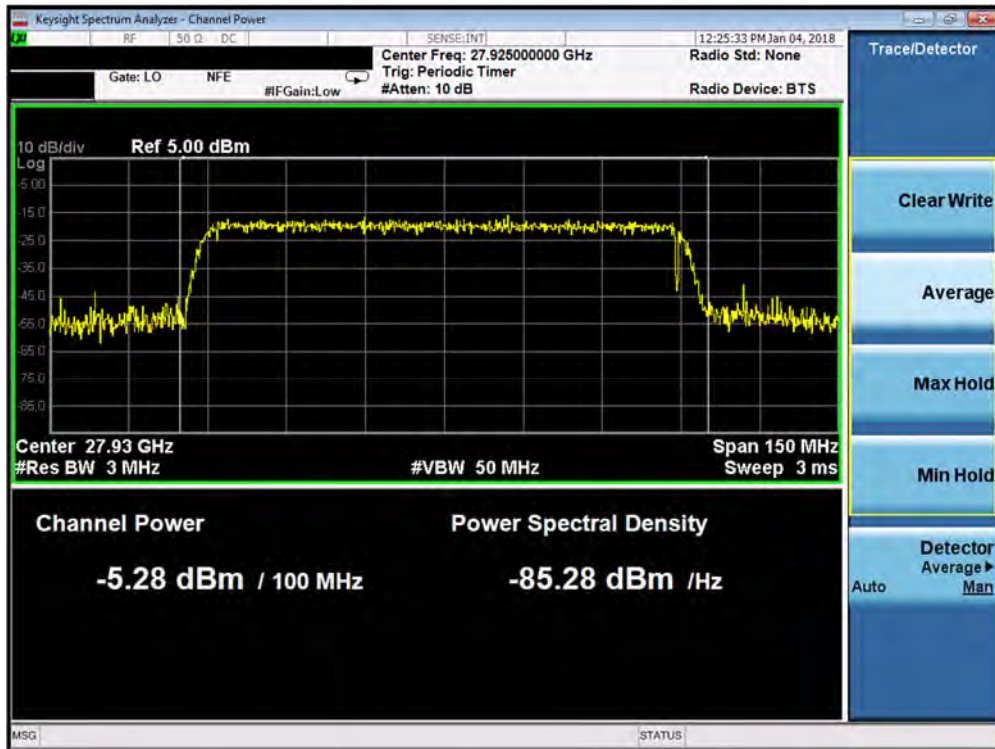


Plot 7-62. Antenna C EIRP Density Plot (1CC 16QAM Low Channel)

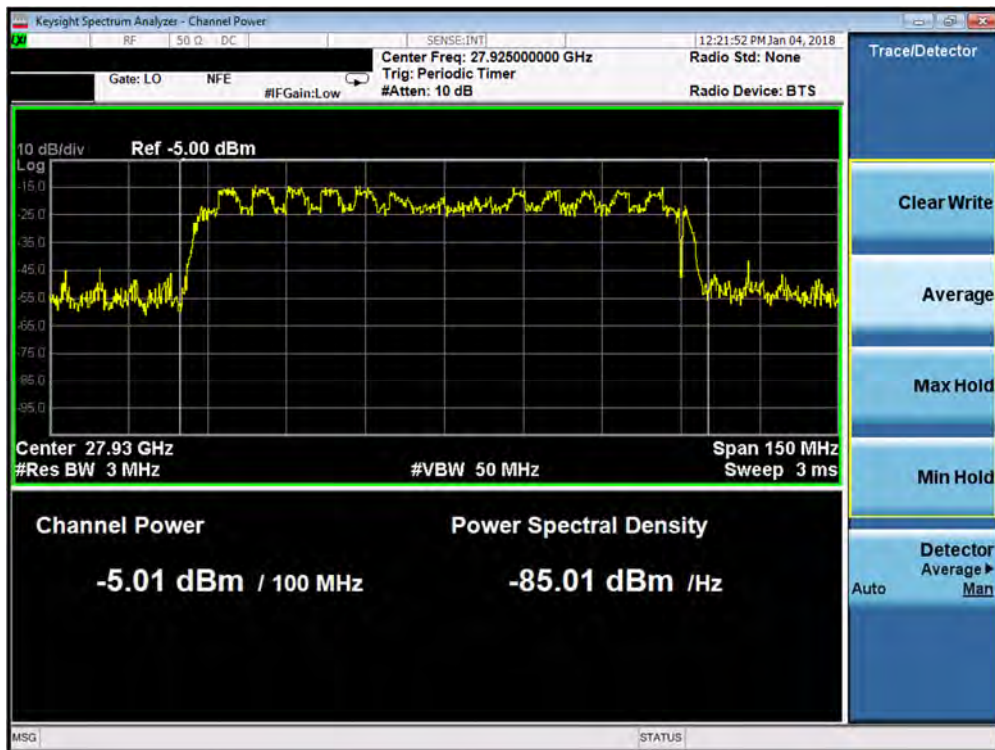


Plot 7-63. Antenna C EIRP Density Plot (1CC 64QAM Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 54 of 222

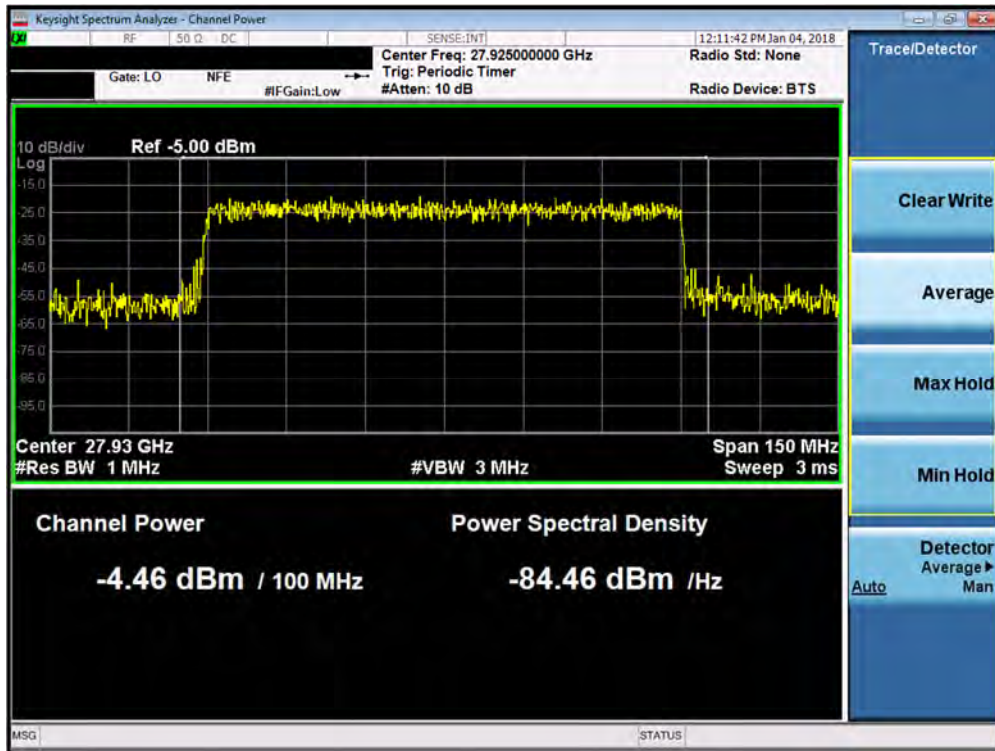


Plot 7-64. Antenna C EIRP Density Plot (1CC QPSK Mid Channel)

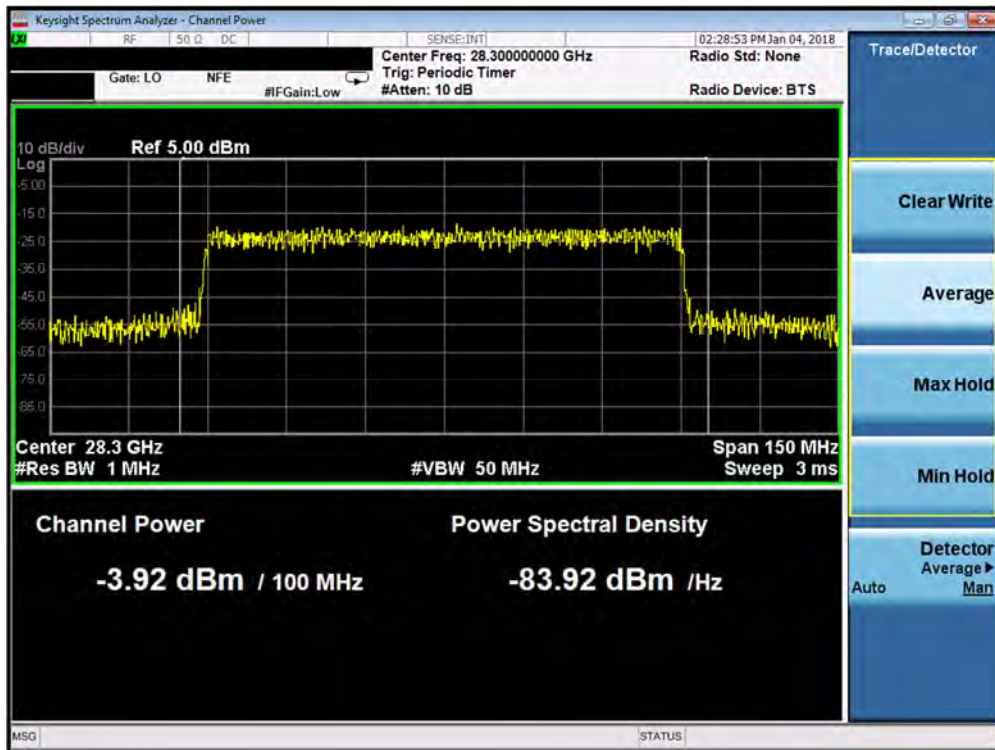


Plot 7-65. Antenna C EIRP Density Plot (1CC 16QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 55 of 222

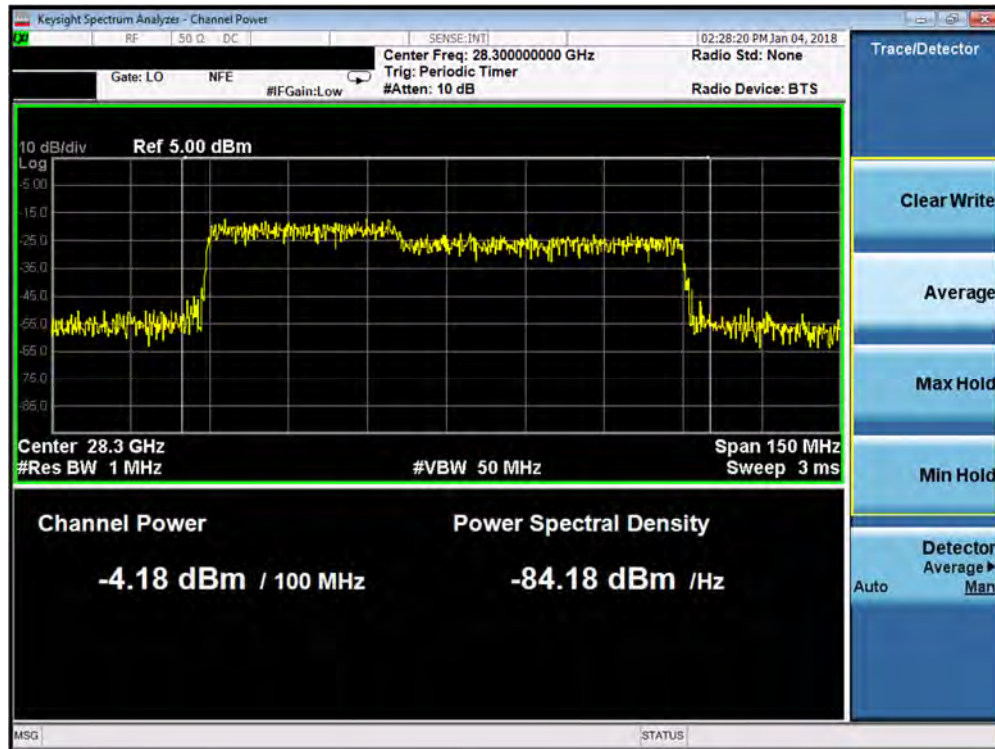


Plot 7-66. Antenna C EIRP Density Plot (1CC 64QAM Mid Channel)

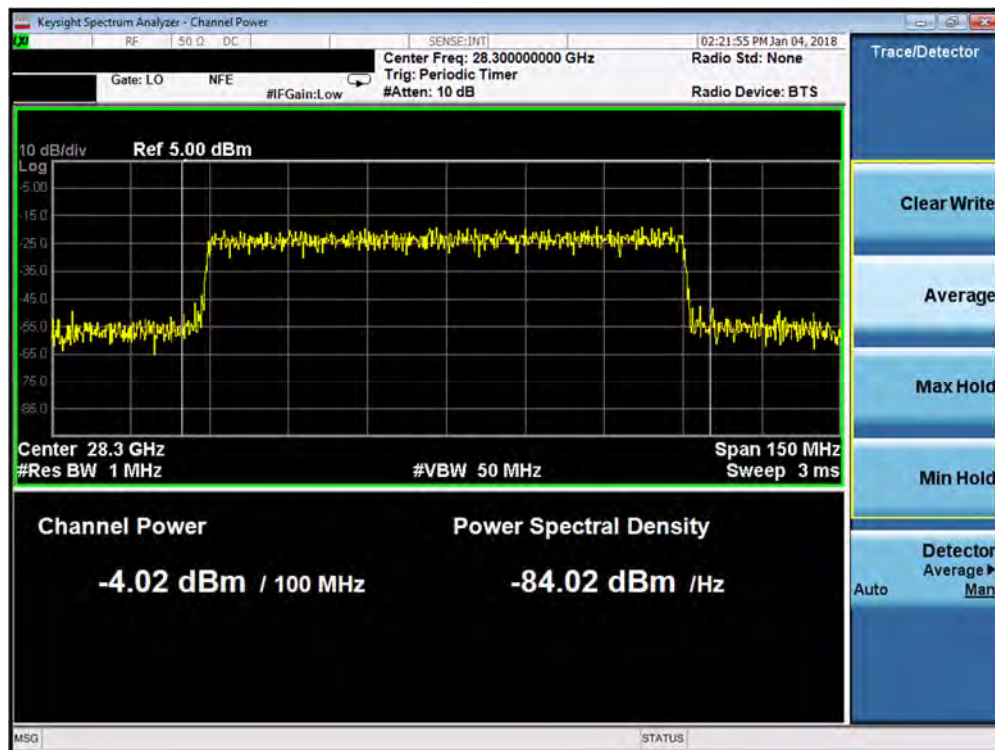


Plot 7-67. Antenna C EIRP Density Plot (1CC QPSK High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 56 of 222



Plot 7-68. Antenna C EIRP Density Plot (1CC 16QAM High Channel)

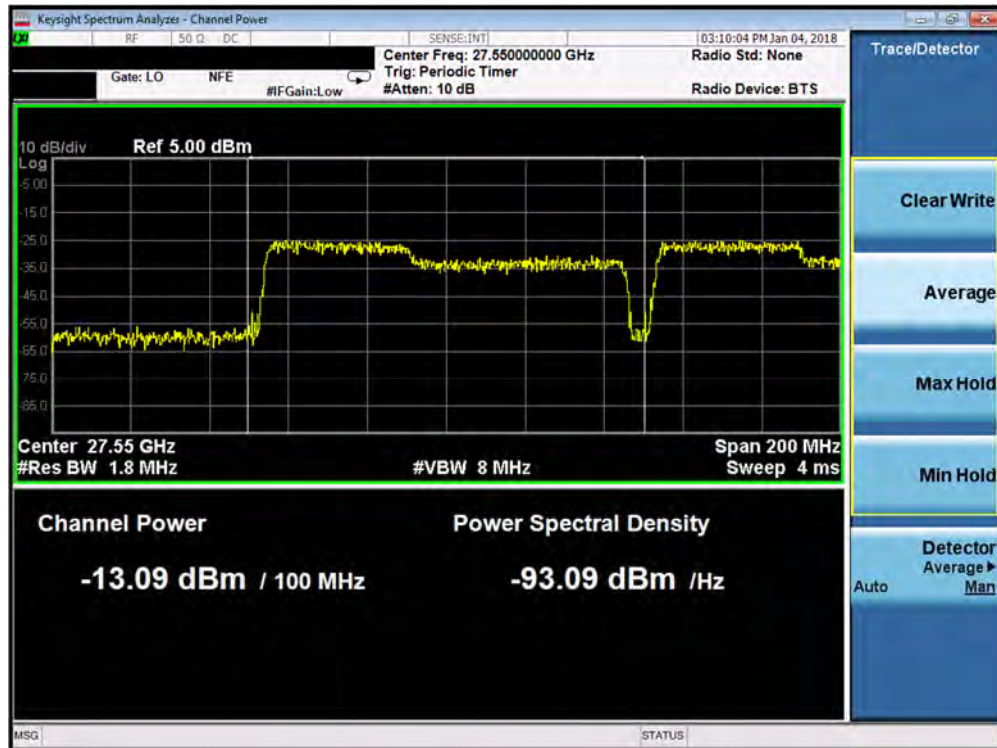


Plot 7-69. Antenna C EIRP Density Plot (1CC 64QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 57 of 222

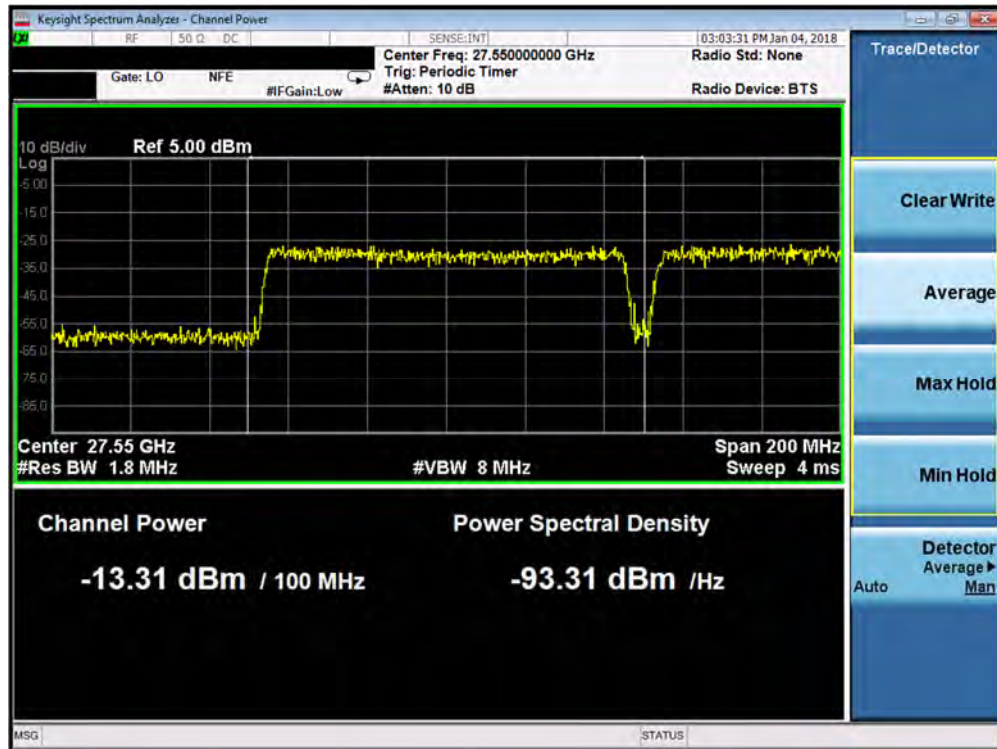


Plot 7-70. Antenna C EIRP Density Plot (8CC QPSK Low Channel)

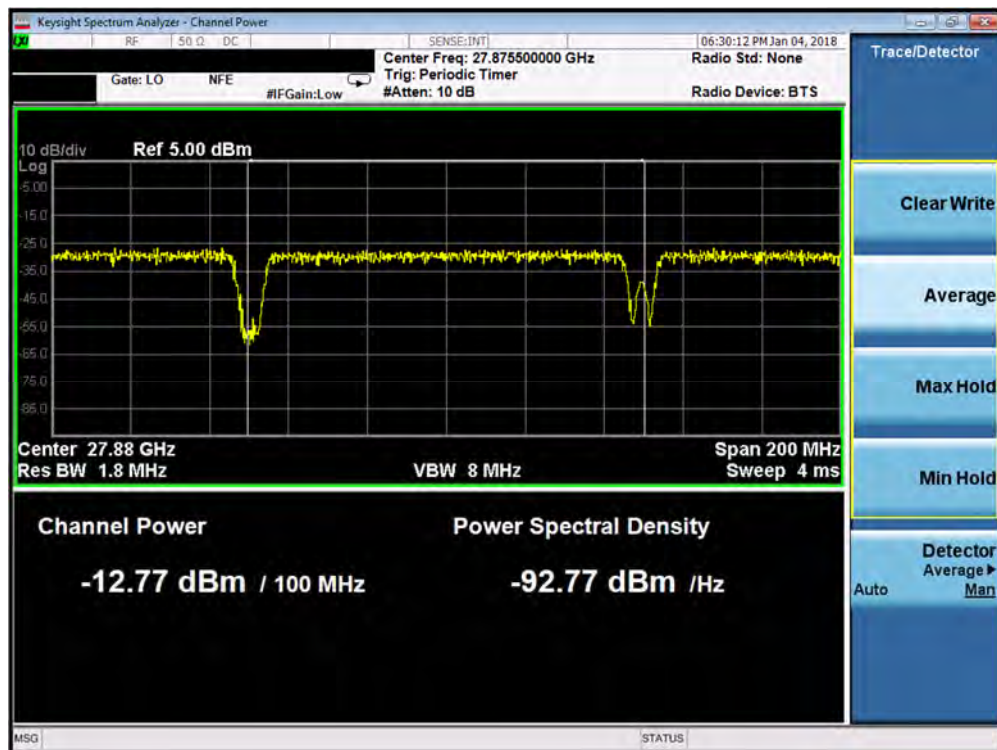


Plot 7-71. Antenna C EIRP Density Plot (8CC 16QAM Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 58 of 222

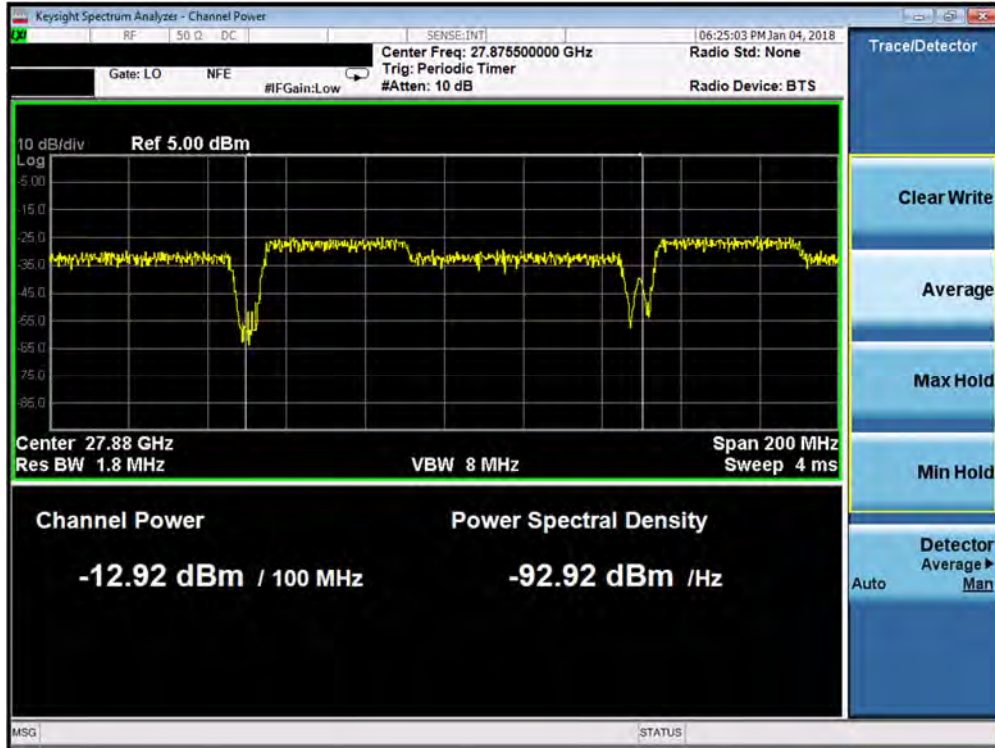


Plot 7-72. Antenna C EIRP Density Plot (8CC 64QAM Low Channel)

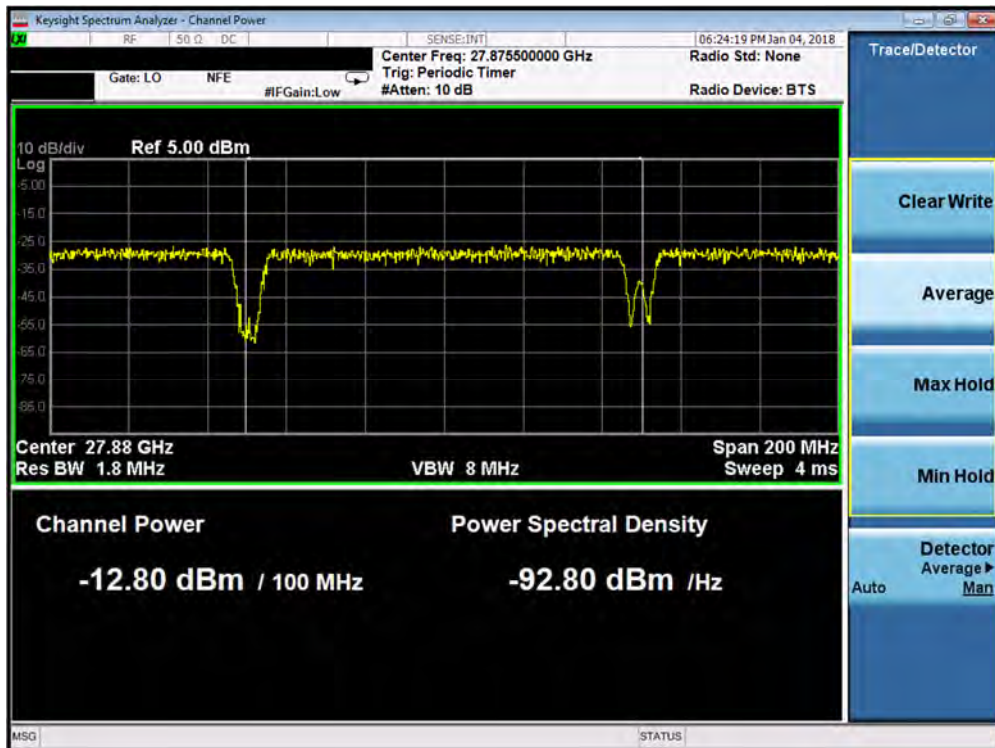


Plot 7-73. Antenna C EIRP Density Plot (8CC QPSK Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 59 of 222

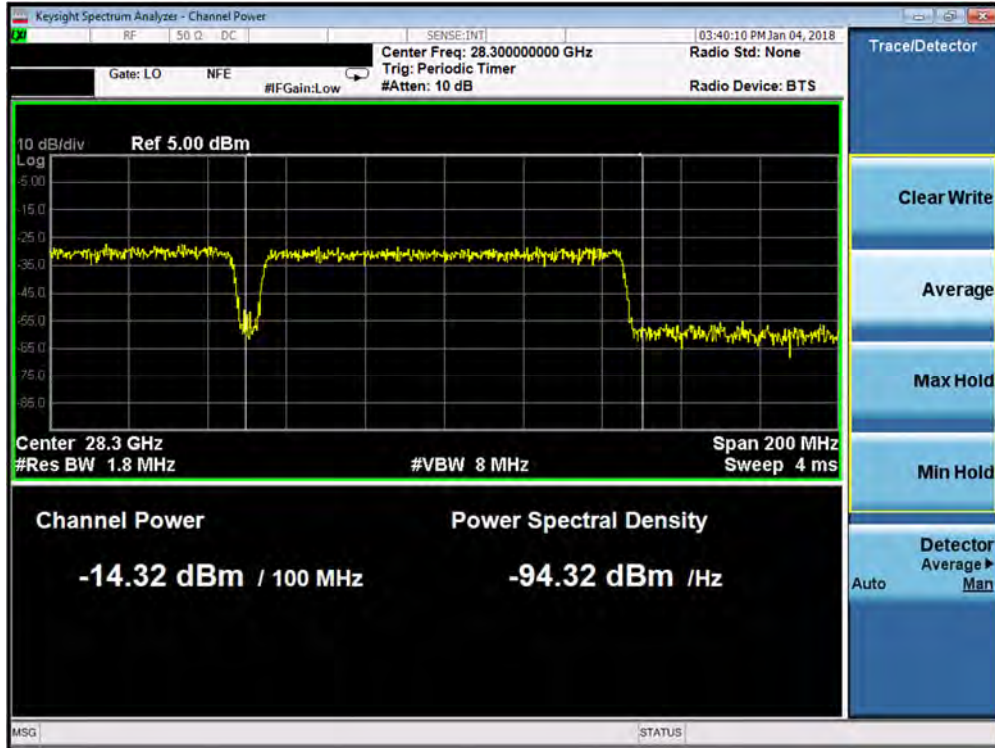


Plot 7-74. Antenna C EIRP Density Plot (8CC 16QAM Mid Channel)

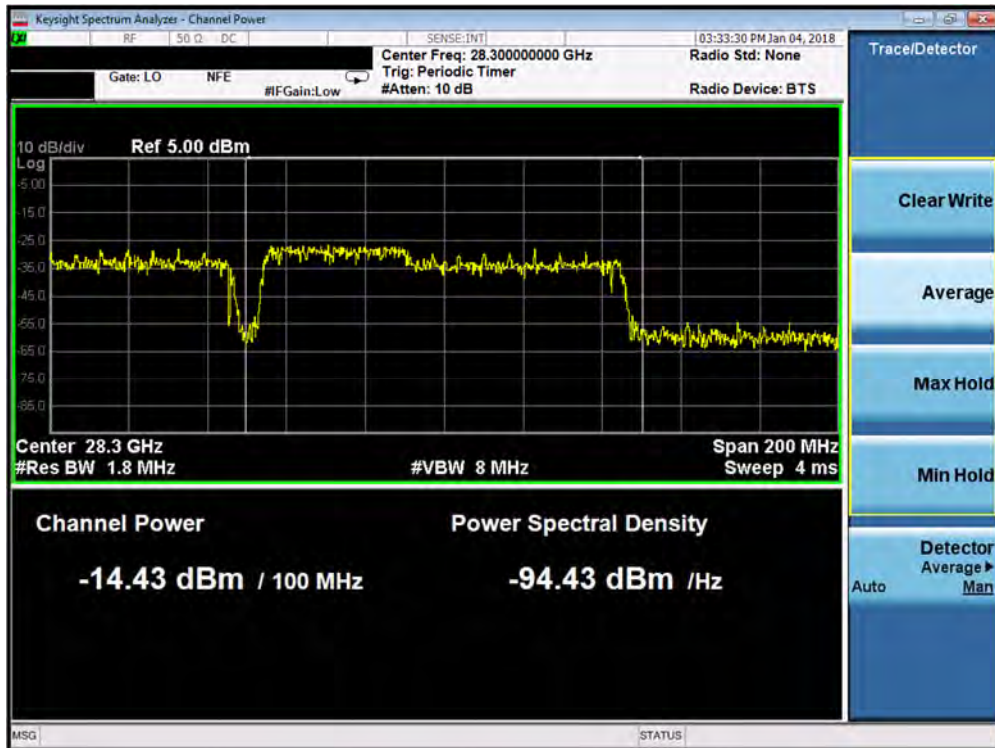


Plot 7-75. Antenna C EIRP Density Plot (8CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 60 of 222

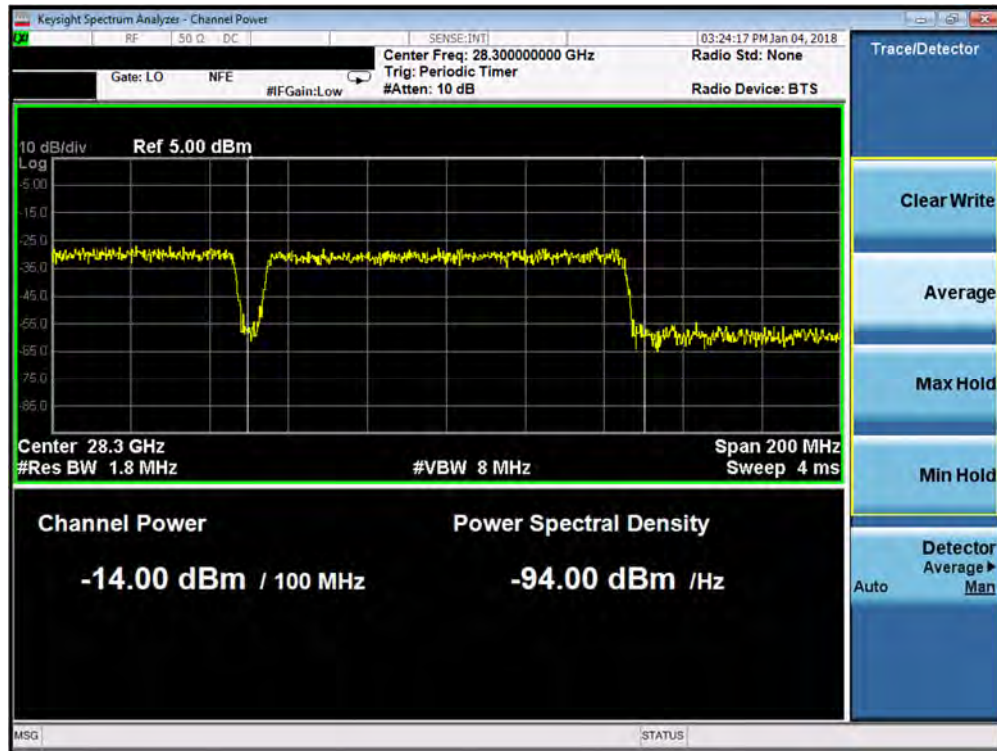


Plot 7-76. Antenna C EIRP Density Plot (8CC QPSK High Channel)



Plot 7-77. Antenna C EIRP Density Plot (8CC 16QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 61 of 222



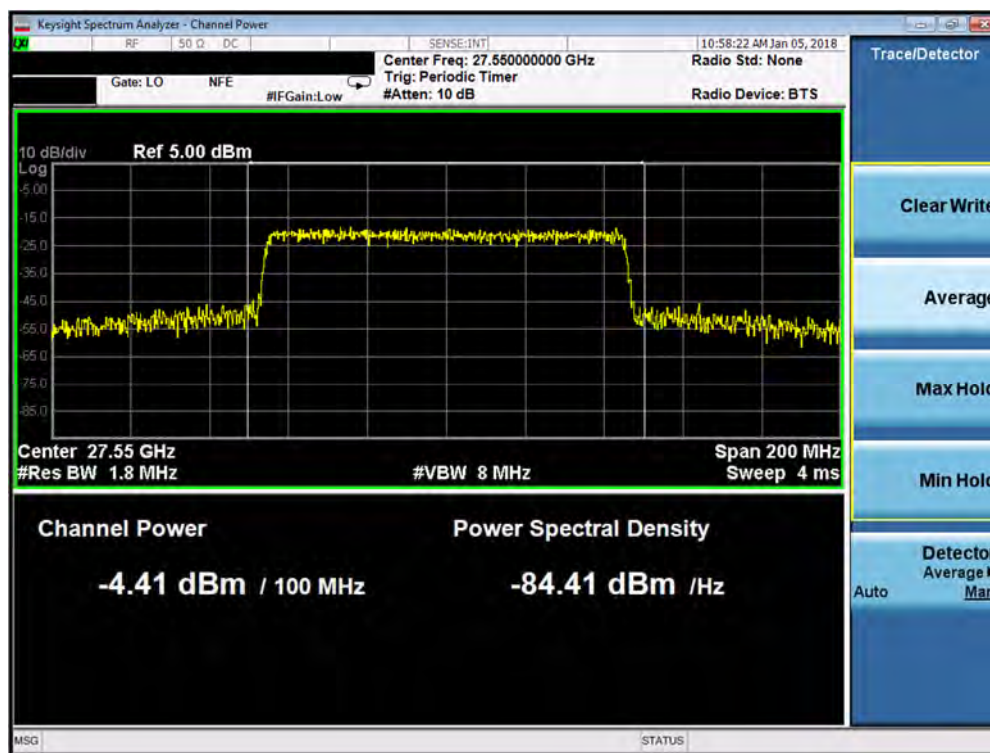
Plot 7-78. Antenna C EIRP Density Plot (8CC 64QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 62 of 222

7.3.4 Antenna D EIRP Density

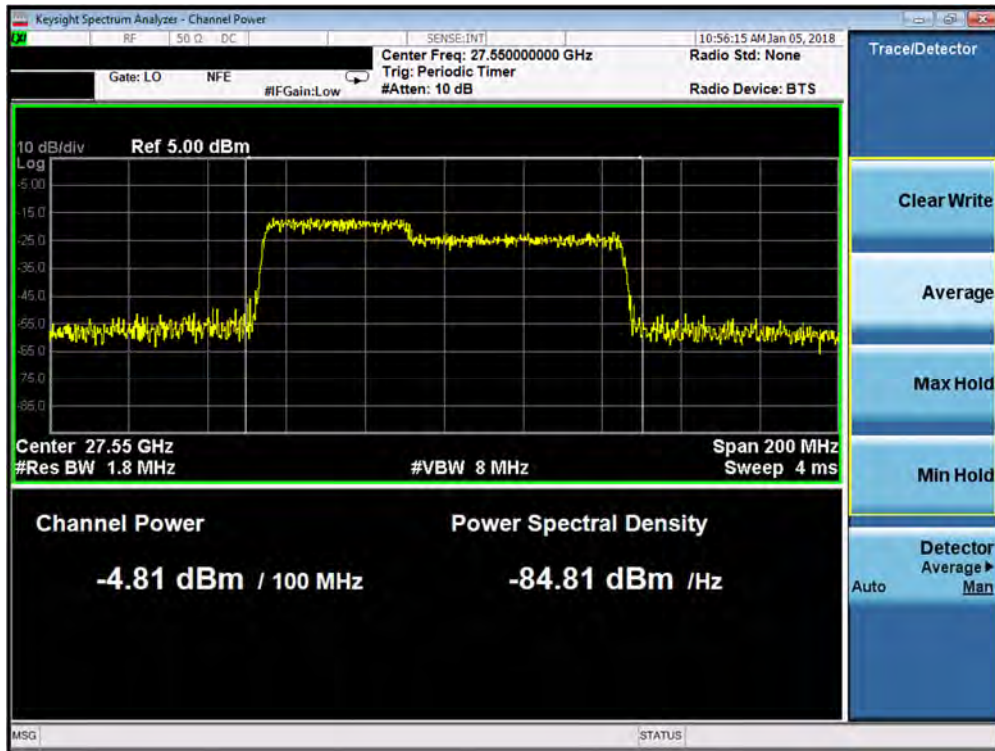
Chan.	Channel Freq [GHz]	CCs active	Modulation	Horn Angle [degrees]	Horn Height [cm]	Turntable Azimuth [degrees]	Analyzer Level [dBm]	AFCL [dB/m]	EUT Antenna Gain [dBi]	Average e.i.r.p. PSD [dBm]	Conducted Average PSD [dBm]	PSD Limit [dBm/100 MHz]	Margin [dB]
Low	27.9	0	QPSK	45.0	146	356	-4.41	52.80	28.15	54.20	26.05	75.00	-20.80
Low	27.9	0	16QAM	45.0	146	356	-4.81	52.80	28.15	53.80	25.65	75.00	-21.20
Low	27.9	0	64QAM	45.0	146	356	-4.39	52.80	28.15	54.22	26.07	75.00	-20.78
Mid	27.925	4	QPSK	45.0	146	356	-3.75	52.80	28.15	54.86	26.71	75.00	-20.14
Mid	27.925	4	16QAM	45.0	146	356	-3.80	52.80	28.15	54.81	26.66	75.00	-20.19
Mid	27.925	4	64QAM	45.0	146	356	-3.81	52.80	28.15	54.80	26.65	75.00	-20.20
High	27.95	7	QPSK	45.0	146	356	-4.39	52.80	28.15	54.22	26.07	75.00	-20.78
High	27.95	7	16QAM	45.0	146	356	-4.63	52.80	28.15	53.98	25.83	75.00	-21.02
High	27.95	7	64QAM	45.0	146	356	-4.46	52.80	28.15	54.15	26.00	75.00	-20.85
Low	27.9	0-7	QPSK	45.0	153	347	-13.59	52.80	28.15	45.02	16.87	75.00	-29.98
Low	27.9	0-7	16QAM	45.0	153	347	-12.96	52.80	28.15	45.65	17.50	75.00	-29.35
Low	27.9	0-7	64QAM	45.0	146	356	-13.32	52.80	28.15	45.29	17.14	75.00	-29.71
Mid	27.925	0-7	QPSK	45.0	153	347	-13.45	52.80	28.15	45.16	17.01	75.00	-29.84
Mid	27.925	0-7	16QAM	45.0	153	347	-13.72	52.80	28.15	44.89	16.74	75.00	-30.11
Mid	27.925	0-7	64QAM	45.0	146	356	-13.21	52.80	28.15	45.40	17.25	75.00	-29.60
High	27.95	0-7	QPSK	45.0	153	347	-13.36	52.80	28.15	45.25	17.10	75.00	-29.75
High	27.95	0-7	16QAM	45.0	153	347	-13.45	52.80	28.15	45.16	17.01	75.00	-29.84
High	27.95	0-7	64QAM	45.0	146	356	-12.80	52.80	28.15	45.81	17.66	75.00	-29.19

Table 7-9. Antenna D Power Density Summary Data

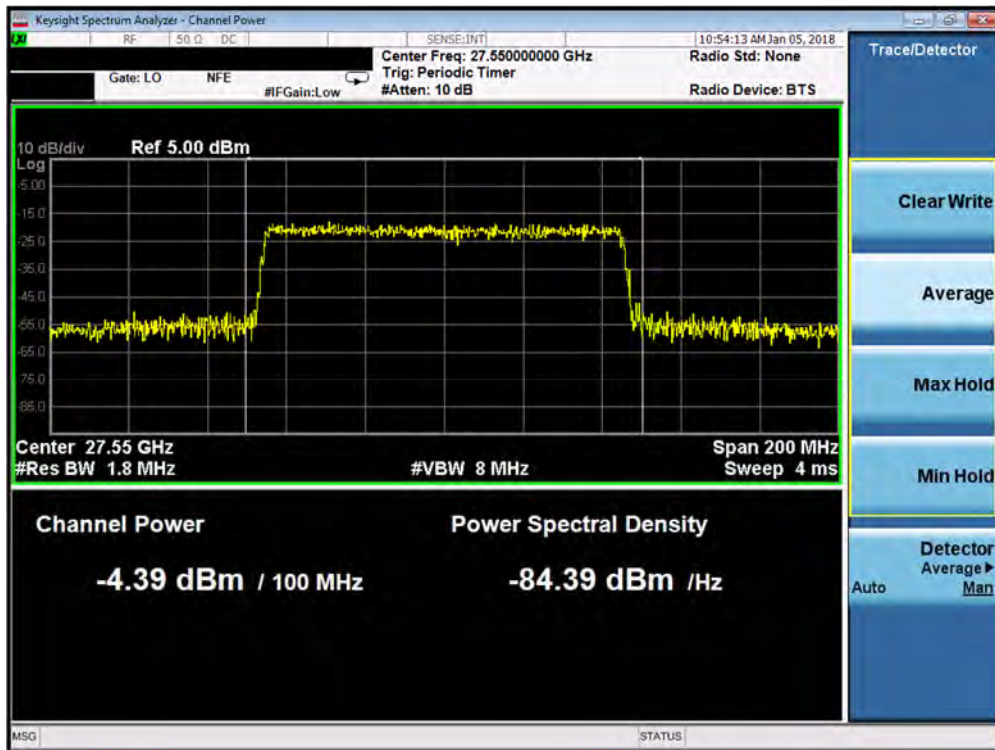


Plot 7-79. Antenna D EIRP Density Plot (1CC QPSK Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 63 of 222

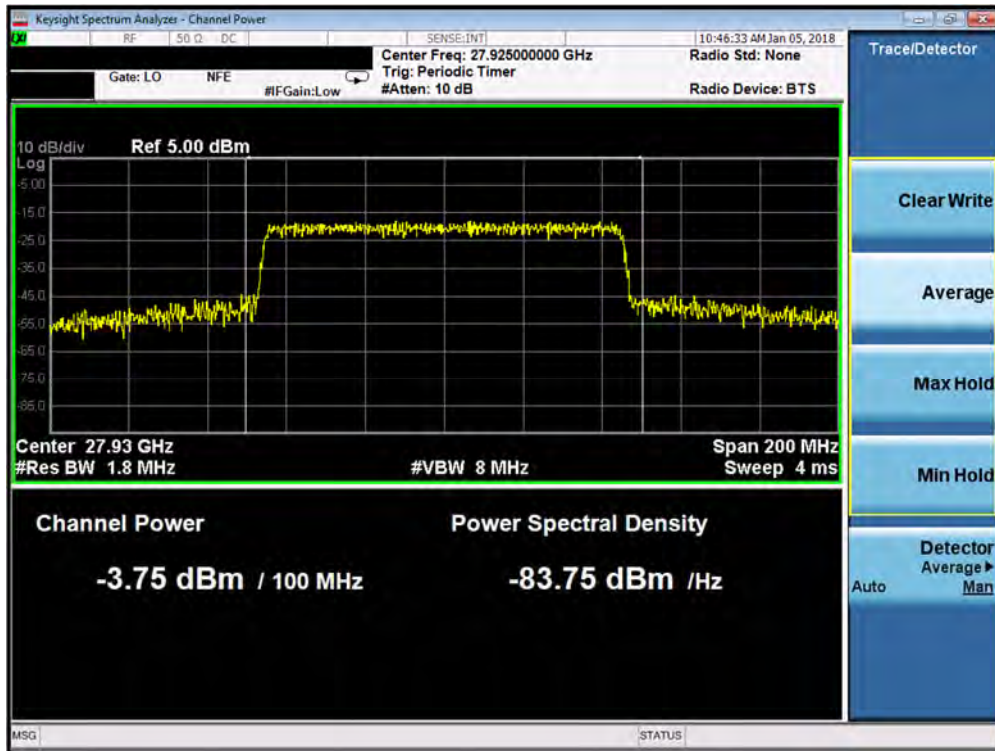


Plot 7-80. Antenna D EIRP Density Plot (1CC 16QAM Low Channel)

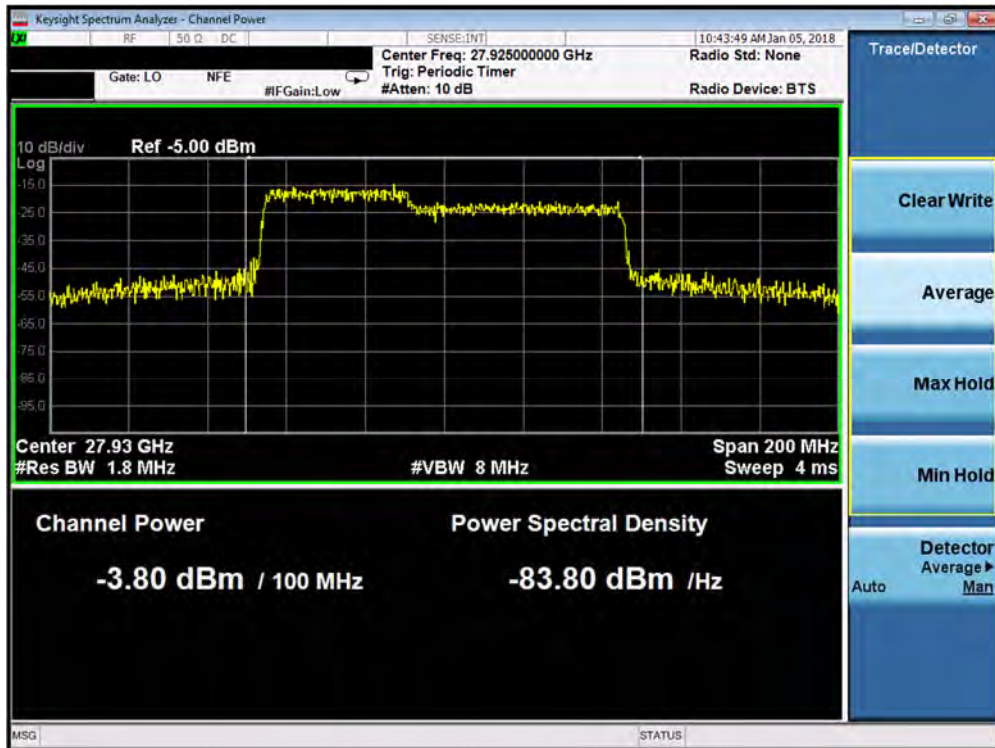


Plot 7-81. Antenna D EIRP Density Plot (1CC 64QAM Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 64 of 222

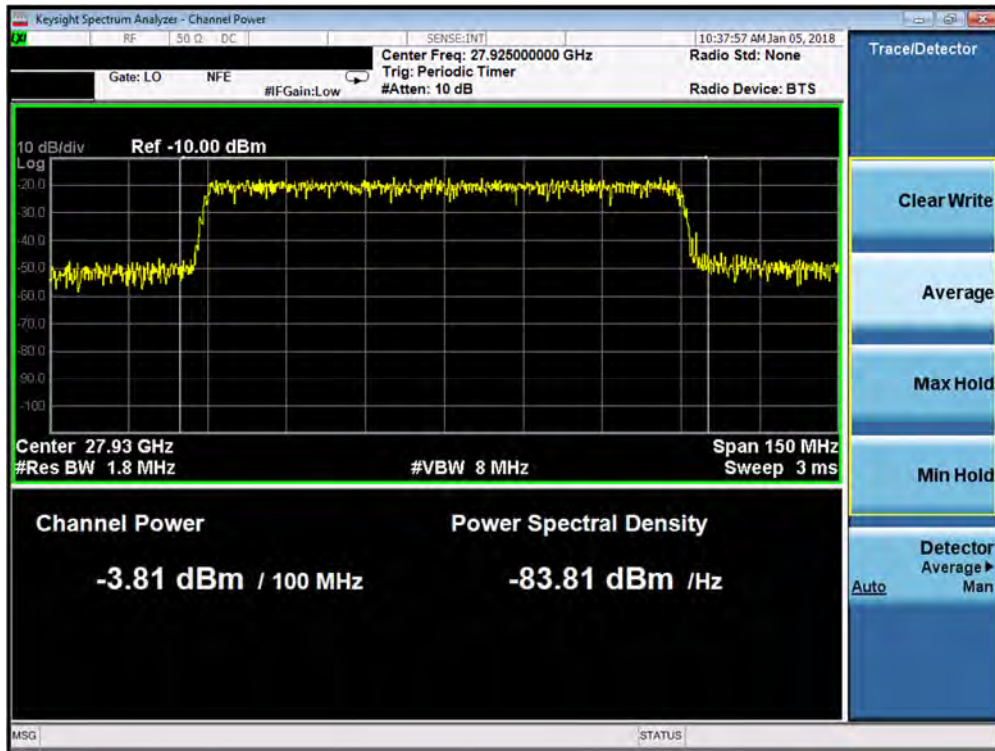


Plot 7-82. Antenna D EIRP Density Plot (1CC QPSK Mid Channel)

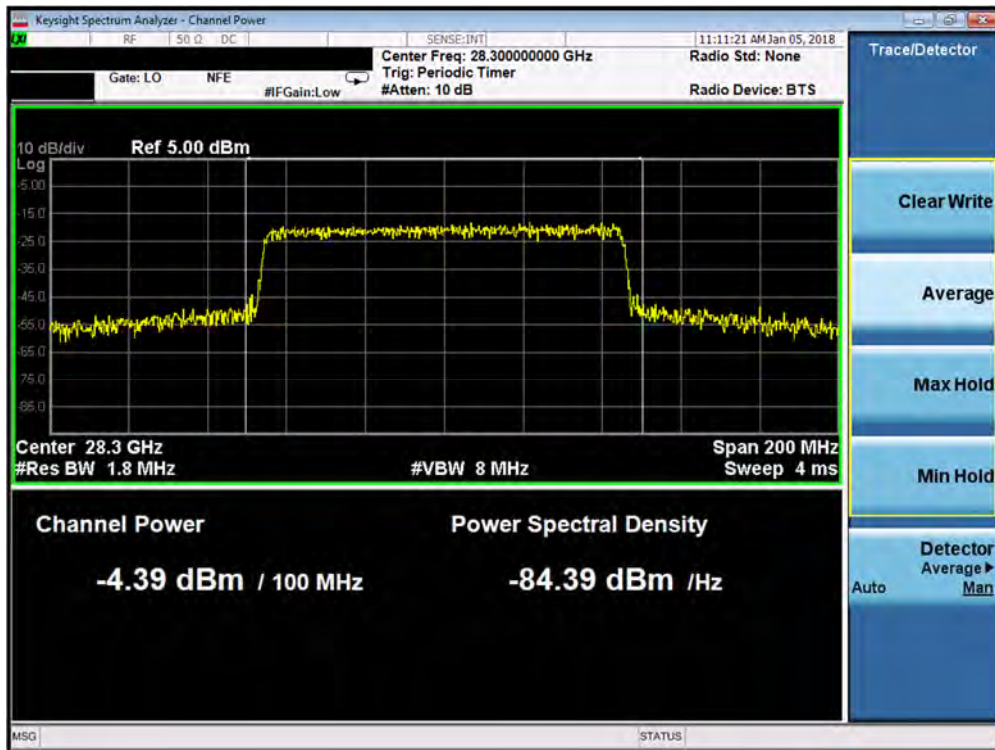


Plot 7-83. Antenna D EIRP Density Plot (1CC 16QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 65 of 222

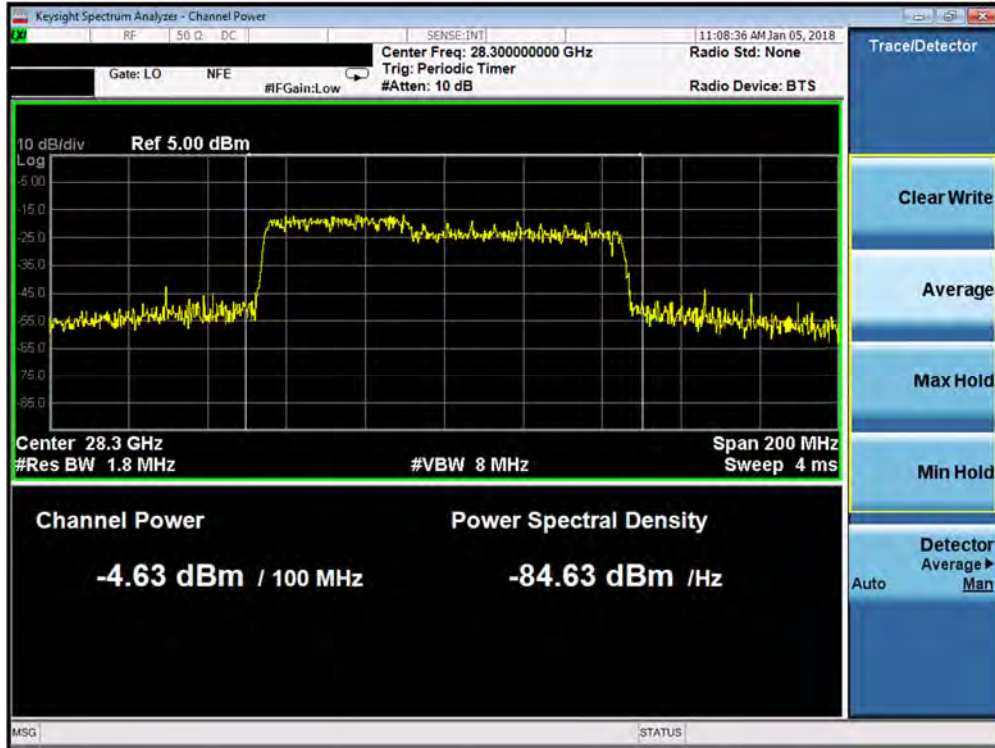


Plot 7-84. Antenna D EIRP Density Plot (1CC 64QAM Mid Channel)

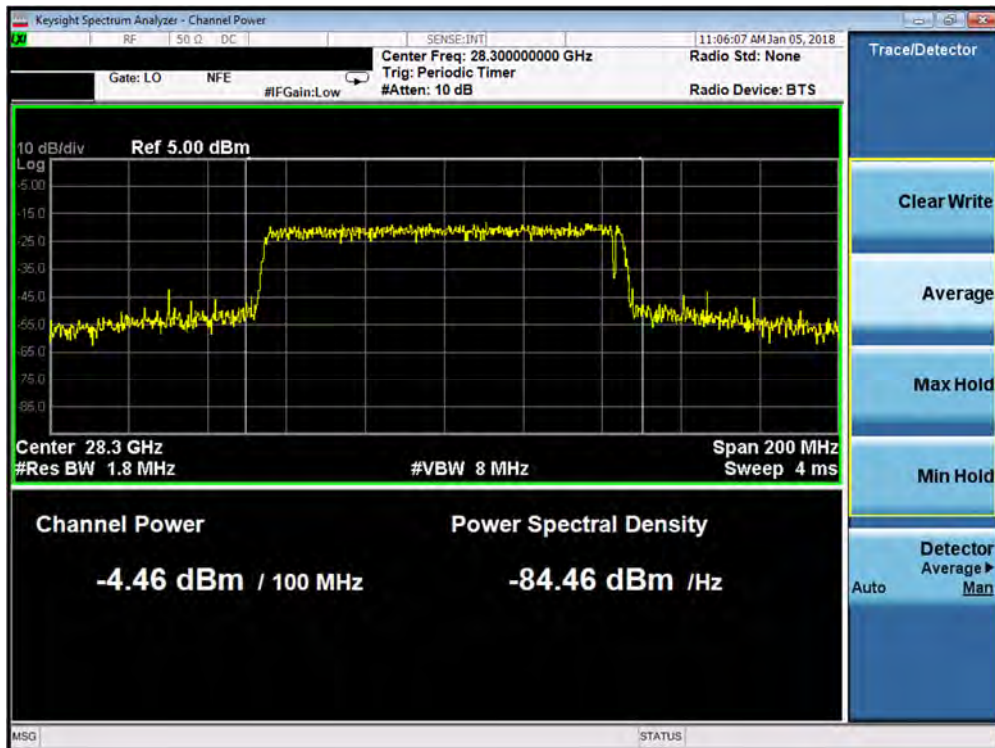


Plot 7-85. Antenna D EIRP Density Plot (1CC QPSK High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 66 of 222

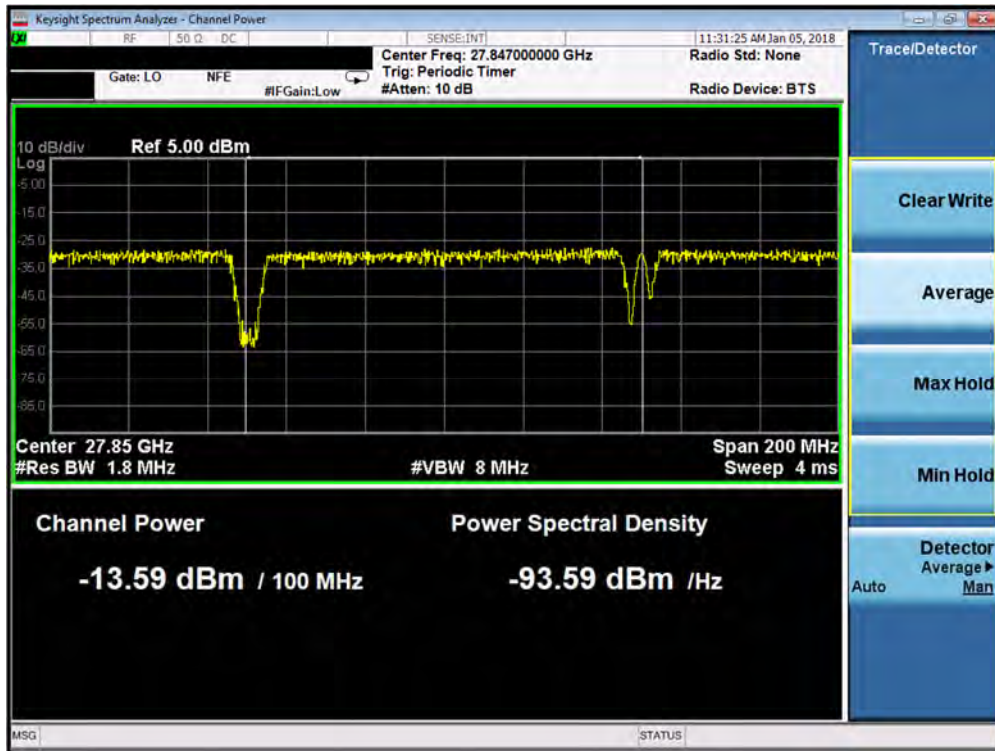


Plot 7-86. Antenna D EIRP Density Plot (1CC 16QAM High Channel)

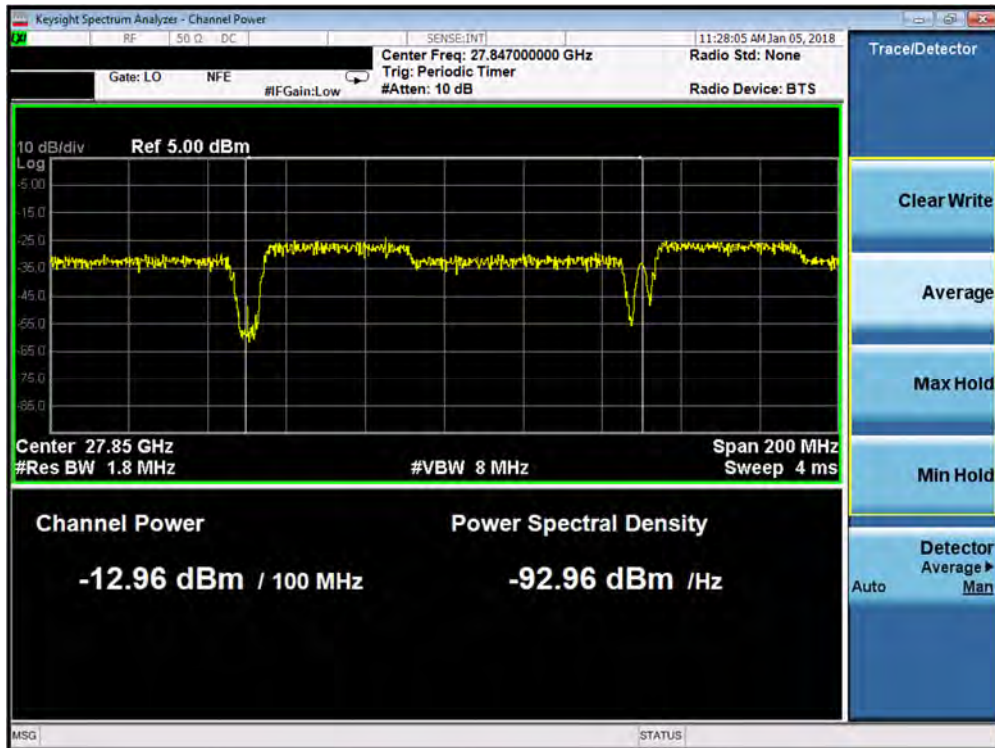


Plot 7-87. Antenna D EIRP Density Plot (1CC 64QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 67 of 222

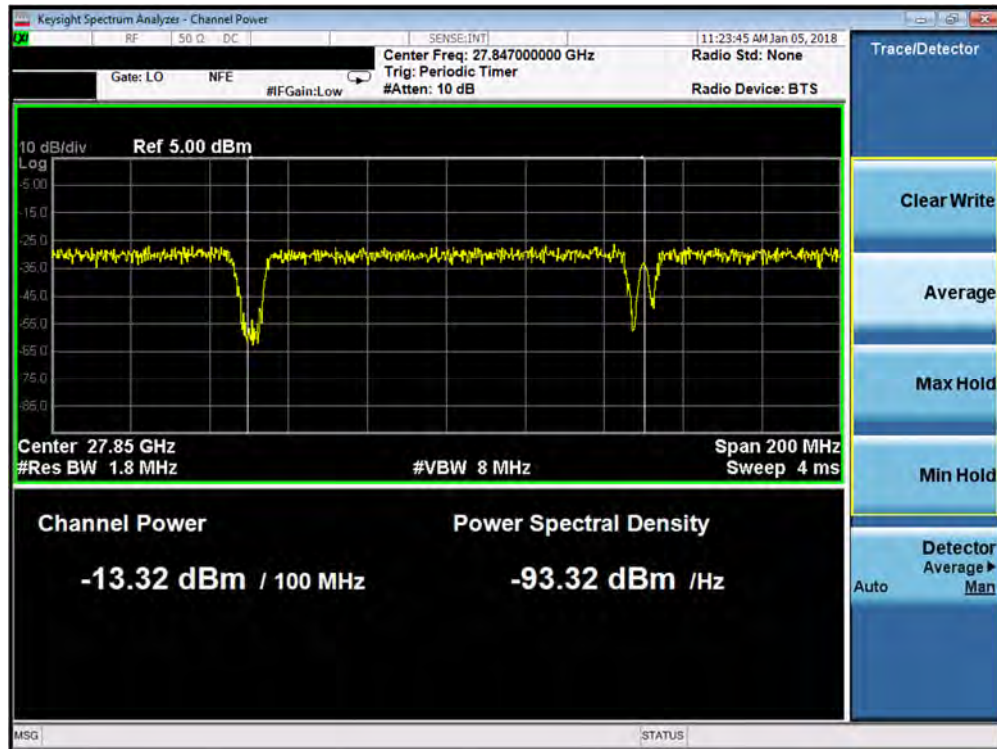


Plot 7-88. Antenna D EIRP Density Plot (8CC QPSK Low Channel)

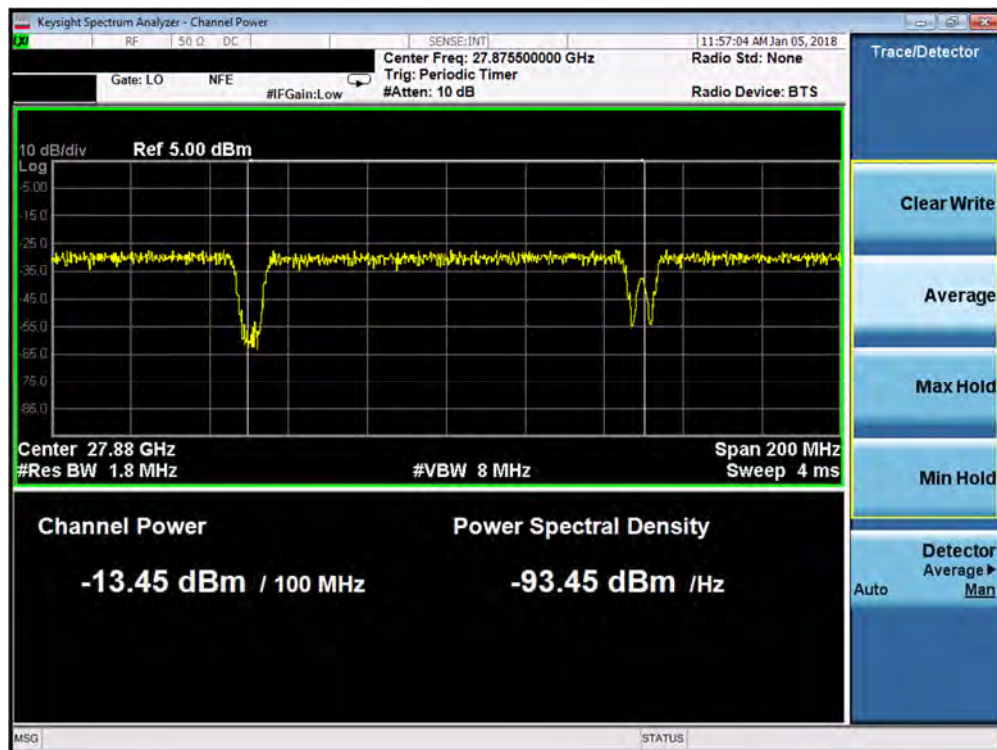


Plot 7-89. Antenna D EIRP Density Plot (8CC 16QAM Low Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 68 of 222

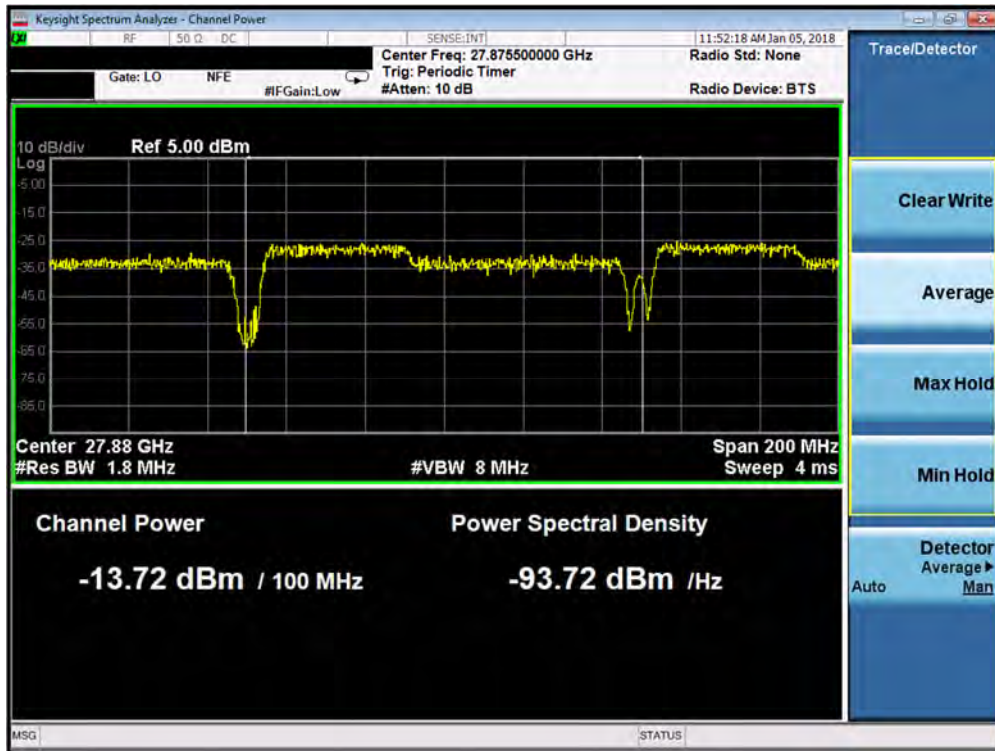


Plot 7-90. Antenna D EIRP Density Plot (8CC 64QAM Low Channel)

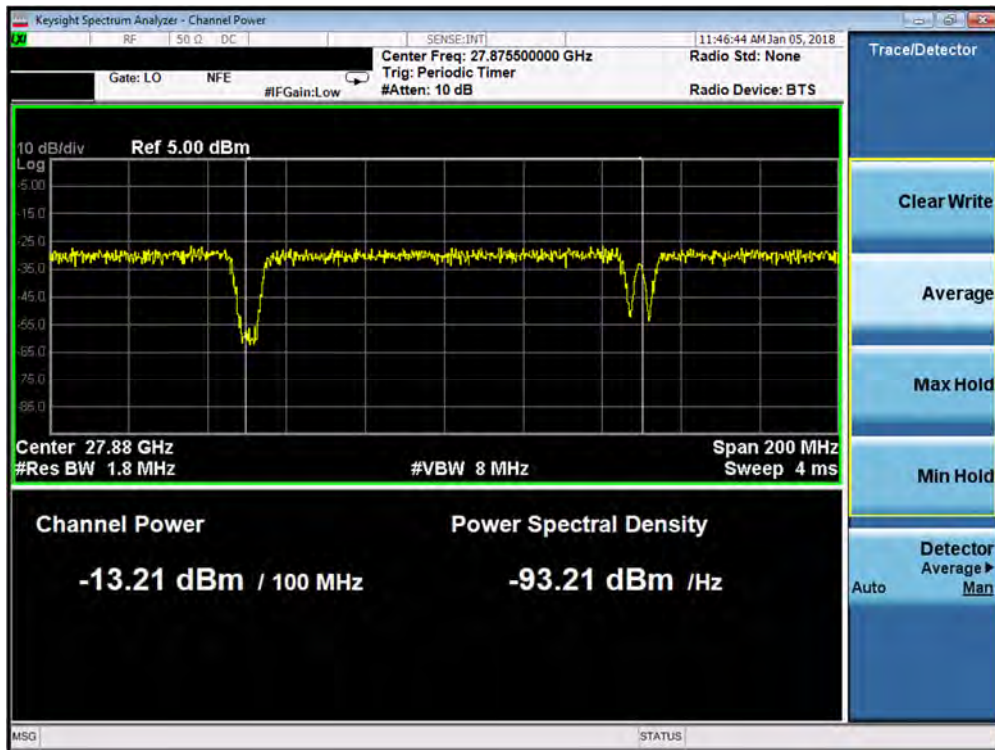


Plot 7-91. Antenna D EIRP Density Plot (8CC QPSK Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 69 of 222

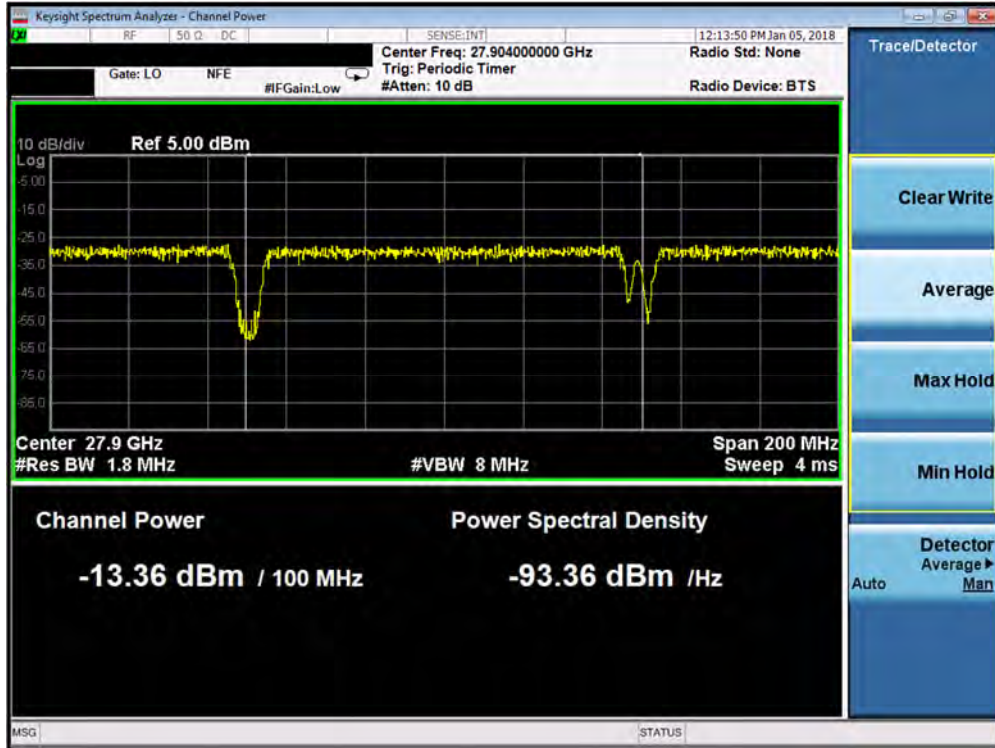


Plot 7-92. Antenna D EIRP Density Plot (8CC 16QAM Mid Channel)

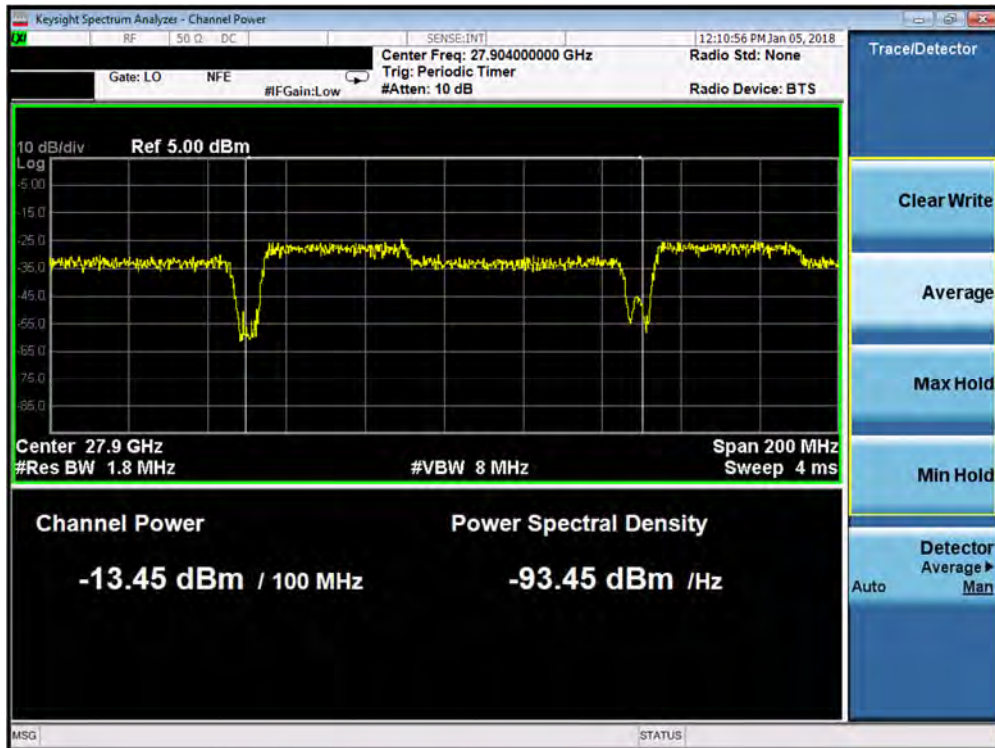


Plot 7-93. Antenna D EIRP Density Plot (8CC 64QAM Mid Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 70 of 222

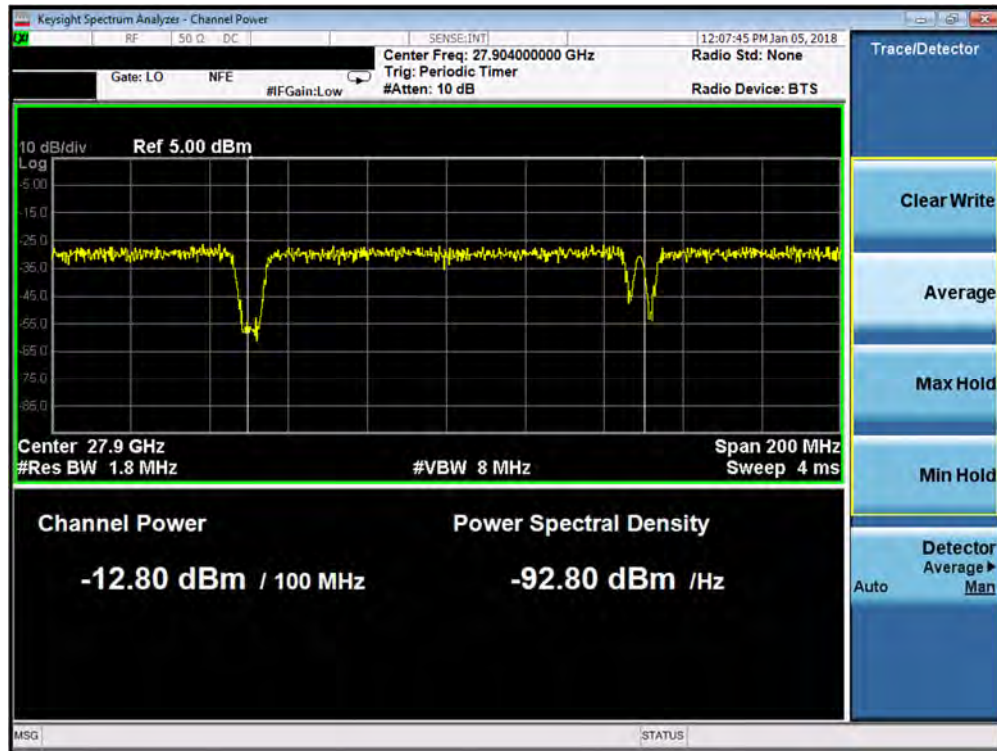


Plot 7-94. Antenna D EIRP Density Plot (8CC QPSK High Channel)



Plot 7-95. Antenna D EIRP Density Plot (8CC 16QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 71 of 222



Plot 7-96. Antenna D EIRP Density Plot (8CC 64QAM High Channel)

FCC ID: A3LSFG-AA100DC	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712270338-01-R1.A3L	Test Dates: 1/2-2/3/2018	EUT Type: 5G Access Unit		Page 72 of 222

7.3.5 MIMO EIRP Density

Antenna	Chan.	Channel Freq [GHz]	CCs active	Modulation	Ant A	Ant C	AFCL	EUT Antenna Gain	Average e.i.r.p. PSD	Conducted Average PSD	PSD Limit	Margin
							[dB/m]	[dBi]	[dBm]	[dBm]	[dBm/100 MHz]	[dB]
A+C	Low	27.9	0	QPSK	53.19	52.97	52.80	28.15	56.09	27.94	75.00	-18.91
	Low	27.9	0	16QAM	52.84	53.14	52.80	28.15	56.00	27.85	75.00	-19.00
	Low	27.9	0	64QAM	52.77	53.53	52.80	28.15	56.18	28.02	75.00	-18.82
	Mid	27.925	4	QPSK	54.07	53.33	52.80	28.15	56.72	28.57	75.00	-18.28
	Mid	27.925	4	16QAM	54.03	53.60	52.80	28.15	56.83	28.68	75.00	-18.17
	Mid	27.925	4	64QAM	53.97	54.15	52.80	28.15	57.07	28.92	75.00	-17.93
	High	27.95	7	QPSK	53.94	54.69	52.80	28.15	57.34	29.19	75.00	-17.66
	High	27.95	7	16QAM	53.64	54.43	52.80	28.15	57.06	28.91	75.00	-17.94
	High	27.95	7	64QAM	53.79	54.59	52.80	28.15	57.22	29.06	75.00	-17.78
	Low	27.9	0-7	QPSK	45.58	45.39	52.80	28.15	48.49	20.34	75.00	-26.51
	Low	27.9	0-7	16QAM	45.36	45.52	52.80	28.15	48.45	20.30	75.00	-26.55
	Low	27.9	0-7	64QAM	45.55	45.30	52.80	28.15	48.44	20.28	75.00	-26.56
	Mid	27.925	0-7	QPSK	45.47	45.84	52.80	28.15	48.67	20.52	75.00	-26.33
	Mid	27.925	0-7	16QAM	45.22	45.69	52.80	28.15	48.47	20.32	75.00	-26.53
	Mid	27.925	0-7	64QAM	45.44	45.81	52.80	28.15	48.64	20.49	75.00	-26.36
	High	27.95	0-7	QPSK	45.41	44.29	52.80	28.15	47.89	19.74	75.00	-27.11
	High	27.95	0-7	16QAM	45.22	44.18	52.80	28.15	47.74	19.59	75.00	-27.26
	High	27.95	0-7	64QAM	45.34	44.61	52.80	28.15	48.00	19.85	75.00	-27.00

Table 7-10. MIMO EIRP Density Summary Data

Antenna	Chan.	Channel Freq [GHz]	CCs active	Modulation	Ant B	Ant D	AFCL	EUT Antenna Gain	Average e.i.r.p. PSD	Conducted Average PSD	PSD Limit	Margin
							[dB/m]	[dBi]	[dBm]	[dBm]	[dBm/100 MHz]	[dB]
B+D	Low	27.9	0	QPSK	53.46	54.20	52.80	28.15	56.85	28.70	75.00	-18.15
	Low	27.9	0	16QAM	53.82	53.80	52.80	28.15	56.82	28.67	75.00	-18.18
	Low	27.9	0	64QAM	53.46	54.22	52.80	28.15	56.87	28.71	75.00	-18.13
	Mid	27.925	4	QPSK	54.59	54.86	52.80	28.15	57.74	29.58	75.00	-17.26
	Mid	27.925	4	16QAM	54.89	54.81	52.80	28.15	57.86	29.71	75.00	-17.14
	Mid	27.925	4	64QAM	54.28	54.80	52.80	28.15	57.56	29.40	75.00	-17.44
	High	27.95	7	QPSK	54.79	54.22	52.80	28.15	57.52	29.37	75.00	-17.48
	High	27.95	7	16QAM	54.67	53.98	52.80	28.15	57.35	29.19	75.00	-17.65
	High	27.95	7	64QAM	54.81	54.15	52.80	28.15	57.50	29.35	75.00	-17.50
	Low	27.9	0-7	QPSK	44.79	45.02	52.80	28.15	47.92	19.76	75.00	-27.08
	Low	27.9	0-7	16QAM	44.48	45.65	52.80	28.15	48.11	19.96	75.00	-26.89
	Low	27.9	0-7	64QAM	44.79	45.29	52.80	28.15	48.06	19.90	75.00	-26.94
	Mid	27.925	0-7	QPSK	45.12	45.16	52.80	28.15	48.15	20.00	75.00	-26.85
	Mid	27.925	0-7	16QAM	44.74	44.89	52.80	28.15	47.82	19.67	75.00	-27.18
	Mid	27.925	0-7	64QAM	44.77	45.40	52.80	28.15	48.11	19.95	75.00	-26.89
	High	27.95	0-7	QPSK	45.15	45.25	52.80	28.15	48.21	20.06	75.00	-26.79
	High	27.95	0-7	16QAM	45.15	45.16	52.80	28.15	48.16	20.01	75.00	-26.84
	High	27.95	0-7	64QAM	45.29	45.81	52.80	28.15	48.57	20.41	75.00	-26.43

Table 7-11. MIMO EIRP Density Summary Data

Note:

The EIRP measurements of the co-polarized antenna arrays (Antenna A/C and Antenna B/D) were added together to address radiated MIMO concerns referenced in ANSI C63.26-2015 Section 6.4.

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7.4 RF Conducted Output Power

§2.1046

Test Overview

RF conducted output power measurements are performed using broadband horn antennas. The conducted power is determined by maximizing the full spectrum EIRP for all component carrier configurations and then subtracting the known antenna gain from the EIRP. 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

ANSI C63.26-2015 Section 5.2.4.4.1
ANSI C63.26-2015 Section 6.4

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq$ 3 x RBW
4. Span = 2x to 3x the OBW
5. No. of sweep points $\geq$ 2 x 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 Notes

- 1) The EUT was tested while positioned upright and mounted on a mast at 1.5m height. The worst case emissions are reported with the EUT in this fixed position and with the modulations and active component carriers shown in the tables below.
- 2) Elements within the same antenna array are correlated to produce beamforming array gain.
- 3) Measurements were taken in the far field of the mmWave signal based on the formula: $R \geq 2D^2/\text{wavelength}$.
- 4) The test case with 1 CC active, "CC0" representing the component carrier with the lowest frequency, was selected for the worst case emission testing as it created the highest EIRP within a 100MHz bandwidth.
- 5) The average EIRP reported below is calculated per formula specified in d) of ANSI C63.26-2015 Section 5.2.7:

$\text{EIRP (dBm)} = E (\text{dB}\mu\text{V/m}) + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m.

For this section, all EIRP density measurements were performed at a distance of 1.51m, so the effective correction is:

$$\text{EIRP (dBm)} = E (\text{dB}\mu\text{V/m}) - 101.22\text{dB}$$

$$= \text{Analyzer Level (dBm)} + \text{AFCL (dB/m)} + 107 \text{ dB} - 101.22\text{dB}$$

$$= \text{Analyzer Level (dBm)} + \text{AFCL (dB/m)} + 5.78\text{dB}$$

- 6) The conducted average power over the full channel BW is calculated as follows:

$$\text{Conducted Average Power (dBm)} = \text{Average EIRP (dBm)} - \text{Antenna Gain (dBi)}$$

- 7) Per ANSI C63.26-2015 Section 6.4, individual EIRPs are also summed before compared to the limit.
- 8) The angle of the horn antenna was rotated to maximize and find the worst case emissions. Worst case EIRP is reported below.
- 9) See Section 3.2 for conducted power and directional gain calculation.

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