

FCC UNII REPORT

Certification

Applicant Name:

SAMSUNG Electronics Co., Ltd.

Date of Issue:

April 19, 2017

Test Site/Location:

HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Address:129, Samsung-ro, Yeongtong-gu, Suwon-si,
Gyeonggi-do, 16677, Rep. of Korea**Report No.:** HCT-R-1703-F006-3**HCT FRN:** 0005866421**FCC ID : A3LSLS-BU10A0****APPLICANT : SAMSUNG Electronics Co., Ltd.****Model:**

SLS-BU10A

EUT Type:

uFemto

Modulation type

OFDM

FCC Classification:

Unlicensed National Information Infrastructure(UNII)

FCC Rule Part(s):

Part 15.407

Band	Mode	Frequency Range (MHz)	A Path Power (dBm)	B Path Power (dBm)	A + B Path Power (dBm)
UNII1	QPSK	5160 - 5240	23.26	23.13	26.21
	16QAM	5160 - 5240	23.12	23.01	26.08
	64QAM	5160 - 5240	23.00	23.23	26.13
UNII3	QPSK	5745 - 5825	23.51	23.49	26.51
	16QAM	5745 - 5825	23.40	23.55	26.49
	64QAM	5745 - 5825	23.36	23.45	26.42

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S. C.853(a)

**Report prepared by : Kyung Soo Kang****Engineer of Telecommunication testing center****Approved by : Jong Seok Lee****Manager of Telecommunication testing center**

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1703-F006	March 23, 2017	- First Approval Report
HCT-R-1703-F006-1	April 04, 2017	- Revised the FCC ID.
HCT-R-1703-F006-2	April 05, 2017	- Revised the Power table of 1 page.
HCT-R-1703-F006-3	April 19, 2017	- Insert the KDB 662911 in Section 3 on page 6

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1. GENERAL INFORMATION

Applicant: Samsung Electronics Co., Ltd.
Address: 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID: A3LSLS-BU10A0
EUT Type: uFemto
Model (s): SLS-BU10A
Date(s) of Tests: March 06, 2017 ~ March 20, 2017
Place of Tests: HCT Co., Ltd.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

2. EUT DESCRIPTION

Model	SLS-BU10A
EUT Type	uFemto
Power Supply	AC/DC ADAPTER: 100 ~ 240 VAC PoE : 48 VDC
Frequency Range	UNII 1 : 5 160 ~ 5 240 MHz UNII 3 : 5 745 ~ 5 825 MHz
Modulation Type	QPSK, 16QAM, 64QAM
Antenna Specification	Manufacturer: Ace Technology Antenna type: INTERNAL ANTENNA Peak Gain : 4 dBi

2.1 EUT OPERATING MODE

■ Operating mode

Mode	Operating Mode	Operating Ant.
LTE-U	SISO	A Path
		B Path
	MIMO	Path A & B

Note : In case of radiation test, we have done all test case. Worst case is MIMO.

So, we attached the results of only worst case.

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03 dated August 22, 2016 entitled “ Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E” and ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’ were used in the measurement.

KDB 662911 D1 v02r01 were used for multiple outputs in the same band.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 8 of ANSI C63.10. (Version: 2013)

Conducted Antenna Terminal

See Section from 8.1 to 8.4.(KDB 789033 D02 v01r03)

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203, §15.407

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

* The antennas of this E.U.T are permanently attached.

* The E.U.T Complies with the requirement of §15.203, §15.407

Directional Gain Calculations

If any transmit signals are correlated with each other (CDD)

$$\text{Directional gain} = 10 \cdot \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N] \text{ dBi}$$

If all transmit signals are completely uncorrelated with each other (SDM)

$$\text{Directional gain} = 10 \cdot \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N] \text{ dBi}$$

Antenna Gain

5GHz Band (UNII 1)

Antenna Gain	Path A	4 dBi
	Path B	4 dBi
Directional Antenna Gain	Ant 0 & 1	7 dBi

5GHz Band (UNII 3)

Antenna Gain	Path A	4 dBi
	Path B	4 dBi
Directional Antenna Gain	Ant 0 & 1	7 dBi

Note : This EUT is supported CDD and SDM. So, we applied the CDD mode for antenna gain. Because highest gain is CDD mode and worst case is CDD mode.

7. 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 data shown herein 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.

Parameter	Expanded Uncertainty ($\pm$ dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	6.07

8. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§15.407 (for Power Measurement)	N/A	CONDUCTED	PASS
6 dB Bandwidth	§15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§15.407(a)(1)	< 1 W (5150-5250 MHz) <1 W (5725-5850 MHz)		PASS
Peak Power Spectral Density	§15.407(a)(1),(5)	<17 dBm/ MHz (5150-5250 MHz) <30 dBm/500 kHz(5725-5850 MHz)		PASS
Frequency Stability	§15.407(g)	NA		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207	<FCC 15.207 limits		PASS
Undesirable Emissions	§15.407(b)	<-27 dBm/MHz EIRP (UNII1) Cf.) Page 48 (UNII 3)	RADIATED	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

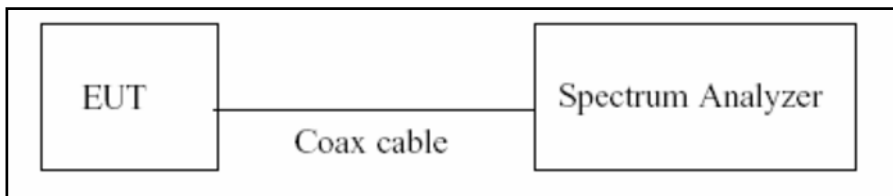
* Note: The EUT is supported power supply both of the AC/DC Adapter and PoE. Test results are only attached worst case(Adapter). But in case of AC Conducted Emission, test results are attached Adapter and PoE.

9. TEST RESULT

9.1 DUTY CYCLE

The zero-span mode on a spectrum analyzer or EMI receiver ,if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW $\geq$ EBW if possible; otherwise, set RBW to the largest available value. Set VBW $\geq$ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$, where T is defined in section B)1)a), and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

■ TEST CONFIGURATION



■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, (B.2 in KDB 789033 D02 v01r03)

The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are $> 50/T$.

1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ($\geq$ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10 \cdot \log(1/\text{Duty Cycle})$

■ Duty Cycle Factor

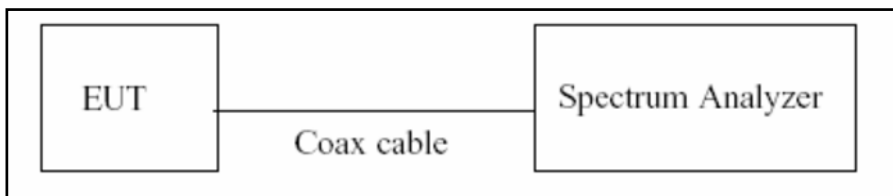
Mode	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
LTE-U	-	-	1	0

9.2 EMISSION BANDWIDTH AND MINIMUM EMISSION BANDWIDTH MEASUREMENT

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033 D02 v01r03, at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

The 26 dB bandwidth is used to determine the conducted power limits.

■ TEST CONFIGURATION



■ TEST PROCEDURE (26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (C.1 in KDB 789033 D02 v01r03)

1. RBW = approximately 1 % of the emission bandwidth
2. VBW > RBW
3. Detector = Peak
4. Trace mode = max hold
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Note : We tested 26 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 26 dB.

1. In order to simplify the report, attached plots were only the most wide channel.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any channels belong to UNII1 and UNII3 band for DFS.

■ **TEST PROCEDURE (for the band 5.725-5.85 GHz, 6 dB Bandwidth)**

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(C.2 in KDB 789033 D02 v01r03)

1. RBW = 100 kHz
2. VBW $\geq$ 3*RBW
3. Detector = Peak
4. Trace mode = max hold
5. Allow the trace to stabilize
6. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points(upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Note : We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

■ TEST RESULTS for A Path_ QPSK

Conducted 26 dB Bandwidth Measurements for QPSK

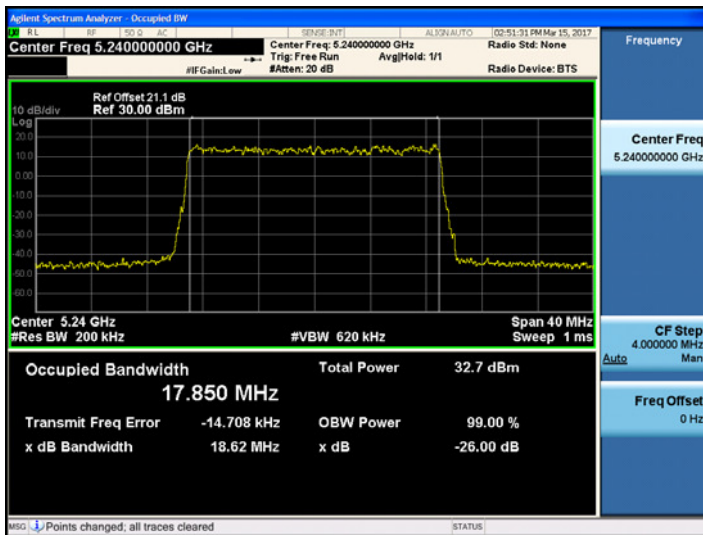
QPSK Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5160	18.55	N/A	Pass
5200	18.61	N/A	Pass
5240	18.62	N/A	Pass

Conducted 26 dB Bandwidth Measurements for QPSK

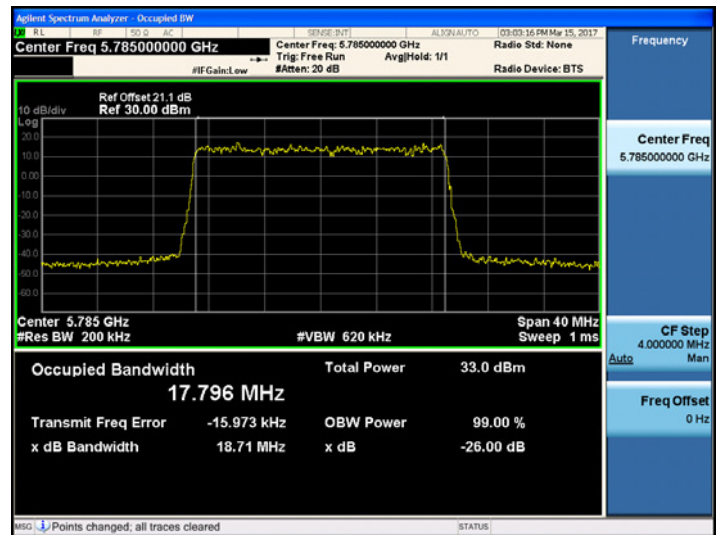
QPSK Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5745	18.62	N/A	Pass
5785	18.71	N/A	Pass
5825	18.63	N/A	Pass

■ TEST Plot for A Path_ QPSK

QPSK UNII 1 BAND 26dB Bandwidth



QPSK UNII 3 BAND 26dB Bandwidth



Note : In order to simplify the report, attached plots were only the most wide channel.

■ TEST RESULTS for B Path_ QPSK

Conducted 26 dB Bandwidth Measurements for QPSK

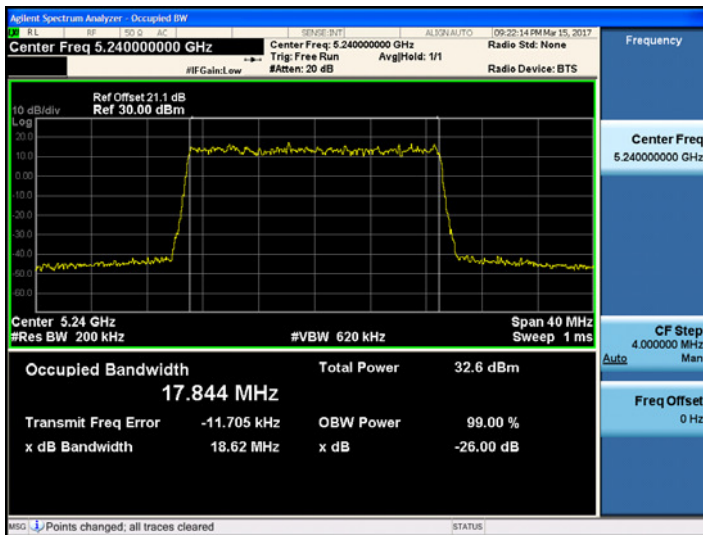
QPSK Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5160	18.56	N/A	Pass
5200	18.59	N/A	Pass
5240	18.62	N/A	Pass

Conducted 26 dB Bandwidth Measurements for QPSK

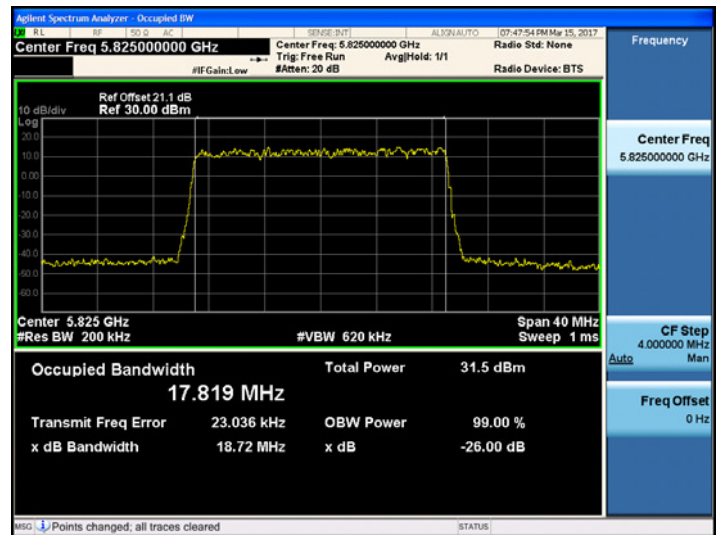
QPSK Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5745	18.58	N/A	Pass
5785	18.70	N/A	Pass
5825	18.72	N/A	Pass

■ TEST Plot for B Path_ QPSK

QPSK UNII 1 BAND 26dB Bandwidth



QPSK UNII 3 BAND 26dB Bandwidth



Note : In order to simplify the report, attached plots were only the most wide channel.

■ TEST RESULTS for A Path_ 16QAM

Conducted 26 dB Bandwidth Measurements for 16QAM

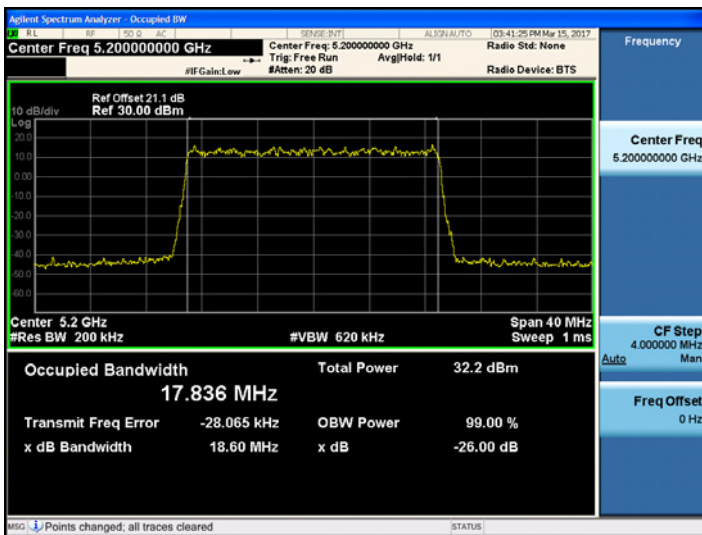
16QAM Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5160	18.57	N/A	Pass
5200	18.60	N/A	Pass
5240	18.55	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 16QAM

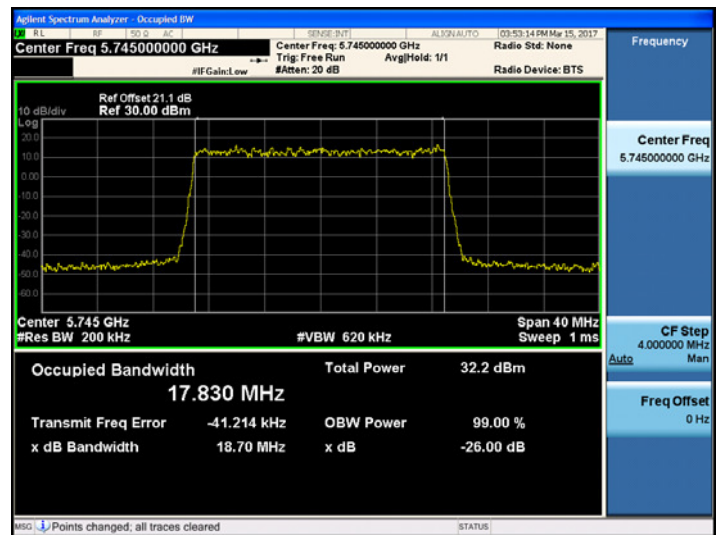
16QAM Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5745	18.70	N/A	Pass
5785	18.70	N/A	Pass
5825	18.55	N/A	Pass

■ TEST Plot for A Path_ 16QAM

16QAM UNII 1 BAND 26dB Bandwidth



16QAM UNII 3 BAND 26dB Bandwidth



Note : In order to simplify the report, attached plots were only the most wide channel.

TEST RESULTS for B Path_ 16QAM

Conducted 26 dB Bandwidth Measurements for 16QAM

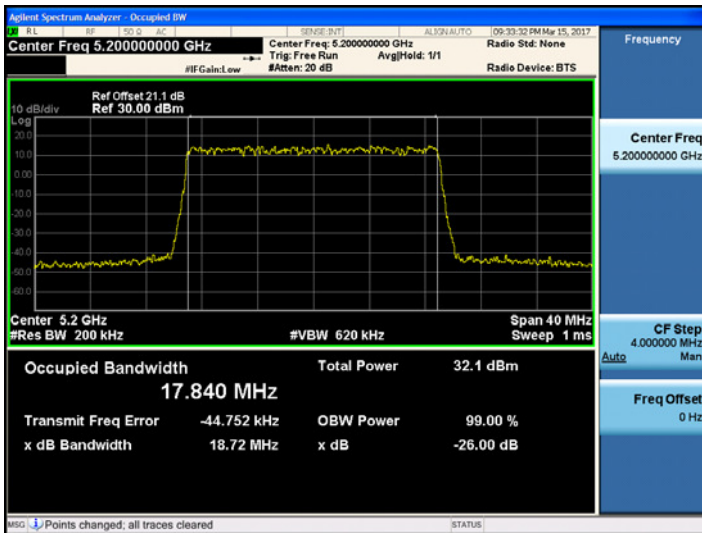
16QAM Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5160	18.62	N/A	Pass
5200	18.72	N/A	Pass
5240	18.56	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 16QAM

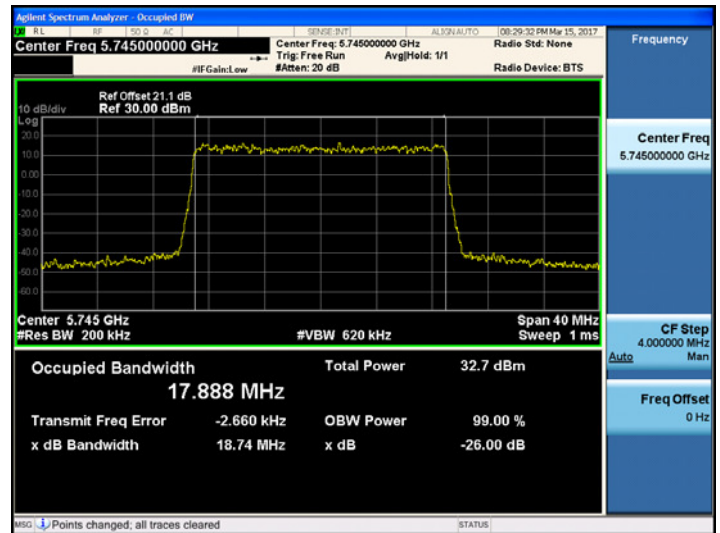
16QAM Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5745	18.74	N/A	Pass
5785	18.67	N/A	Pass
5825	18.67	N/A	Pass

TEST Plot for B Path_ 16QAM

16QAM UNII 1 BAND 26dB Bandwidth



16QAM UNII 3 BAND 26dB Bandwidth



Note : In order to simplify the report, attached plots were only the most wide channel.

TEST RESULTS for A Path_ 64QAM

Conducted 26 dB Bandwidth Measurements for 64QAM

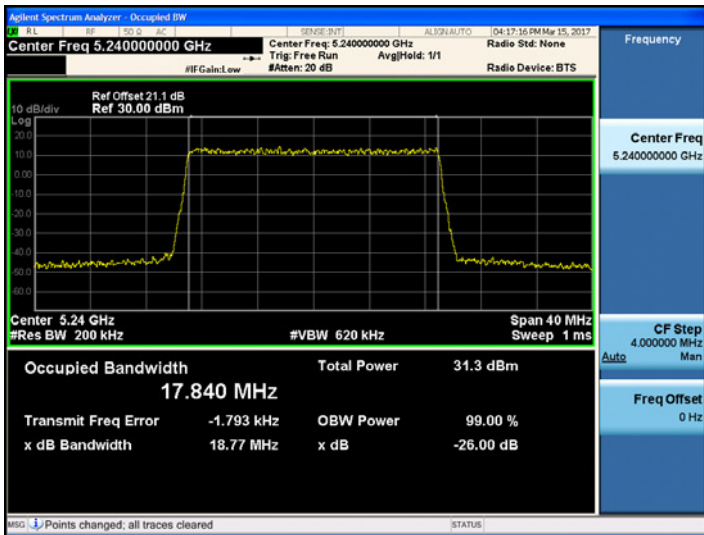
64QAM Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5160	18.65	N/A	Pass
5200	18.73	N/A	Pass
5240	18.77	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 64QAM

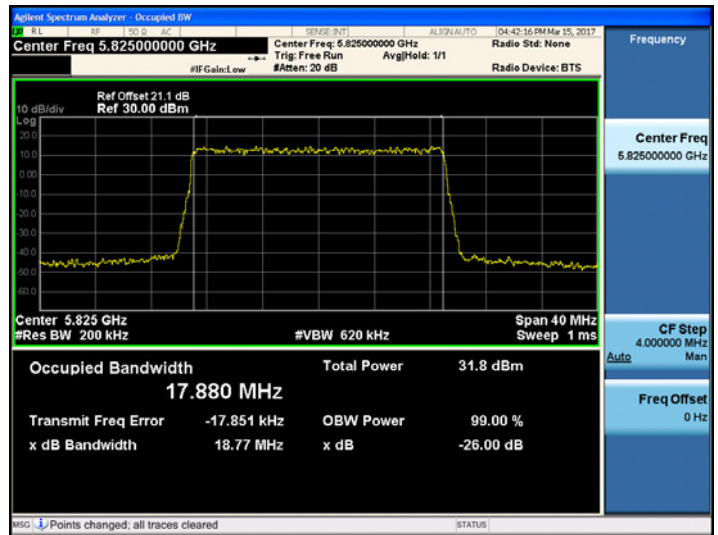
64QAM Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5745	18.75	N/A	Pass
5785	18.72	N/A	Pass
5825	18.77	N/A	Pass

TEST Plot for A Path_ 64QAM

64QAM UNII 1 BAND 26dB Bandwidth



64QAM UNII 3 BAND 26dB Bandwidth



Note : In order to simplify the report, attached plots were only the most wide channel.

■ TEST RESULTS for B Path_ 64QAM

Conducted 26 dB Bandwidth Measurements for 64QAM

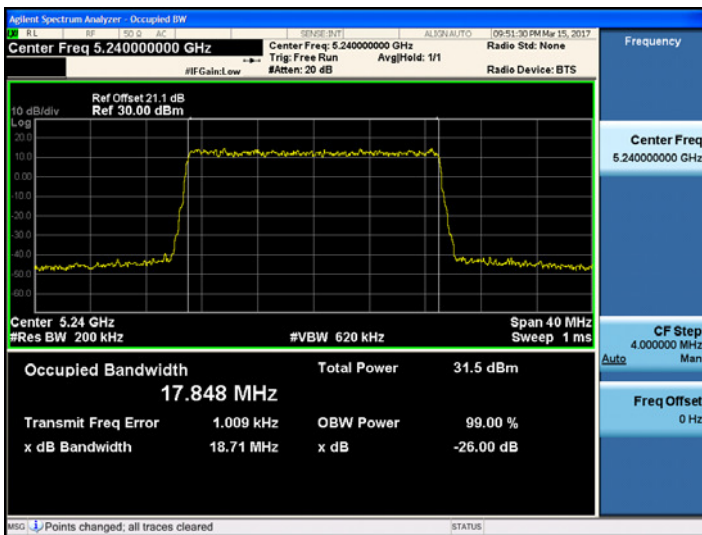
64QAM Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5160	18.63	N/A	Pass
5200	18.62	N/A	Pass
5240	18.71	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 64QAM

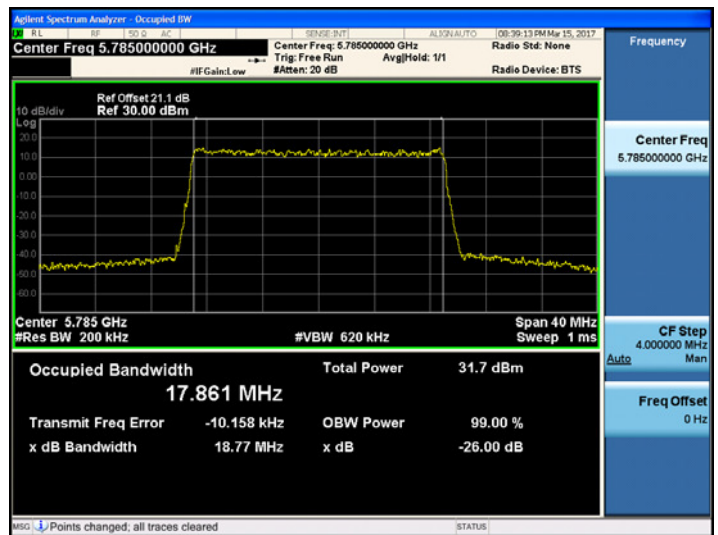
64QAM Mode	Measured Bandwidth	Minimum Bandwidth	Pass / Fail
Frequency [MHz]	[MHz]	[MHz]	
5745	18.63	N/A	Pass
5785	18.77	N/A	Pass
5825	18.65	N/A	Pass

■ TEST Plot for B Path_ 64QAM

64QAM UNII 1 BAND 26dB Bandwidth



64QAM UNII 3 BAND 26dB Bandwidth



Note : In order to simplify the report, attached plots were only the most wide channel.

Conducted 6 dB Bandwidth
☒ **TEST RESULTS for A Path**
Conducted 6 dB Bandwidth Measurements for QPSK

QPSK Mode	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]			
5745	18.02	0.5	Pass
5785	17.97	0.5	Pass
5825	17.92	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 16QAM

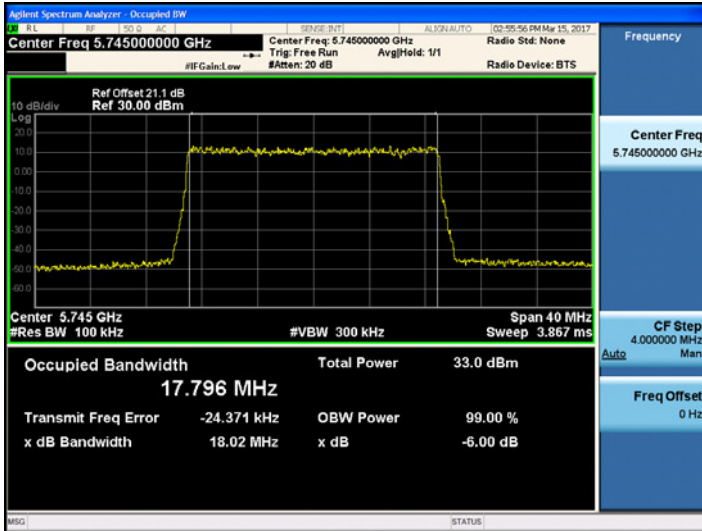
16QAM Mode	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]			
5745	17.95	0.5	Pass
5785	17.98	0.5	Pass
5825	17.99	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 64QAM

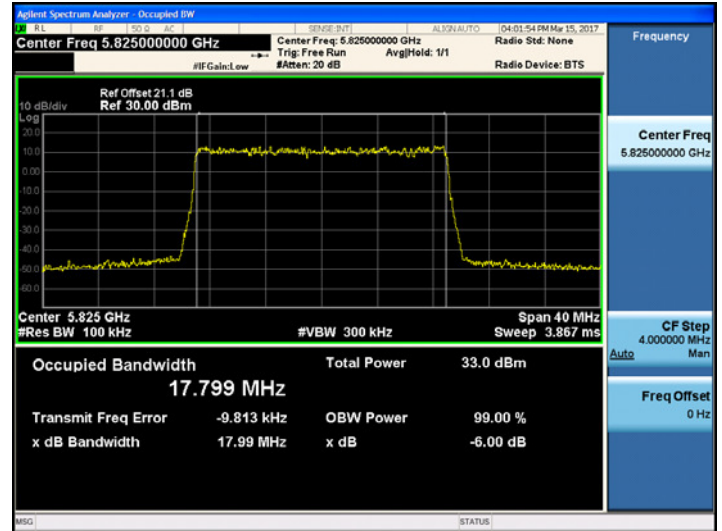
64QAM Mode	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]			
5745	17.97	0.5	Pass
5785	17.99	0.5	Pass
5825	17.95	0.5	Pass

■ TEST PlotS for A Path

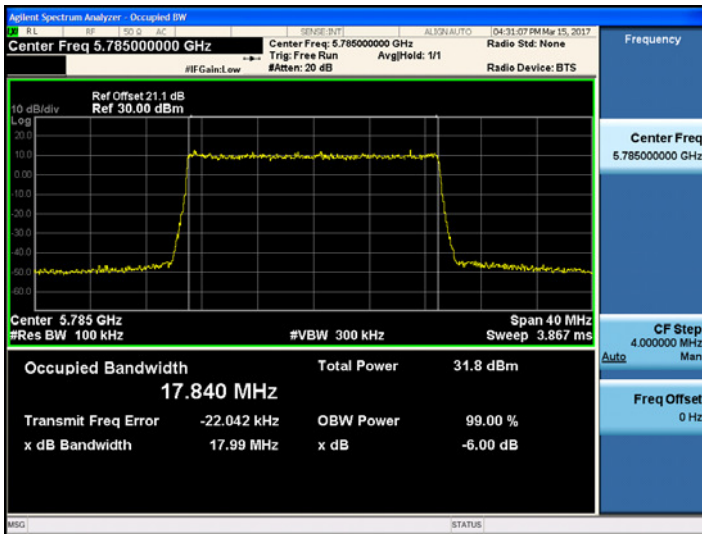
QPSK UNII 3 BAND 6dB Bandwidth



16QAM UNII 3 BAND 6dB Bandwidth



64QAM UNII 3 BAND 6dB Bandwidth



Note : In order to simplify the report, attached plots were only the most wide channel.

■ **TEST RESULTS for B Path**

Conducted 6 dB Bandwidth Measurements for QPSK

QPSK Mode	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]			
5745	18.00	0.5	Pass
5785	18.01	0.5	Pass
5825	17.97	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 16QAM

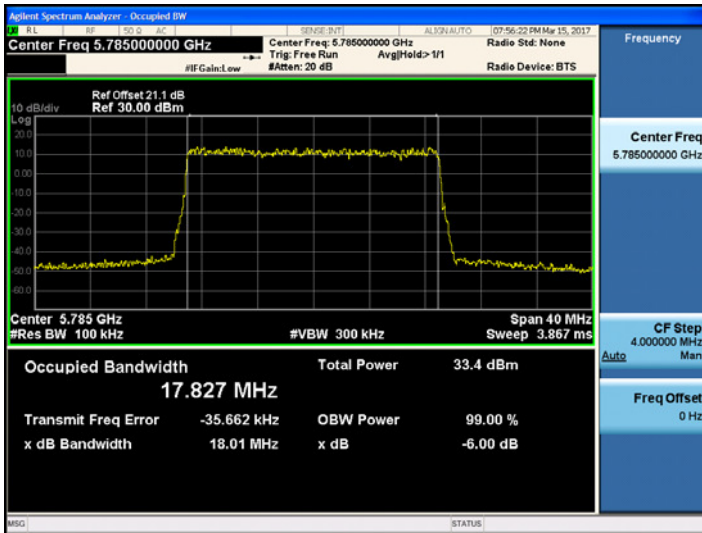
16QAM Mode	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]			
5745	18.00	0.5	Pass
5785	17.98	0.5	Pass
5825	18.00	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 64QAM

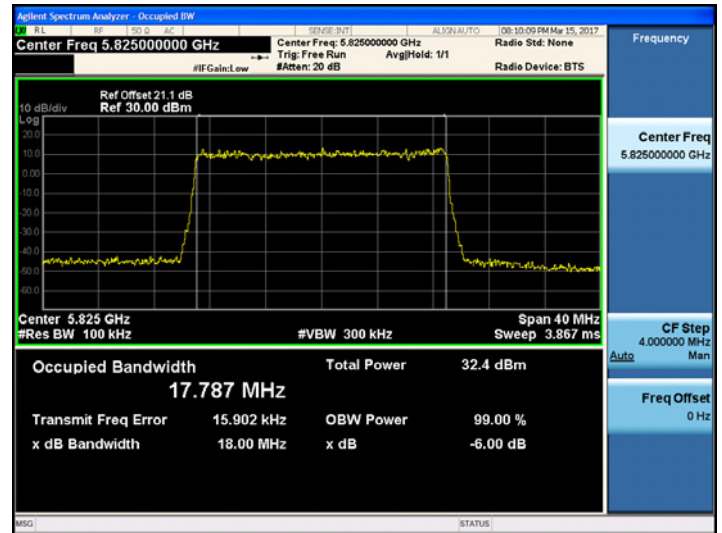
64QAM Mode	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]			
5745	18.05	0.5	Pass
5785	18.01	0.5	Pass
5825	17.99	0.5	Pass

■ TEST PlotS for B Path

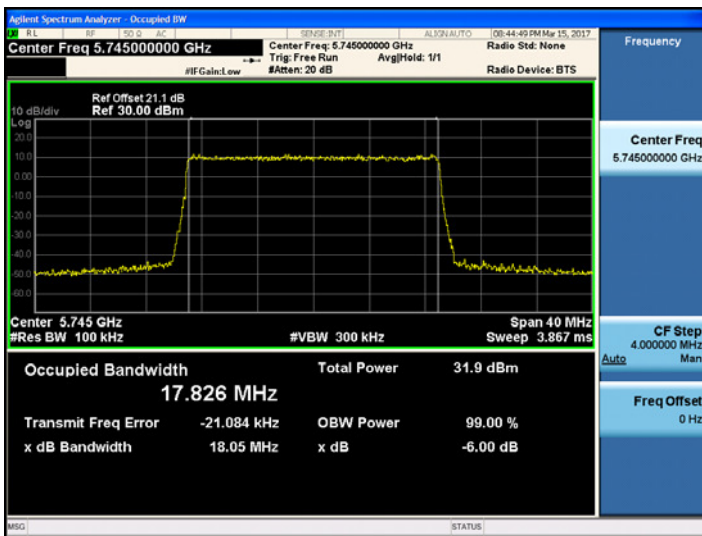
QPSK UNII 3 BAND 6dB Bandwidth



16QAM UNII 3 BAND 6dB Bandwidth



64QAM UNII 3 BAND 6dB Bandwidth



Note : In order to simplify the report, attached plots were only the most wide channel.

9.3 OUTPUT POWER MEASUREMENT

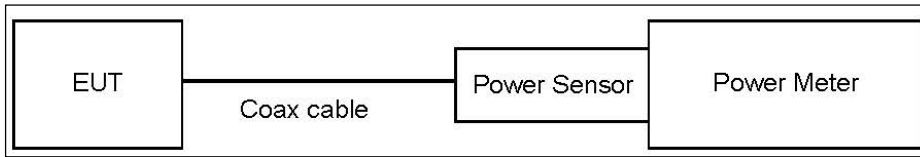
Test Requirements and limit, §15.407(a)(1)

A transmitter antenna terminal of EUT is connected to the input of a Power meter or Spectrum Analyzer .Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

■ Limit

Operating Mode	Band	Operating Ant.	Ant. Gain (dBi)	Limit (dBm)
SISO	UNII 1	A Path	4	30.00
		B Path	4	30.00
	UNII 3	A Path	4	30.00
		B Path	4	30.00
MIMO(CDD)	UNII 1	Path A & B	7	29.00
	UNII 3		7	29.00

Note : 1. Limit is calculated by antenna gain.

■ TEST CONFIGURATION**■ TEST PROCEDURE**

- Average Power (Procedure E.3.a in KDB 789033 D02 v01r03).
 1. Measure the duty cycle.
 2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
 3. Add $10 \log (1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Note :

Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1, 3	21.1

(Actual value of loss for the attenuator and cable combination)

QPSK (UNII 1)**■ TEST RESULTS for A Path****Conducted Output Power Measurements (QPSK Mode: 5160~5240)**

QPSK Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5160	22.70	30
5200	22.99	30
5240	23.26	30

■ TEST RESULTS for B Path**Conducted Output Power Measurements (QPSK Mode: 5160~5240)**

QPSK Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5160	23.06	30
5200	22.99	30
5240	23.13	30

■ TEST RESULTS_Sum Data of Path A & B**Conducted Output Power Measurements (QPSK Mode: 5160~5240)**

QPSK Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5160	25.89	29
5200	26.00	29
5240	26.21	29

QPSK (UNII 3)**■ TEST RESULTS for A Path****Conducted Output Power Measurements (QPSK Mode: 5745~5825)**

QPSK Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5745	23.20	30
5785	23.51	30
5825	23.62	30

■ TEST RESULTS for B Path**Conducted Output Power Measurements (QPSK Mode: 5745~5825)**

QPSK Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5745	23.54	30
5785	23.49	30
5825	22.17	30

■ TEST RESULTS_Sum Data of Path A & B**Conducted Output Power Measurements (QPSK Mode: 5745~5825)**

QPSK Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5745	26.38	29
5785	26.51	29
5825	25.97	29

16QAM (UNII 1)**■ TEST RESULTS for A Path****Conducted Output Power Measurements (16QAM Mode: 5160~5240)**

16QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5160	22.83	30
5200	23.04	30
5240	23.12	30

■ TEST RESULTS for B Path**Conducted Output Power Measurements (16QAM Mode: 5160~5240)**

16QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5160	22.97	30
5200	22.90	30
5240	23.01	30

■ TEST RESULTS_Sum Data of Path A & B**Conducted Output Power Measurements (16QAM Mode: 5160~5240)**

16QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5160	25.91	29
5200	25.98	29
5240	26.08	29

16QAM (UNII 3)

■ TEST RESULTS for A Path

Conducted Output Power Measurements (16QAM Mode: 5745~5825)

16QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5745	23.17	30
5785	23.40	30
5825	23.51	30

■ TEST RESULTS for B Path

Conducted Output Power Measurements (16QAM Mode: 5745~5825)

16QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5745	23.63	30
5785	23.55	30
5825	22.95	30

■ TEST RESULTS_Sum Data of Path A & B

Conducted Output Power Measurements (16QAM Mode: 5745~5825)

16QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5745	26.42	29
5785	26.49	29
5825	26.25	29

64QAM (UNII 1)

■ TEST RESULTS for A Path

Conducted Output Power Measurements (64QAM Mode: 5160~5240)

64QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5160	22.73	30
5200	22.82	30
5240	23.00	30

■ TEST RESULTS for B Path

Conducted Output Power Measurements (64QAM Mode: 5160~5240)

64QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5160	22.77	30
5200	22.78	30
5240	23.23	30

■ TEST RESULTS_Sum Data of Path A & B

Conducted Output Power Measurements (64QAM Mode: 5160~5240)

64QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5160	25.76	29
5200	25.81	29
5240	26.13	29

64QAM (UNII 3)**■ TEST RESULTS for A Path****Conducted Output Power Measurements (64QAM Mode: 5745~5825)**

64QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5745	23.02	30
5785	23.36	30
5825	23.51	30

■ TEST RESULTS for B Path**Conducted Output Power Measurements (64QAM Mode: 5745~5825)**

64QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5745	23.58	30
5785	23.45	30
5825	23.01	30

■ TEST RESULTS_Sum Data of Path A & B**Conducted Output Power Measurements (64QAM Mode: 5745~5825)**

64QAM Mode	Measured Power (dBm)	Limit (dBm)
Frequency [MHz]		
5745	26.32	29
5785	26.42	29
5825	26.28	29

9.4 POWER SPECTRAL DENSITY

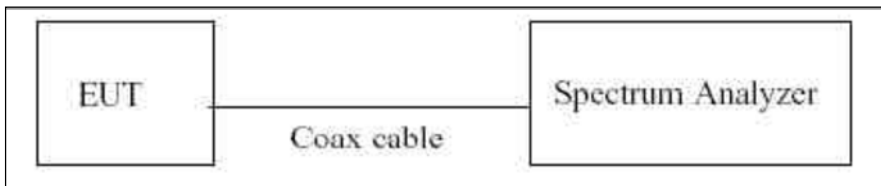
The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The maximum permissible peak power spectral density is 17 dBm/ MHz for UNII 1 and 30 dBm/500 kHz for UNII 3.

■ Limit

Power Spectral Density

Operating Mode	Band	Operating Ant.	Ant. Gain (dBi)	Limit
SISO	UNII 1	A Path	4	17 dBm/MHz
		B Path	4	17 dBm/MHz
	UNII 3	A Path	4	30 dBm/500 kHz
		B Path	4	30 dBm/500 kHz
MIMO(CDD)	UNII 1	Pat A & B	7	16 dBm/MHz
	UNII 3		7	29 dBm/500 kHz

Note : 1. Limit is calculated by antenna gain.

■ TEST CONFIGURATION**■ TEST PROCEDURE**

We tested according to Method in KDB 789033 D02 v01r03.

The spectrum analyzer is set to :

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
3. VBW $\geq$ 3 MHz
4. Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to "free run".
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.

■ Sample Calculation

PSD = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

Output Power = -5 dBm + 10 dB + 0.8 dB + 0.21 dB = 16.01 dBm

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 5.2 GHz, 5.3 GHz and 5.6 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1, 3	21.1

(Actual value of loss for the attenuator and cable combination)

QPSK

■ TEST RESULTS for A Path

Conducted Power Density Measurements

Frequency (MHz)	Test Result		
	Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5160	11.395	17	Pass
5200	11.619		Pass
5240	11.801		Pass
5745	9.449	30	Pass
5785	9.688		Pass
5825	9.882		Pass

■ TEST RESULTS for B Path

Conducted Power Density Measurements

Frequency (MHz)	Test Result		
	Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5160	11.991	17	Pass
5200	11.652		Pass
5240	11.774		Pass
5745	9.905	30	Pass
5785	9.710		Pass
5825	9.379		Pass

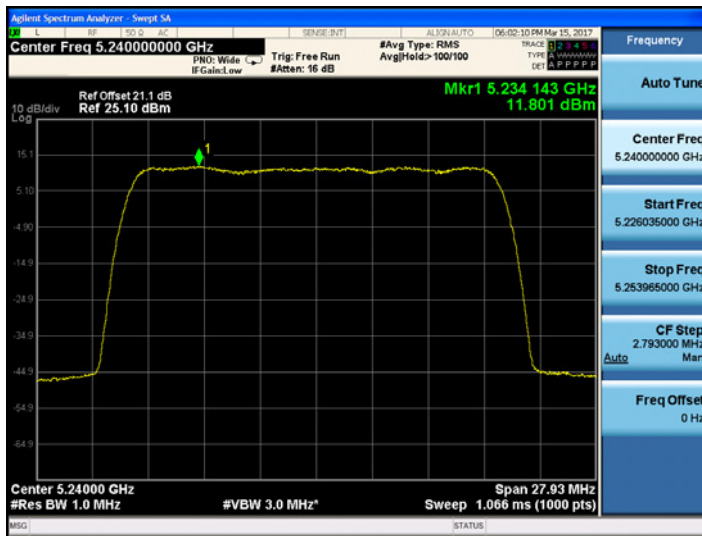
■ Sum Data of Path A & B

Conducted Power Density Measurements

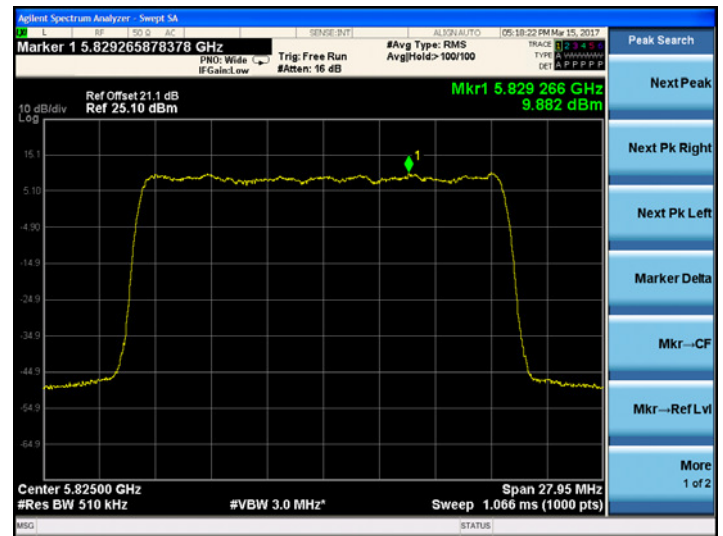
Frequency (MHz)	Test Result		
	Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5160	14.71	16	Pass
5200	14.65		Pass
5240	14.80		Pass
5745	12.69	29	Pass
5785	12.71		Pass
5825	12.65		Pass

■ TEST Plot for QPSK_A Path

QPSK UNII 1 BAND PSD_5240 MHz

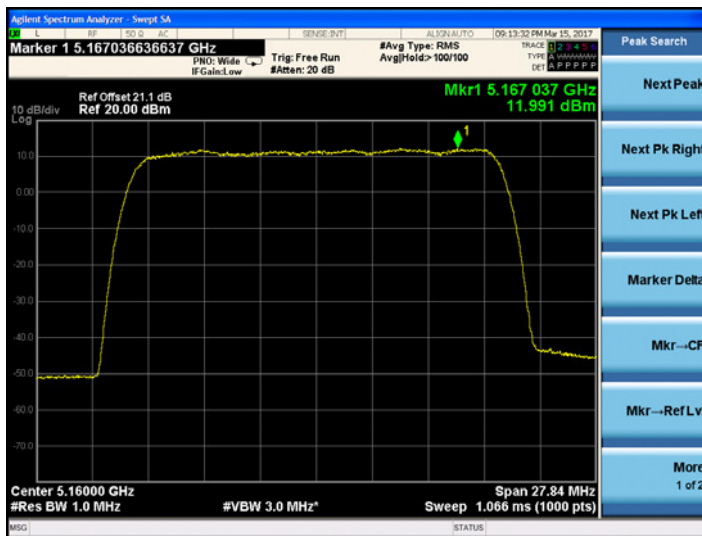


QPSK UNII 3 BAND PSD_5825 MHz

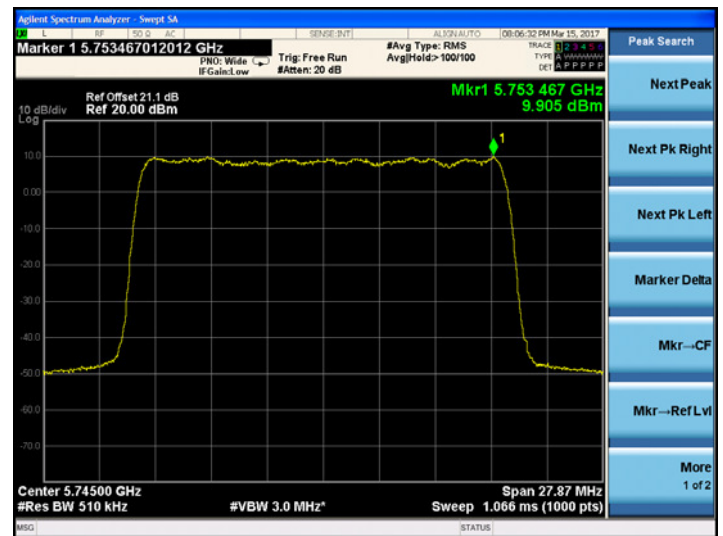


■ TEST Plot for QPSK_B Path

QPSK UNII 1 BAND PSD_5160 MHz



QPSK UNII 3 BAND PSD_5745 MHz



16QAM

■ TEST RESULTS for A Path

Conducted Power Density Measurements

Frequency (MHz)	Test Result		
	Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5160	11.703	17	Pass
5200	11.332		Pass
5240	11.801		Pass
5745	8.390	30	Pass
5785	9.679		Pass
5825	10.149		Pass

■ TEST RESULTS for B Path

Conducted Power Density Measurements

Frequency (MHz)	Test Result		
	Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5160	11.736	17	Pass
5200	11.437		Pass
5240	11.905		Pass
5745	10.055	30	Pass
5785	10.122		Pass
5825	10.122		Pass

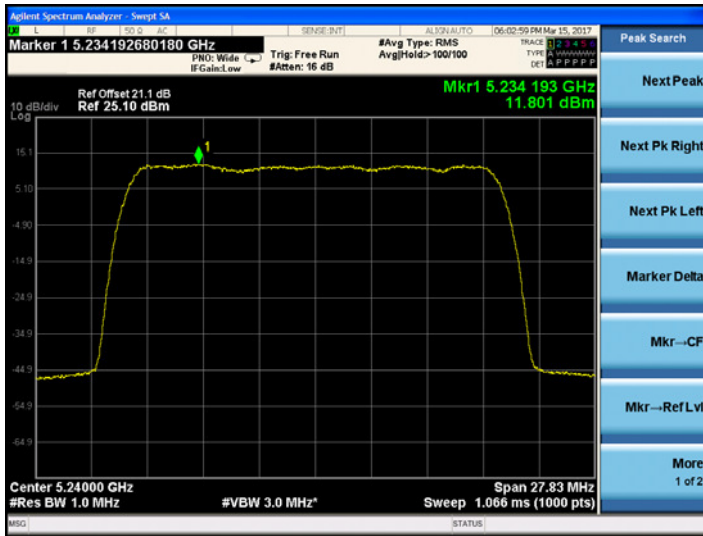
■ Sum Data of Path A & B

Conducted Power Density Measurements

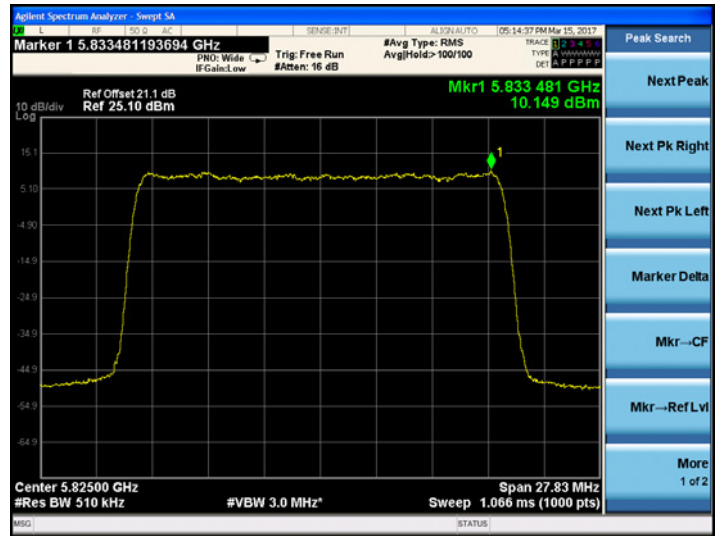
Frequency (MHz)	Test Result		
	Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5160	14.73	16	Pass
5200	14.40		Pass
5240	14.86		Pass
5745	12.31	29	Pass
5785	12.92		Pass
5825	13.15		Pass

■ TEST Plot for 16QAM _A Path

16QAM UNII 1 BAND PSD_5240 MHz

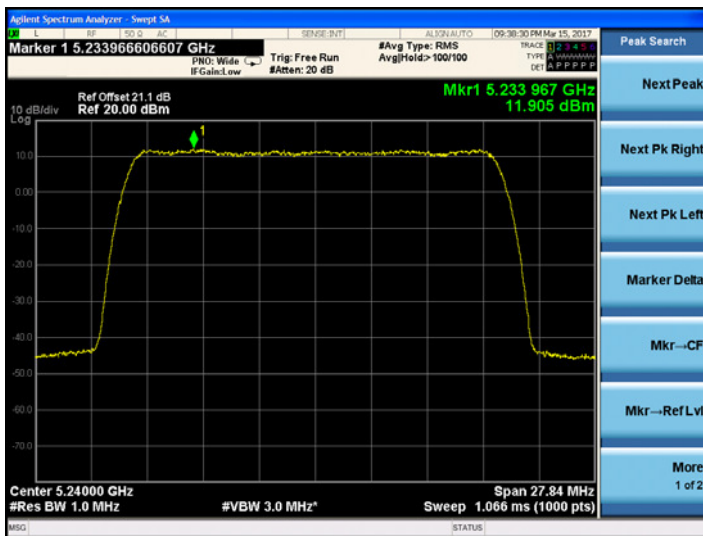


16QAM UNII 3 BAND PSD_5825 MHz

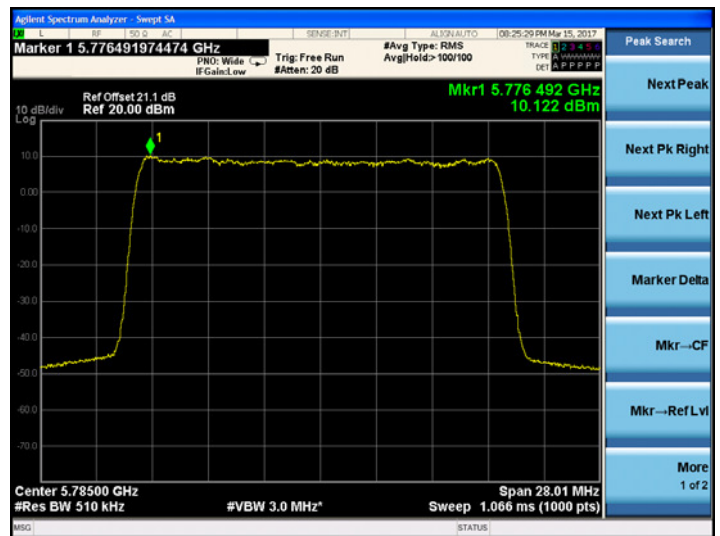


■ TEST Plot for 16QAM _B Path

16QAM UNII 1 BAND PSD_5240 MHz



16QAM UNII 3 BAND PSD_5785 MHz



64QAM

■ TEST RESULTS for A Path

Conducted Power Density Measurements

Frequency (MHz)	Test Result		
	Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5160	11.639	17	Pass
5200	11.468		Pass
5240	11.859		Pass
5745	9.407	30	Pass
5785	8.651		Pass
5825	9.264		Pass

■ TEST RESULTS for B Path

Conducted Power Density Measurements

Frequency (MHz)	Test Result		
	Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5160	12.025	17	Pass
5200	11.299		Pass
5240	11.745		Pass
5745	10.061	30	Pass
5785	9.927		Pass
5825	9.950		Pass

■ Sum Data of Path A & B

Conducted Power Density Measurements

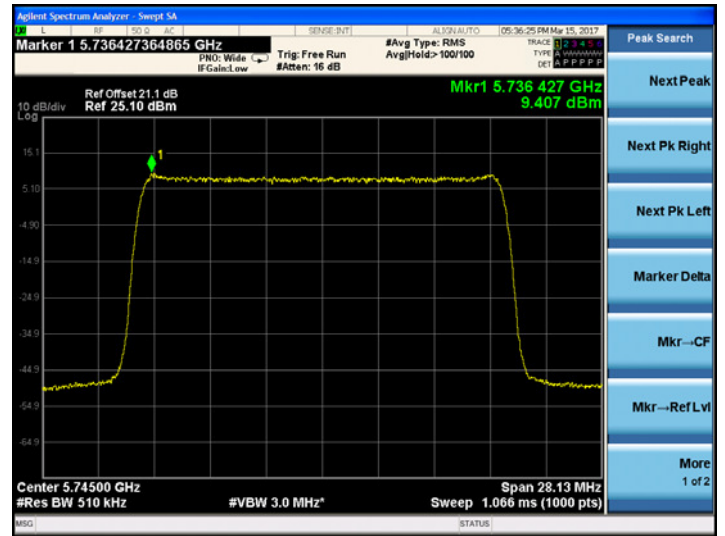
Frequency (MHz)	Test Result		
	Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5160	14.85	16	Pass
5200	14.39		Pass
5240	14.81		Pass
5745	12.76	29	Pass
5785	12.35		Pass
5825	12.63		Pass

■ TEST Plot for 64QAM _A Path

64QAM UNII 1 BAND PSD_5240 MHz

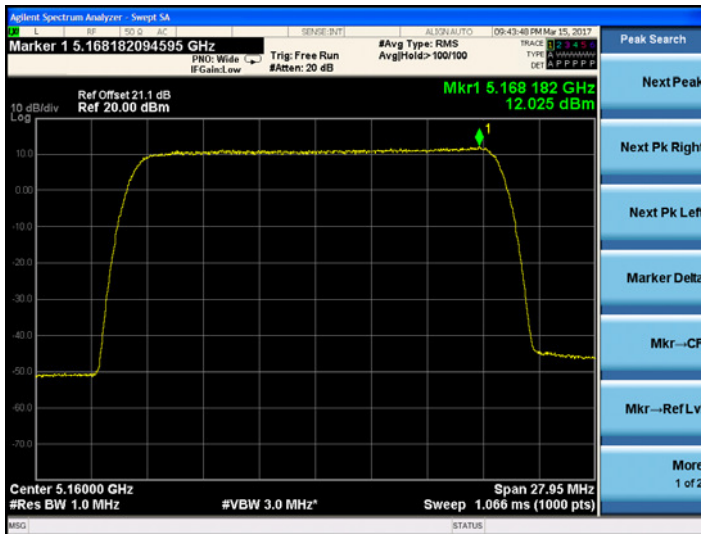


64QAM UNII 3 BAND PSD_5745 MHz

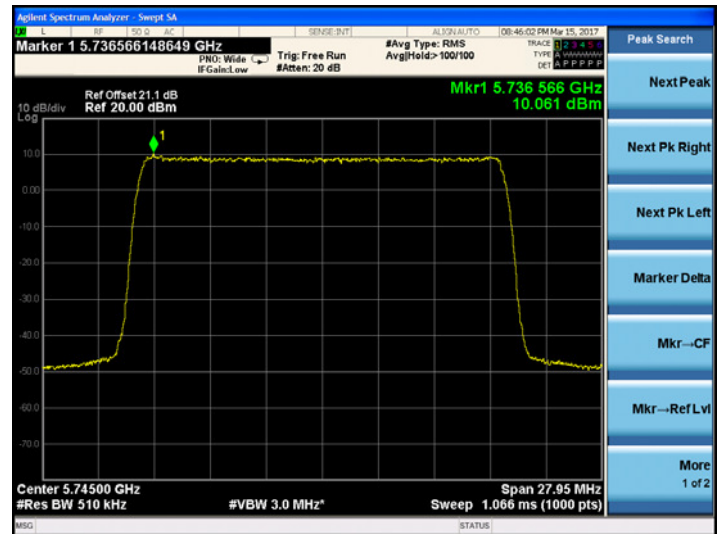


■ TEST Plot for 16QAM _B Path

64QAM UNII 1 BAND PSD_5160 MHz



64QAM UNII 3 BAND PSD_5745 MHz



9.5 FREQUENCY STABILITY.

The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 °C and 80 °C. The temperature was incremented by 10 °C intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

A Path

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,160,000,000 Hz
REFERENCE VOLTAGE:	220.0 VAC

Voltage	Power (VAC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	220	+20(Ref)	5160089.13	89.13
100%		-30	5160058.05	58.05
100%		-20	5160054.33	54.33
100%		-10	5160059.69	59.69
100%		0	5160060.88	60.88
100%		+10	5160064.81	64.81
100%		+30	5160068.21	68.21
100%		+40	5160071.51	71.51
100%		+50	5160072.44	72.44
100%		+60	5160072.97	72.97
100%		+70	5160073.98	73.98
100%		+80	5160074.43	74.43
115%	253	+20	5160085.14	85.14
Batt. Endpoint	187	+20	5160084.96	84.96

Note:

Based on the results of the frequency stability test shown above 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 error 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.

OPERATING BAND: UNII Band 3
 OPERATING FREQUENCY: 5,745,000,000 Hz
 REFERENCE VOLTAGE: 220.0 VAC

Voltage	Power (VAC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	220	+20(Ref)	5745088.21	88.21
100%		-30	5745057.33	57.33
100%		-20	5745050.12	50.12
100%		-10	5745053.76	53.76
100%		0	5745054.99	54.99
100%		+10	5745068.23	68.23
100%		+30	5745084.23	84.23
100%		+40	5745081.22	81.22
100%		+50	5745079.55	79.55
100%		+60	5745076.86	76.86
100%		+70	5745071.96	71.96
100%		+80	5745076.12	76.12
115%	253	+20	5745069.54	69.54
Batt. Endpoint	187	+20	5745067.84	67.84

Note:

Based on the results of the frequency stability test shown above 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 error 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.

B Path

OPERATING BAND: UNII Band 1
 OPERATING FREQUENCY: 5,160,000,000 Hz
 REFERENCE VOLTAGE: 220.0 VAC

Voltage	Power (VAC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	220	+20(Ref)	5160086.45	86.45
100%		-30	5160064.33	64.33
100%		-20	5160060.12	60.12
100%		-10	5160057.93	57.93
100%		0	5160059.42	59.42
100%		+10	5160061.75	61.75
100%		+30	5160066.75	66.75
100%		+40	5160072.42	72.42
100%		+50	5160071.44	71.44
100%		+60	5160072.97	70.33
100%		+70	5160073.98	69.23
100%		+80	5160074.43	72.48
115%	253	+20	5160081.66	81.66
85%	187	+20	5160080.71	80.71

Note:

Based on the results of the frequency stability test shown above 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 error 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.

OPERATING BAND: UNII Band 3
 OPERATING FREQUENCY: 5,745,000,000 Hz
 REFERENCE VOLTAGE: 220.0 VAC

Voltage	Power (VAC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	220	+20(Ref)	5745088.21	84.69
100%		-30	5745057.33	60.44
100%		-20	5745050.12	56.72
100%		-10	5745053.76	56.81
100%		0	5745054.99	51.88
100%		+10	5745068.23	64.72
100%		+30	5745084.23	81.44
100%		+40	5745081.22	80.12
100%		+50	5745079.55	75.84
100%		+60	5745076.86	74.36
100%		+70	5745071.96	72.46
100%		+80	5745076.12	75.81
115%	253	+20	5745069.54	80.47
85%	187	+20	5745067.84	89.31

Note:

Based on the results of the frequency stability test shown above 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 error 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.

9.6 RADIATED MEASUREMENT**9.6.1 RADIATED SPURIOUS EMISSIONS.****Test Requirements and limit, §15.205, §15.209, §15.407**

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

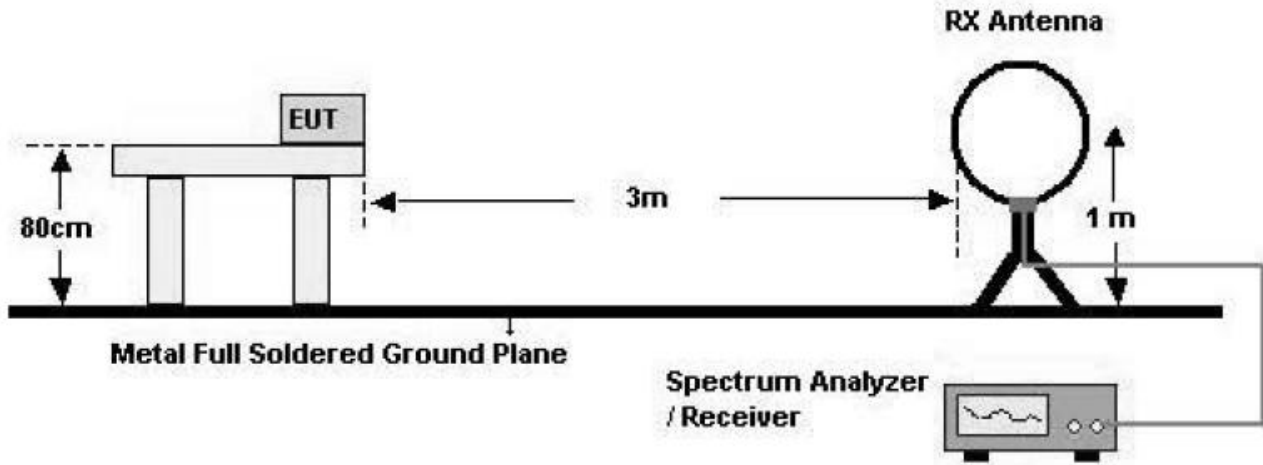
■ §15.407, KDB 789033 D02

All harmonics that do not lie in a restricted band are subject to a peak limit of -27 dBm/MHz. At a distance of 3 meters the field strength limit in dBµV/m can be determined by adding a “conversion” factor of 95.2 dB to the EIRP limit of -27 dBm/MHz to obtain the limit for out of band spurious emissions of 68.2 dBµV/m.

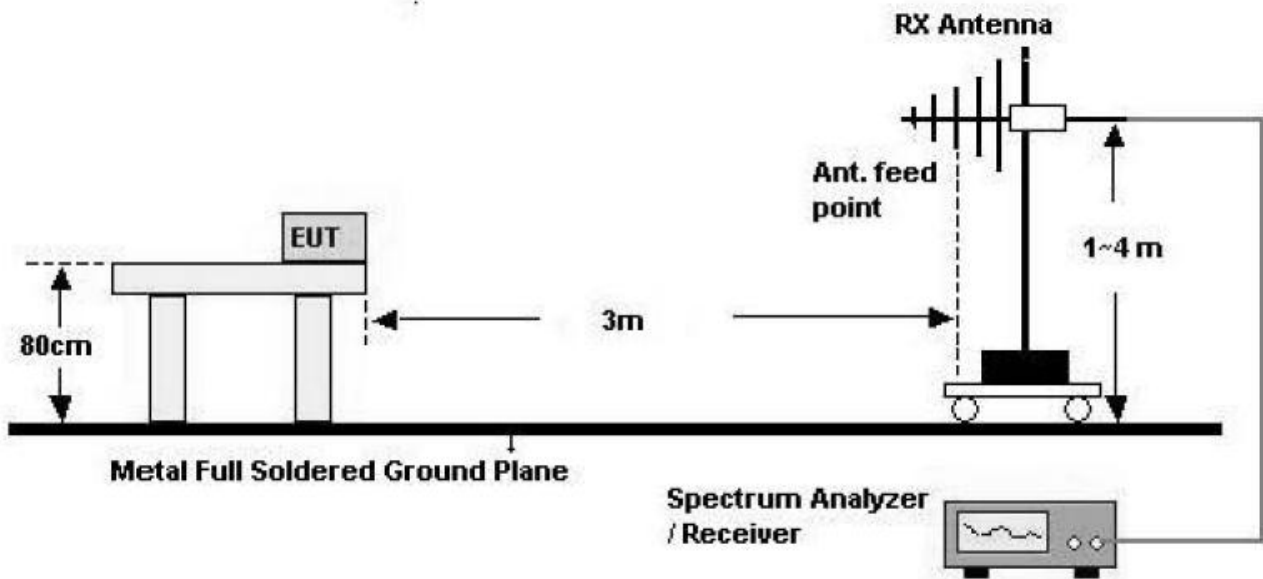
Especially, for transmitter operating in the 5725 Mhz – 5850 MHz : All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

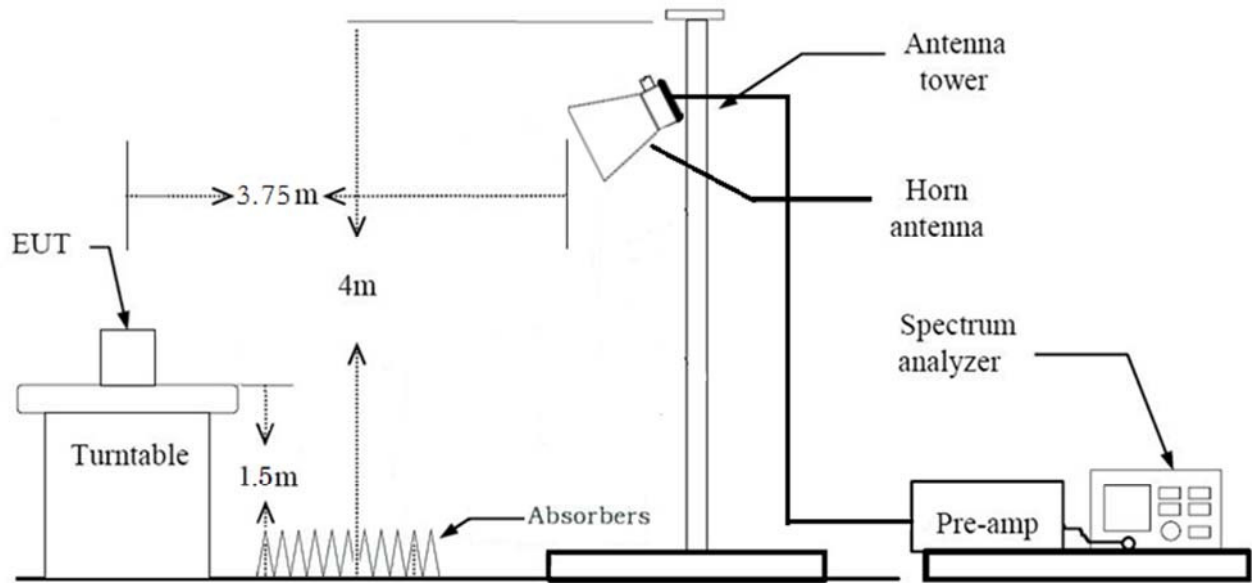
Test Configuration

Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz**TEST PROCEDURE USED**

ANSI C63.10:2013

Method G)5) in KDB 789033 D02 v01r03 (Peak)

Method G)6)d) in KDB 789033 D02 v01r03 (Average)

. Spectrum setting:

- Peak.

1. RBW = 1 MHz

2. VBW $\geq$ 3 MHz

3. Detector = Peak

4. Sweep Time = auto

5. Trace mode = max hold

6. Allow sweeps to continue until the trace stabilizes.

7. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately $1/x$, where x is the duty cycle.

- Average (Method VB :Averaging using reduced video bandwidth)

1. RBW = 1 MHz

2. VBW

2.1. If the EUT is configured to transmit with duty cycle ≥ 98 percent, set $VBW \leq RBW/100$ (i.e., 10 kHz) but not less than 10 Hz.

2.2. If the EUT duty cycle is < 98 percent, set $VBW \geq 1/T$, where T is the minimum transmission duration.

3. The analyzer is set to linear detector mode.

4. Detector = Peak.

5. Sweep time = auto.

6. Trace mode = max hold.

7. Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of $1/x$, where x is the duty cycle.

Note :

1. We used the Method VB for LTE-U mode to perform the average filed strength measurements.

2. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).

3. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

TEST RESULTS**9 kHz – 30MHz****Operation Mode:** Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB)
4. Limit line = specific Limits (dB μ V) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

TEST RESULTS**Below 1 GHz****Operation Mode:** Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

Band :	UNII 1
Operation Mode:	QPSK
Operating Frequency	5160 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10320	52.01	0.31	V	52.32	68.20	15.88	PK
15480	50.19	0.63	V	50.82	73.98	23.16	PK
15480	36.30	0.63	V	36.93	53.98	17.05	AV
10320	51.69	0.31	H	52.00	68.20	16.20	PK
15480	50.10	0.63	H	50.73	73.98	23.25	PK
15480	36.27	0.63	H	36.90	53.98	17.08	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 1

Operation Mode: QPSK

Operating Frequency 5200 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	50.37	0.28	V	50.65	68.20	17.55	PK
15600	50.49	-0.93	V	49.56	73.98	24.42	PK
15600	36.61	-0.93	V	35.68	53.98	18.30	AV
10400	50.18	0.28	H	50.46	68.20	17.74	PK
15600	49.69	-0.93	H	48.76	73.98	25.22	PK
15600	36.51	-0.93	H	35.58	53.98	18.40	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 1

Operation Mode: QPSK

Operating Frequency 5240 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	50.37	-0.68	V	49.69	68.20	18.51	PK
15720	50.24	-1.18	V	49.06	73.98	24.92	PK
15720	36.61	-1.18	V	35.43	53.98	18.55	AV
10480	50.23	-0.68	H	49.55	68.20	18.65	PK
15720	50.11	-1.18	H	48.93	73.98	25.05	PK
15720	36.49	-1.18	H	35.31	53.98	18.67	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 1

Operation Mode: 16QAM

Operating Frequency 5160 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10320	49.98	0.31	V	50.29	68.20	17.91	PK
15480	49.52	0.63	V	50.15	73.98	23.83	PK
15480	36.21	0.63	V	36.84	53.98	17.14	AV
10320	50.08	0.31	H	50.39	68.20	17.81	PK
15480	49.64	0.63	H	50.27	73.98	23.71	PK
15480	36.32	0.63	H	36.95	53.98	17.03	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 1

Operation Mode: 16QAM

Operating Frequency 5200 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	49.69	0.28	V	49.97	68.20	18.23	PK
15600	50.28	-0.93	V	49.35	73.98	24.63	PK
15600	36.55	-0.93	V	35.62	53.98	18.36	AV
10400	49.93	0.28	H	50.21	68.20	17.99	PK
15600	50.46	-0.93	H	49.53	73.98	24.45	PK
15600	36.63	-0.93	H	35.70	53.98	18.28	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

UNII 1

Band :

Operation Mode:

16QAM

Operating Frequency

5240 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	49.73	-0.68	V	49.05	68.20	19.15	PK
15720	49.66	-1.18	V	48.48	73.98	25.50	PK
15720	36.45	-1.18	V	35.27	53.98	18.71	AV
10480	49.95	-0.68	H	49.27	68.20	18.93	PK
15720	50.09	-1.18	H	48.91	73.98	25.07	PK
15720	36.84	-1.18	H	35.66	53.98	18.32	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 1

Operation Mode: 64QAM

Operating Frequency 5160 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10320	50.12	0.31	V	50.43	68.20	17.77	PK
15480	50.34	0.63	V	50.97	73.98	23.01	PK
15480	35.86	0.63	V	36.49	53.98	17.49	AV
10320	50.35	0.31	H	50.66	68.20	17.54	PK
15480	51.08	0.63	H	51.71	73.98	22.27	PK
15480	36.01	0.63	H	36.64	53.98	17.34	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 1

Operation Mode: 64QAM

Operating Frequency 5200 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	49.11	0.28	V	49.39	68.20	18.81	PK
15600	50.06	-0.93	V	49.13	73.98	24.85	PK
15600	36.42	-0.93	V	35.49	53.98	18.49	AV
10400	49.21	0.28	H	49.49	68.20	18.71	PK
15600	50.16	-0.93	H	49.23	73.98	24.75	PK
15600	36.60	-0.93	H	35.67	53.98	18.31	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 1

Operation Mode: 64QAM

Operating Frequency 5240 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	50.07	-0.68	V	49.39	68.20	18.81	PK
15720	49.68	-1.18	V	48.50	73.98	25.48	PK
15720	36.58	-1.18	V	35.40	53.98	18.58	AV
10480	50.19	-0.68	H	49.51	68.20	18.69	PK
15720	49.93	-1.18	H	48.75	73.98	25.23	PK
15720	36.68	-1.18	H	35.50	53.98	18.48	AV

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 3

Operation Mode: QPSK

Operating Frequency 5745MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	50.28	0.32	V	50.60	73.98	23.38	PK
11490	37.19	0.32	V	37.51	53.98	16.47	AV
17235	50.48	5.06	V	55.54	68.20	12.66	PK
11490	50.17	0.32	H	50.49	73.98	23.49	PK
11490	37.10	0.32	H	37.42	53.98	16.56	AV
17235	50.23	5.06	H	55.29	68.20	12.91	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 3

Operation Mode: QPSK

Operating Frequency 5785 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	50.36	0.01	V	50.37	73.98	23.61	PK
11570	36.92	0.01	V	36.93	53.98	17.05	AV
17355	49.01	4.18	V	53.19	68.20	15.01	PK
11570	50.24	0.01	H	50.25	73.98	23.73	PK
11570	36.79	0.01	H	36.80	53.98	17.18	AV
17355	48.94	4.18	H	53.12	68.20	15.08	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 3

Operation Mode: QPSK

Operating Frequency 5825 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	52.09	-0.57	V	51.52	73.98	22.46	PK
11650	37.66	-0.57	V	37.09	53.98	16.89	AV
17475	48.31	4.04	V	52.35	68.20	15.85	PK
11650	51.58	-0.57	H	51.01	73.98	22.97	PK
11650	37.42	-0.57	H	36.85	53.98	17.13	AV
17475	48.16	4.04	H	52.20	68.20	16.00	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 3

Operation Mode: 16QAM

Operating Frequency 5745 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	50.10	0.32	V	50.42	73.98	23.56	PK
11490	36.59	0.32	V	36.91	53.98	17.07	AV
17235	49.75	5.06	V	54.81	68.20	13.39	PK
11490	50.12	0.32	H	50.44	73.98	23.54	PK
11490	36.88	0.32	H	37.20	53.98	16.78	AV
17235	49.88	5.06	H	54.94	68.20	13.26	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 3

Operation Mode: 16QAM

Operating Frequency 5785 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	49.87	0.01	V	49.88	73.98	24.10	PK
11570	36.47	0.01	V	36.48	53.98	17.50	AV
17355	48.20	4.18	V	52.38	68.20	15.82	PK
11570	49.94	0.01	H	49.95	73.98	24.03	PK
11570	36.59	0.01	H	36.60	53.98	17.38	AV
17355	48.21	4.18	H	52.39	68.20	15.81	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 3

Operation Mode: 16QAM

Operating Frequency 5825 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	49.33	-0.57	V	48.76	73.98	25.22	PK
11650	36.72	-0.57	V	36.15	53.98	17.83	AV
17475	49.57	4.04	V	53.61	68.20	14.59	PK
11650	49.53	-0.57	H	48.96	73.98	25.02	PK
11650	36.98	-0.57	H	36.41	53.98	17.57	AV
17475	49.62	4.04	H	53.66	68.20	14.54	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band :	UNII 3
Operation Mode:	64QAM
Operating Frequency	5745 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	50.18	0.32	V	50.50	73.98	23.48	PK
11490	36.49	0.32	V	36.81	53.98	17.17	AV
17235	49.71	5.06	V	54.77	68.20	13.43	PK
11490	50.30	0.32	H	50.62	73.98	23.36	PK
11490	36.78	0.32	H	37.10	53.98	16.88	AV
17235	49.84	5.06	H	54.90	68.20	13.30	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 3

Operation Mode: 64QAM

Operating Frequency 5785 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	49.36	0.01	V	49.37	73.98	24.61	PK
11570	36.56	0.01	V	36.57	53.98	17.41	AV
17355	48.52	4.18	V	52.70	68.20	15.50	PK
11570	49.56	0.01	H	49.57	73.98	24.41	PK
11570	36.77	0.01	H	36.78	53.98	17.20	AV
17355	48.69	4.18	H	52.87	68.20	15.33	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

Band : UNII 3

Operation Mode: 64QAM

Operating Frequency 5825 MHz

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	50.49	-0.57	V	49.92	73.98	24.06	PK
11650	36.48	-0.57	V	35.91	53.98	18.07	AV
17475	48.74	4.04	V	52.78	68.20	15.42	PK
11650	50.82	-0.57	H	50.25	73.98	23.73	PK
11650	36.83	-0.57	H	36.26	53.98	17.72	AV
17475	48.87	4.04	H	52.91	68.20	15.29	PK

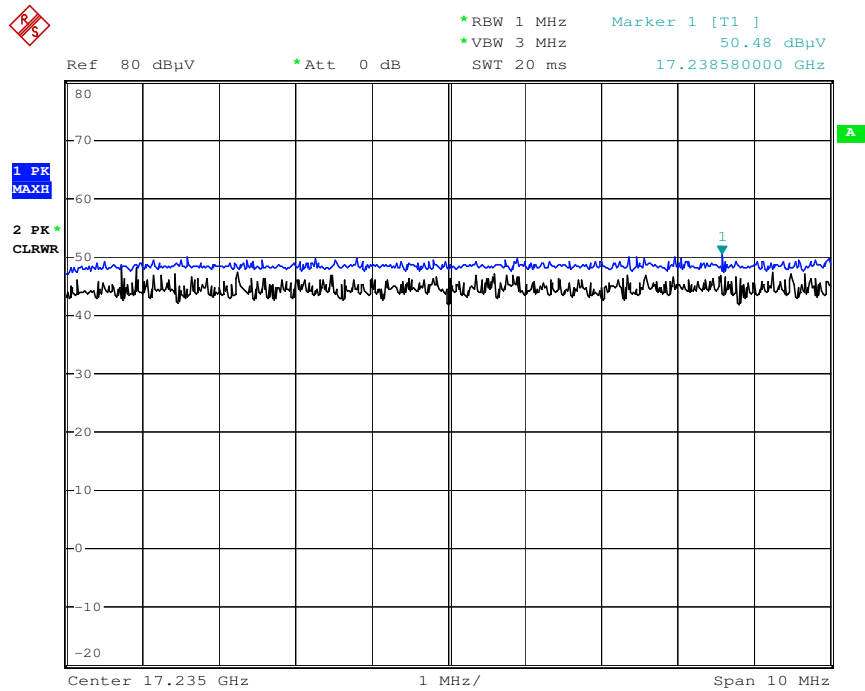
*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = $20 \log (\text{test distance} / \text{specific distance})$ (dB)

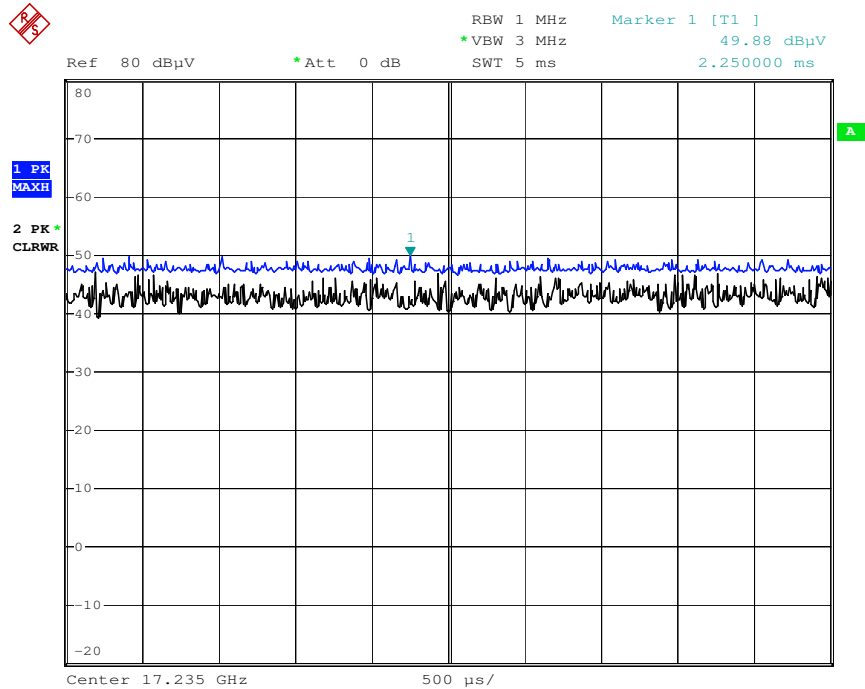
RESULT PLOTS

Radiated Spurious Emissions plot –Peak Reading (QPSK, 3rd Harmonic, X-V, 5745 MHz)



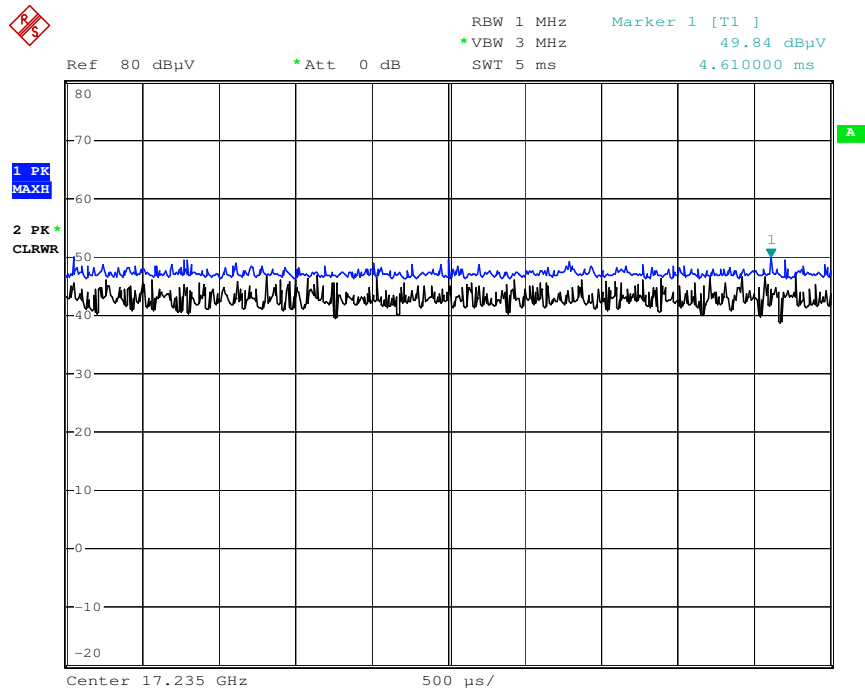
Date: 14.MAR.2017 13:44:07

Radiated Spurious Emissions plot –Peak Reading (16QAM, 3rd Harmonic, X-H, 5745 MHz)



Date: 15.MAR.2017 02:27:24

Radiated Spurious Emissions plot –Peak Reading (64QAM, 3rd Harmonic, X-H, 5745 MHz)



Date: 15.MAR.2017 03:19:13

Note : Only the worst case plots for Radiated Spurious Emissions.

9.6.2 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Band : UNII 1
Operation Mode: QPSK
Operating Frequency 5160 MHz

Frequency [MHz]	Reading dBuV	AN.+CL+ATT. +D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	26.24	38.66	H	64.90	73.98	9.08	PK
5150	14.16	38.66	H	52.82	53.98	1.16	AV
5150	26.18	38.66	V	64.84	73.98	9.14	PK
5150	14.12	38.66	V	52.78	53.98	1.20	AV

Band : UNII 1
Operation Mode: 16QAM
Operating Frequency 5160 MHz

Frequency [MHz]	Reading dBuV	AN.+CL+ATT. +D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	26.38	38.66	H	65.04	73.98	8.94	PK
5150	14.18	38.66	H	52.84	53.98	1.14	AV
5150	26.24	38.66	V	64.9	73.98	9.08	PK
5150	14.11	38.66	V	52.77	53.98	1.21	AV

Band :	UNII 1
Operation Mode:	64QAM
Operating Frequency	5160 MHz

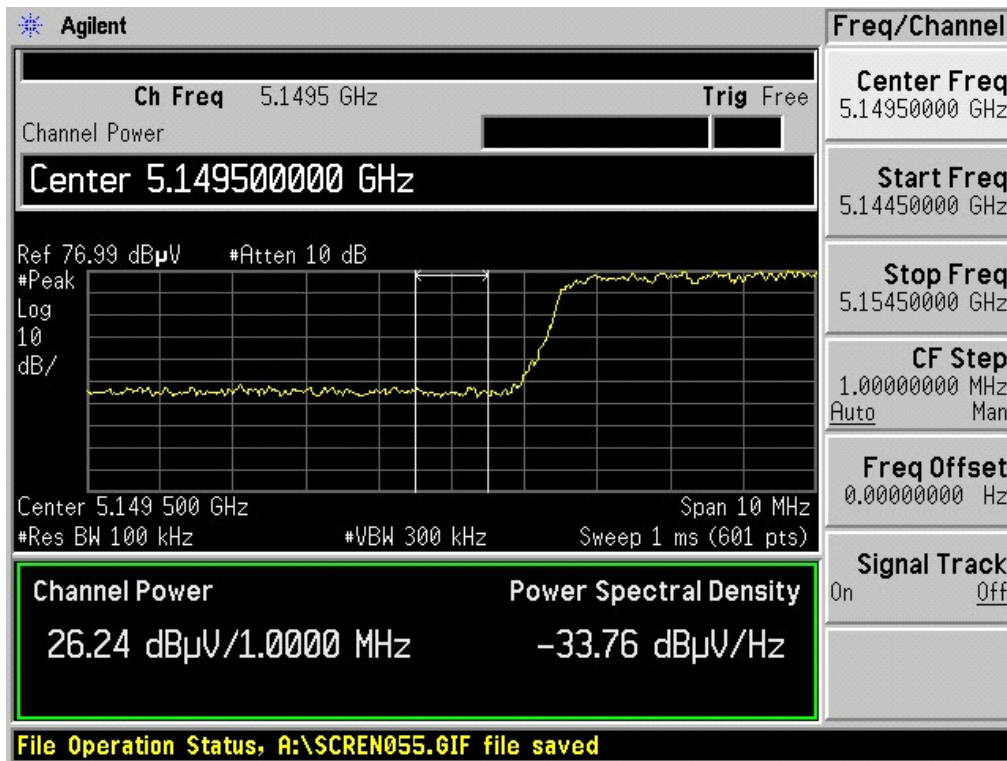
Frequency [MHz]	Reading dBuV	AN.+CL+ATT. +D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	25.30	38.66	H	63.96	73.98	10.02	PK
5150	14.11	38.66	H	52.77	53.98	1.21	AV
5150	25.23	38.66	V	63.89	73.98	10.09	PK
5150	14.06	38.66	V	52.72	53.98	1.26	AV

Notes:

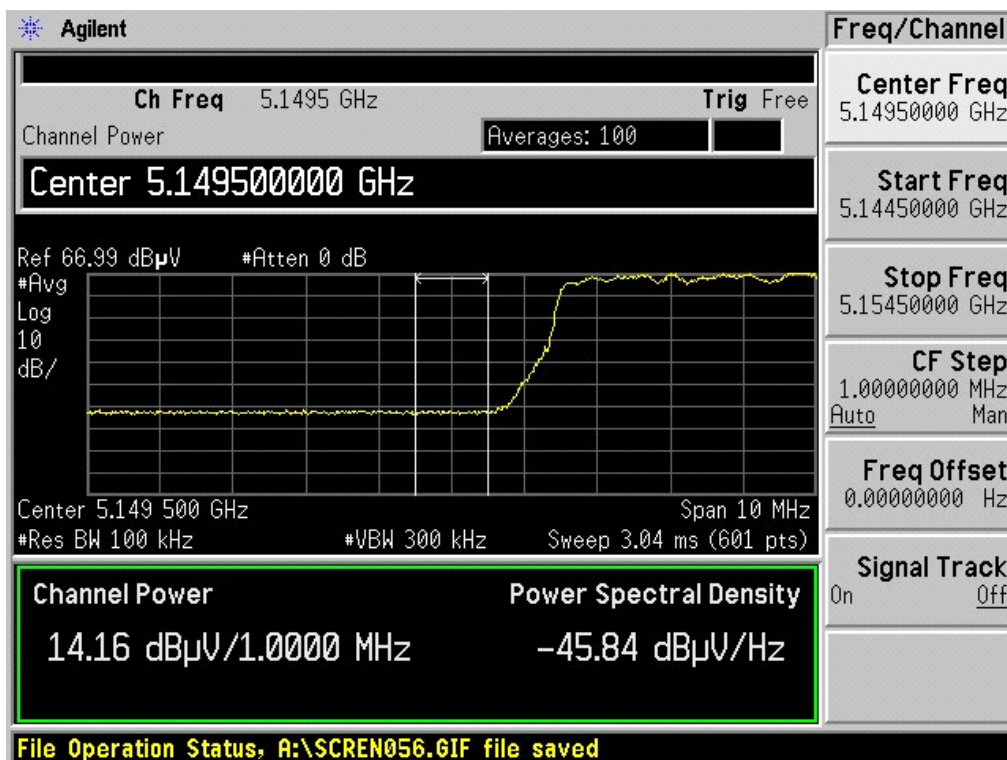
1. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + ATT + Distance Factor
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. “*” is radiated band edge test frequency.(not restricted band emissions)

■ **RESULT PLOTS**

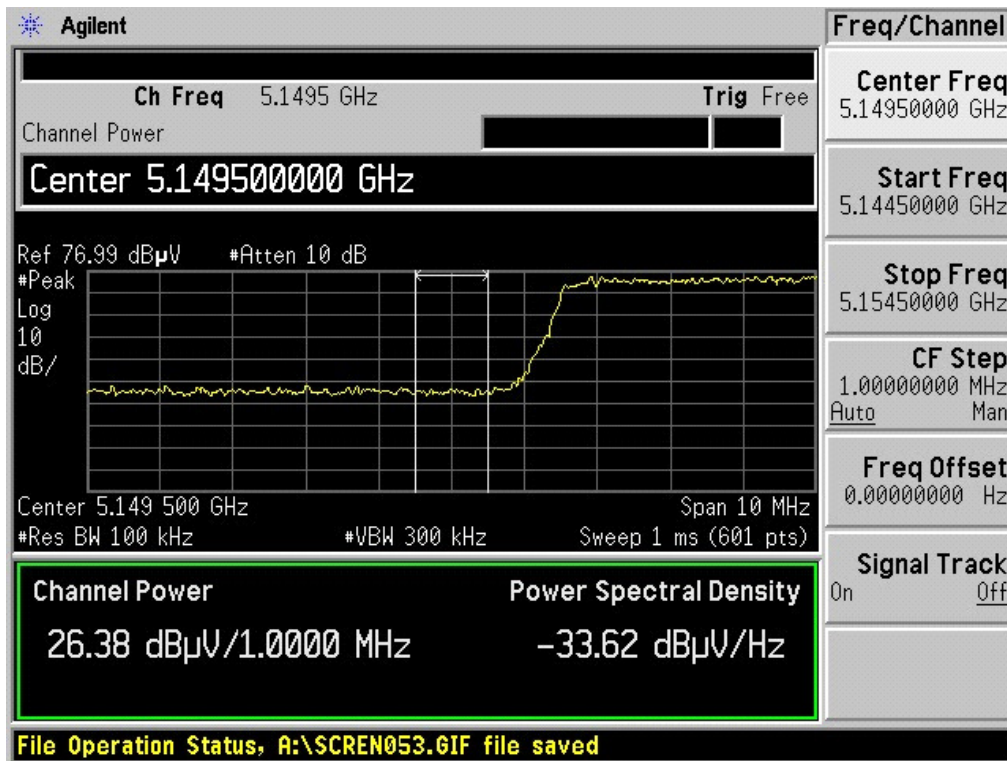
Radiated Restricted Band Edges plot – Peak Reading (QPSK, Z-H, 5160 MHz)



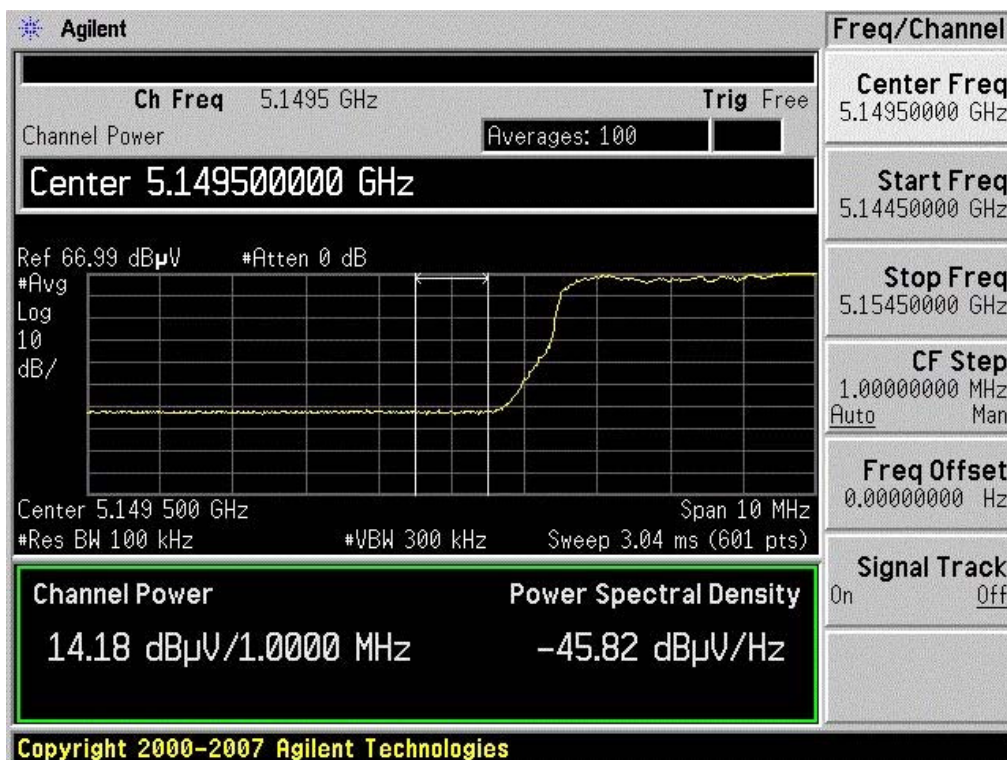
Radiated Restricted Band Edges plot – Average Reading (QPSK, Z-H, 5160 MHz)



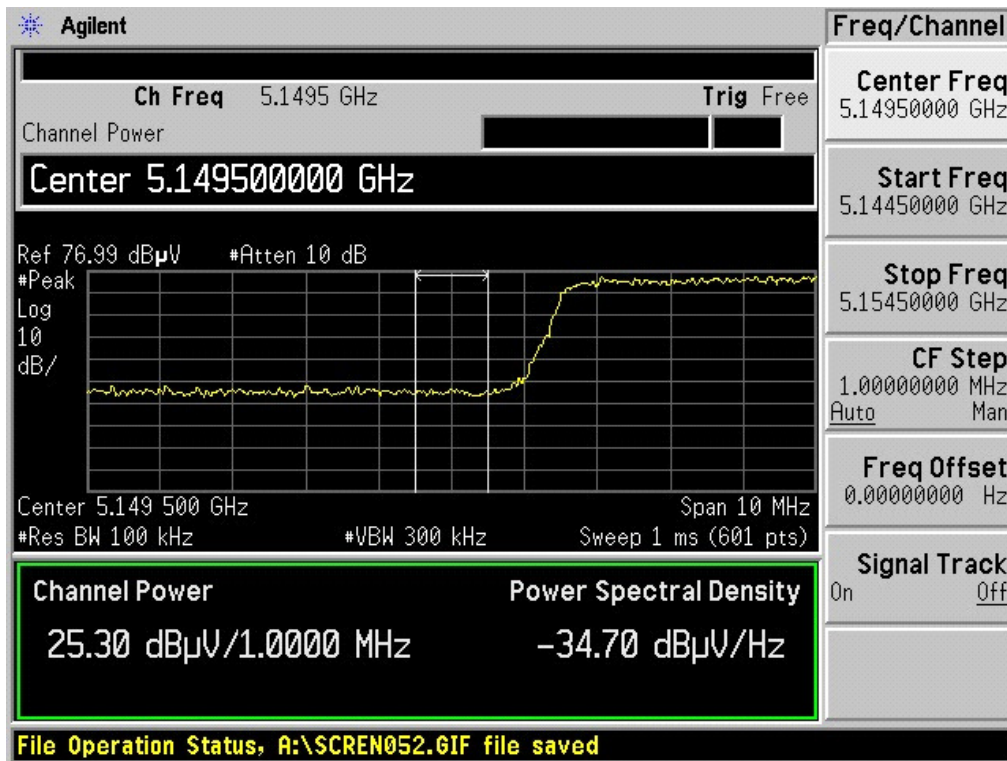
Radiated Restricted Band Edges plot – Peak Reading (16QAM, Z-H, 5160 MHz)



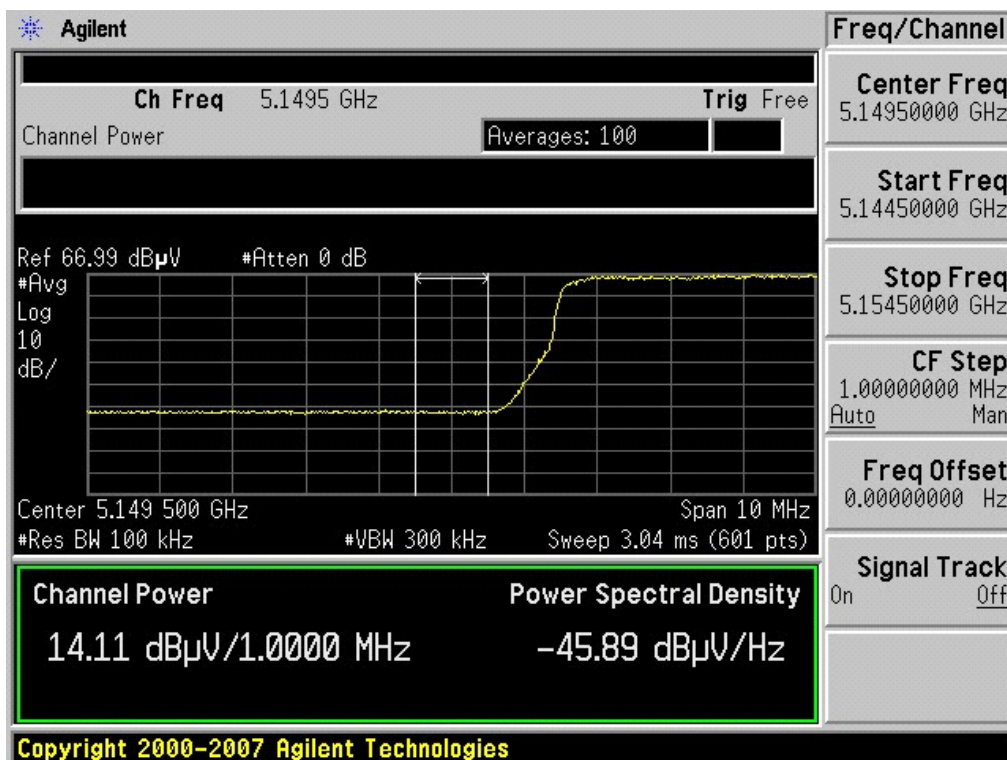
Radiated Restricted Band Edges plot – Average Reading (16QAM, Z-H, 5160 MHz)



Radiated Restricted Band Edges plot – Peak Reading (64QAM, Z-H, 5160 MHz)

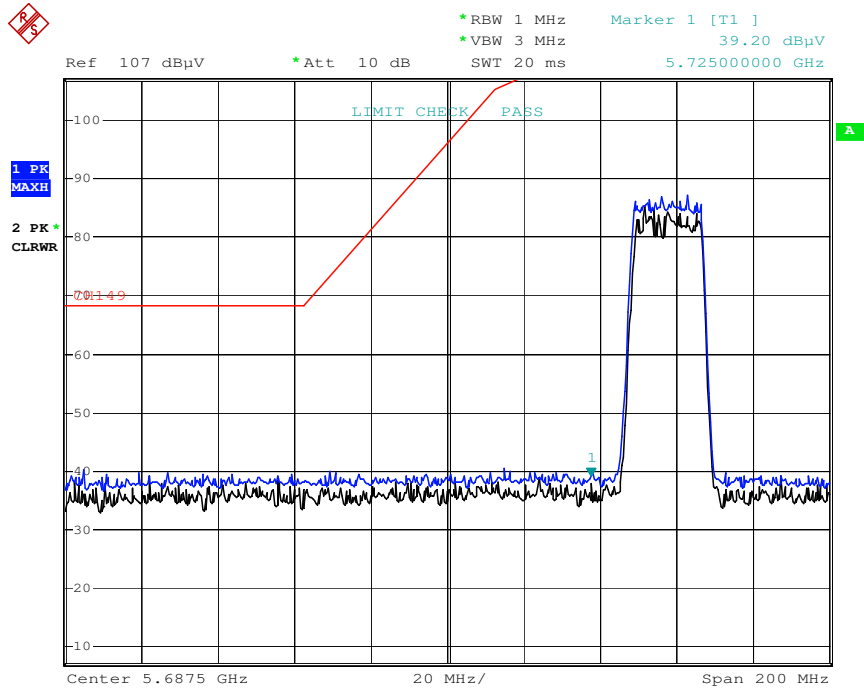


Radiated Restricted Band Edges plot – Average Reading (64QAM, Z-H, 5160 MHz)



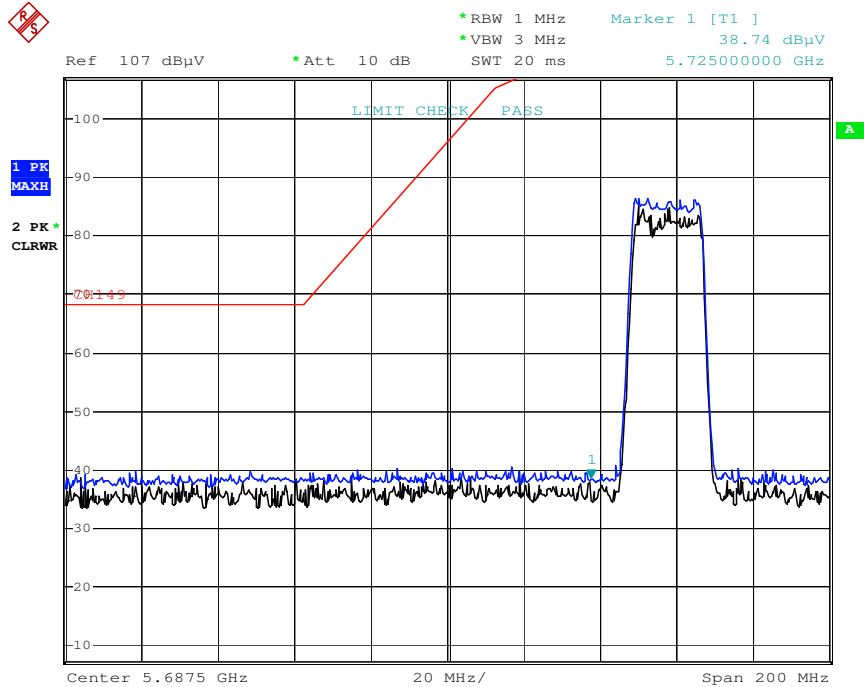
■ **RESULT PLOTS (UNII 3 – 5745 MHz)**

Radiated Restricted Band Edges plot – Peak Reading (QPSK)



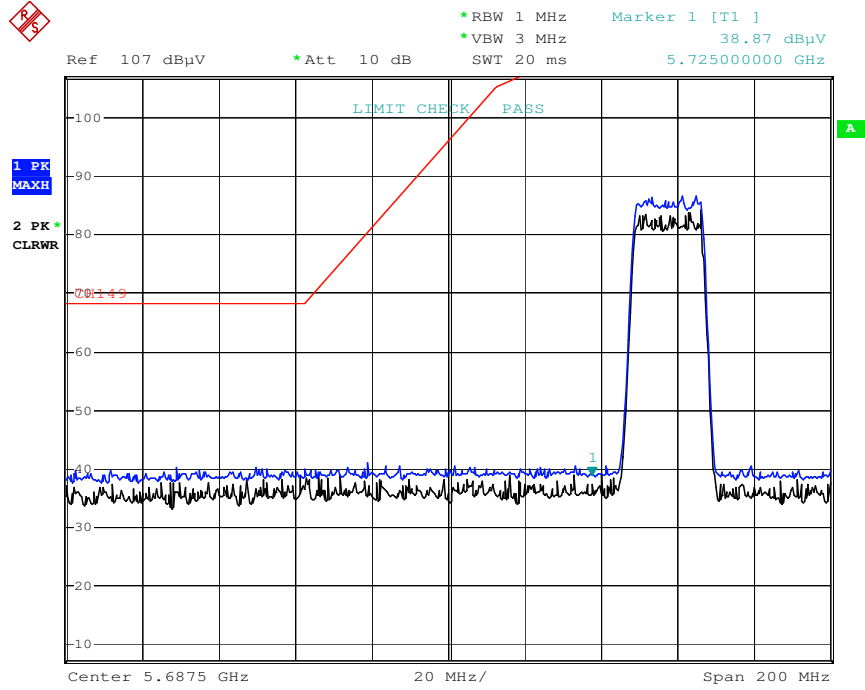
Date: 13.MAR.2017 12:06:43

Radiated Restricted Band Edges plot – Peak Reading (16QAM)



Date: 13.MAR.2017 11:46:22

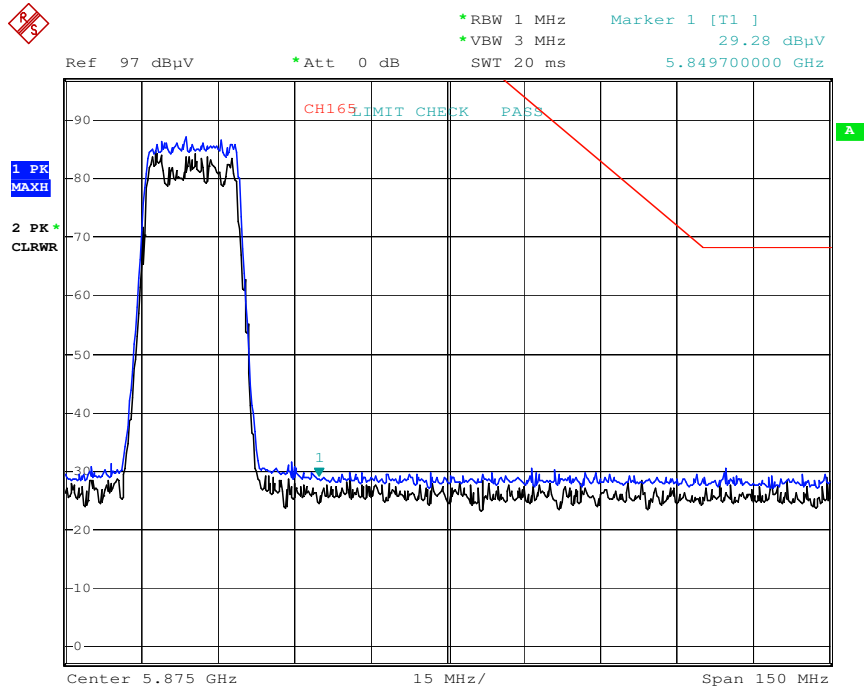
Radiated Restricted Band Edges plot – Peak Reading (64QAM)



Date: 13.MAR.2017 11:39:23

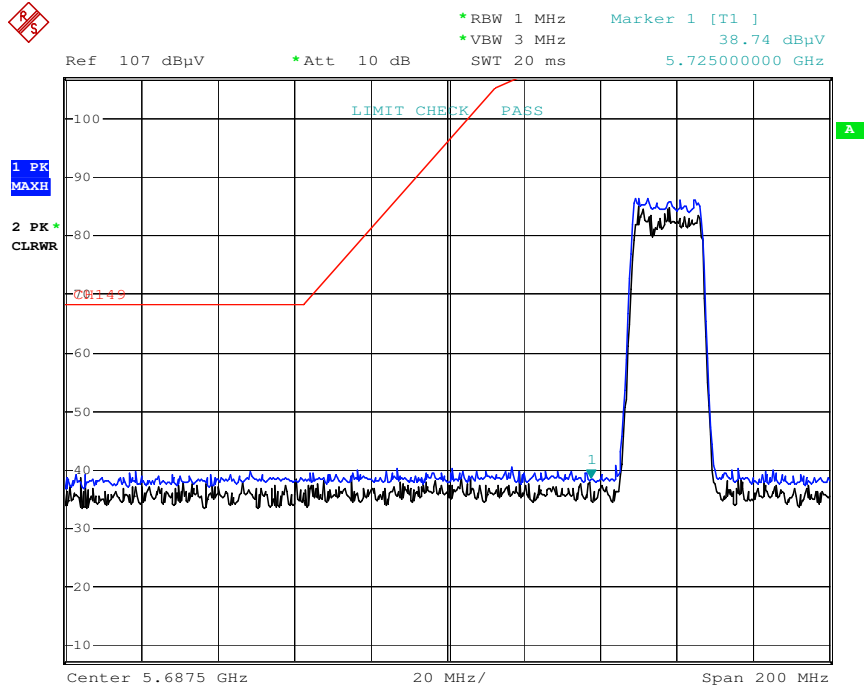
■ RESULT PLOTS (UNII 3 – 5825 MHz)

Radiated Restricted Band Edges plot – Peak Reading (QPSK)



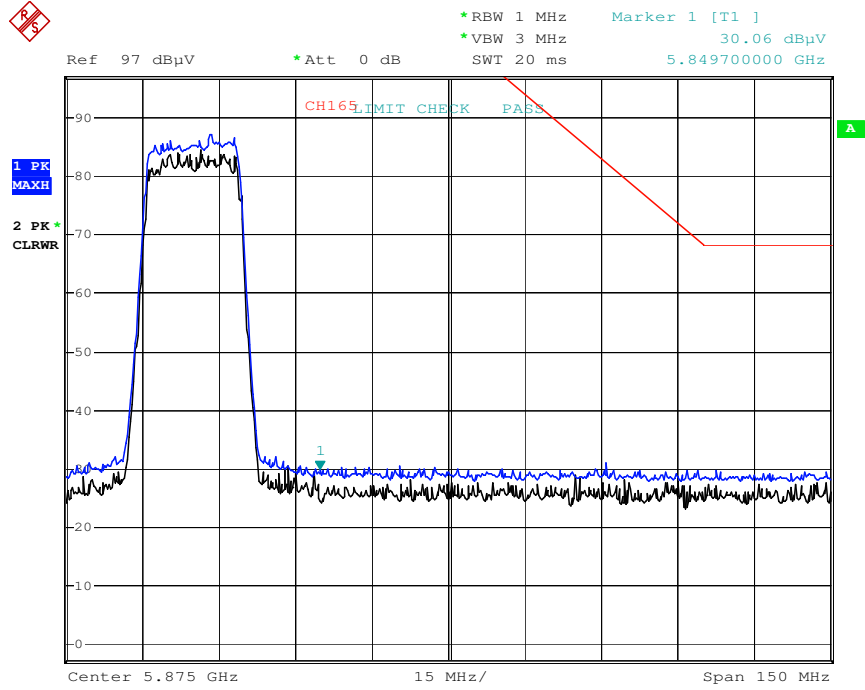
Date: 13.MAR.2017 12:35:37

Radiated Restricted Band Edges plot – Peak Reading (16QAM)



Date: 13.MAR.2017 11:46:22

Radiated Restricted Band Edges plot – Peak Reading (64QAM)



Date: 13.MAR.2017 12:23:44

9.7 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference groundplane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor

■ **RESULT PLOTS (Adaptor)**
Conducted Emissions (Line 1)

EMI Auto Test(9)

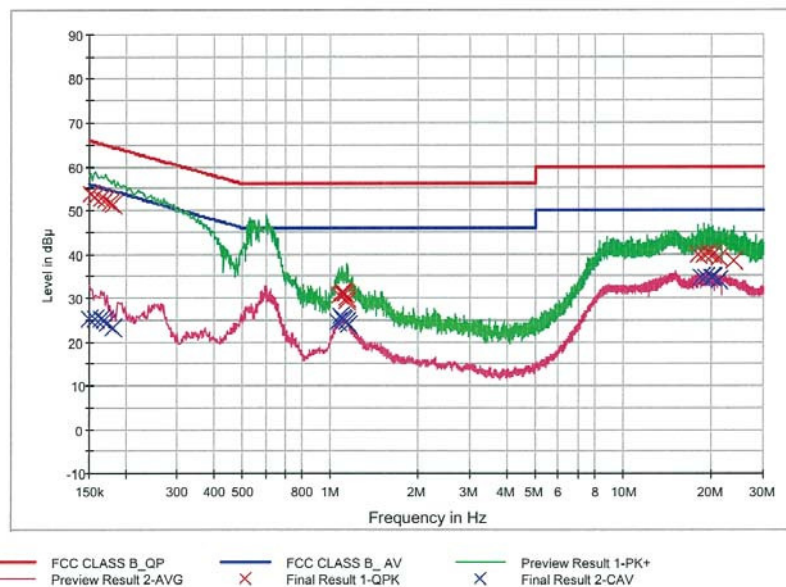
1 / 2

HCT TEST Report

Common Information

EUT: LTE-U (femto)_(HM-NA65W)
Manufacturer: SAMSUNG
Test Site: SHIELD ROOM
Operating Conditions: LTE-U (5G)

FCC CLASS B



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	53.8	9.000	Off	L1	9.6	12.1	65.9
0.158000	53.1	9.000	Off	L1	9.6	12.5	65.6
0.164000	52.7	9.000	Off	L1	9.6	12.5	65.3
0.170000	52.3	9.000	Off	L1	9.6	12.7	65.0
0.176000	51.8	9.000	Off	L1	9.6	12.9	64.7
0.180000	51.5	9.000	Off	L1	9.6	13.0	64.5
1.064000	30.7	9.000	Off	L1	9.7	25.3	56.0
1.090000	31.1	9.000	Off	L1	9.7	24.9	56.0
1.100000	31.2	9.000	Off	L1	9.7	24.8	56.0
1.118000	31.0	9.000	Off	L1	9.7	25.0	56.0
1.132000	29.9	9.000	Off	L1	9.7	26.1	56.0
1.140000	29.4	9.000	Off	L1	9.7	26.6	56.0
17.982000	39.9	9.000	Off	L1	10.3	20.1	60.0
18.700000	40.0	9.000	Off	L1	10.3	20.0	60.0
19.504000	40.0	9.000	Off	L1	10.3	20.0	60.0
20.206000	39.9	9.000	Off	L1	10.4	20.1	60.0
21.200000	39.3	9.000	Off	L1	10.4	20.7	60.0
23.730000	38.6	9.000	Off	L1	10.4	21.4	60.0

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EMI Auto Test(9)

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Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	25.2	9.000	Off	L1	9.6	30.8	56.0
0.158000	25.4	9.000	Off	L1	9.6	30.2	55.6
0.164000	25.3	9.000	Off	L1	9.6	29.9	55.3
0.168000	24.9	9.000	Off	L1	9.6	30.2	55.1
0.172000	24.2	9.000	Off	L1	9.6	30.7	54.9
0.180000	23.3	9.000	Off	L1	9.6	31.2	54.5
1.058000	24.6	9.000	Off	L1	9.7	21.4	46.0
1.078000	25.9	9.000	Off	L1	9.7	20.1	46.0
1.090000	25.2	9.000	Off	L1	9.7	20.8	46.0
1.114000	25.1	9.000	Off	L1	9.7	20.9	46.0
1.134000	24.6	9.000	Off	L1	9.7	21.4	46.0
1.144000	23.8	9.000	Off	L1	9.7	22.2	46.0
18.276000	34.9	9.000	Off	L1	10.3	15.1	50.0
19.100000	34.8	9.000	Off	L1	10.3	15.2	50.0
19.908000	34.7	9.000	Off	L1	10.3	15.3	50.0
20.102000	34.8	9.000	Off	L1	10.4	15.2	50.0
20.206000	34.6	9.000	Off	L1	10.4	15.4	50.0
21.200000	34.1	9.000	Off	L1	10.4	15.9	50.0

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Conducted Emissions (Line 2)

EMI Auto Test(9)

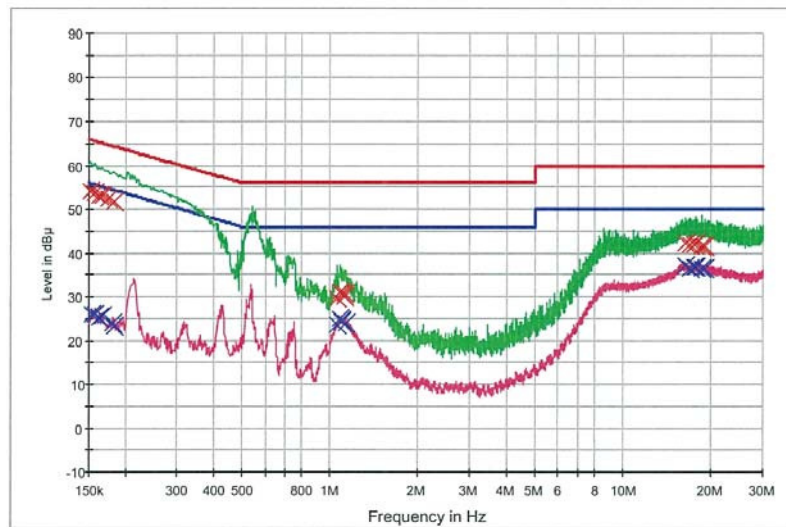
1 / 2

HCT TEST Report

Common Information

EUT: LTE-U (femto)_(HM-NA65W)
 Manufacturer: SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions: LTE-U (5G)

FCC CLASS B



— FCC CLASS B_QP — FCC CLASS B_AV — Preview Result 1-PK+
 — Preview Result 2-AVG — Final Result 1-QPK — Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.152000	54.1	9.000	Off	N	9.6	11.8	65.9
0.158000	53.6	9.000	Off	N	9.6	12.0	65.6
0.162000	53.2	9.000	Off	N	9.6	12.2	65.4
0.166000	52.9	9.000	Off	N	9.6	12.3	65.2
0.174000	52.3	9.000	Off	N	9.6	12.5	64.8
0.184000	51.6	9.000	Off	N	9.6	12.7	64.3
1.062000	29.8	9.000	Off	N	9.7	26.2	56.0
1.080000	31.1	9.000	Off	N	9.7	24.9	56.0
1.092000	30.7	9.000	Off	N	9.7	25.3	56.0
1.100000	30.7	9.000	Off	N	9.7	25.3	56.0
1.124000	30.7	9.000	Off	N	9.7	25.3	56.0
1.128000	30.2	9.000	Off	N	9.7	25.8	56.0
16.352000	42.1	9.000	Off	N	10.3	17.9	60.0
16.956000	41.8	9.000	Off	N	10.3	18.2	60.0
17.546000	41.9	9.000	Off	N	10.3	18.1	60.0
17.782000	42.1	9.000	Off	N	10.3	17.9	60.0
18.602000	41.7	9.000	Off	N	10.3	18.3	60.0
18.956000	41.6	9.000	Off	N	10.3	18.4	60.0

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EMI Auto Test(9)

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Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	25.8	9.000	Off	N	9.6	30.0	55.8
0.158000	25.8	9.000	Off	N	9.6	29.7	55.6
0.162000	25.4	9.000	Off	N	9.6	29.9	55.4
0.166000	25.5	9.000	Off	N	9.6	29.7	55.2
0.180000	23.9	9.000	Off	N	9.6	30.6	54.5
0.184000	23.3	9.000	Off	N	9.6	31.0	54.3
1.062000	23.6	9.000	Off	N	9.7	22.4	46.0
1.080000	25.0	9.000	Off	N	9.7	21.0	46.0
1.092000	24.4	9.000	Off	N	9.7	21.6	46.0
1.096000	24.7	9.000	Off	N	9.7	21.3	46.0
1.100000	24.4	9.000	Off	N	9.7	21.6	46.0
1.132000	23.9	9.000	Off	N	9.7	22.1	46.0
16.352000	37.0	9.000	Off	N	10.3	13.0	50.0
16.956000	36.6	9.000	Off	N	10.3	13.4	50.0
17.546000	36.7	9.000	Off	N	10.3	13.3	50.0
17.782000	36.7	9.000	Off	N	10.3	13.3	50.0
18.602000	36.4	9.000	Off	N	10.3	13.6	50.0
18.956000	36.5	9.000	Off	N	10.3	13.5	50.0

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■ **RESULT PLOTS (POE)**

Conducted Emissions (Line 1)

EMI Auto Test(9)

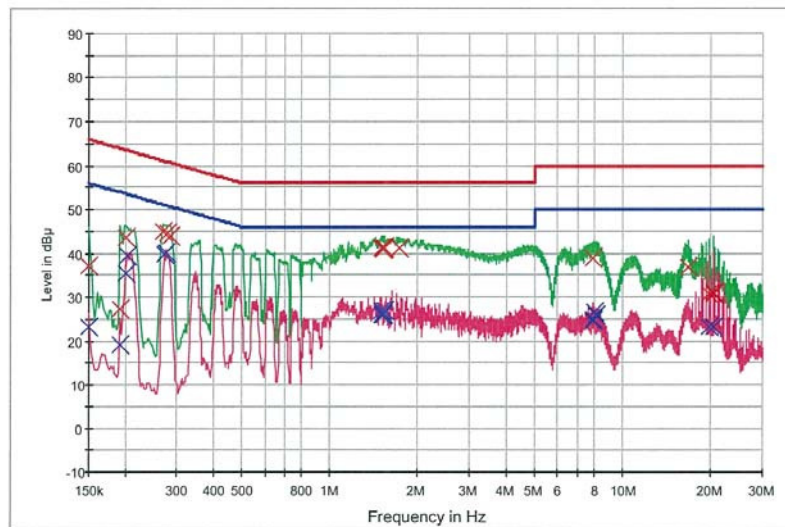
1 / 2

HCT TEST Report

Common Information

EUT: LTE-U (9501G POE)
Manufacturer: SAMSUNG
Test Site: SHIELD ROOM
Operating Conditions: LTE-U (5G)

FCC CLASS B



— FCC CLASS B_QP — FCC CLASS B_AV — Preview Result 1-PK+
— Preview Result 2-AVG × Final Result 1-QPK × Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	37.1	9.000	Off	L1	9.6	28.9	66.0
0.192000	27.4	9.000	Off	L1	9.6	36.5	63.9
0.200000	43.7	9.000	Off	L1	9.6	19.9	63.6
0.268000	45.1	9.000	Off	L1	9.7	16.1	61.2
0.278000	44.6	9.000	Off	L1	9.7	16.3	60.9
0.284000	44.0	9.000	Off	L1	9.7	16.7	60.7
1.506000	41.3	9.000	Off	L1	9.8	14.7	56.0
1.512000	41.3	9.000	Off	L1	9.8	14.7	56.0
1.518000	41.0	9.000	Off	L1	9.8	15.0	56.0
1.522000	41.1	9.000	Off	L1	9.8	14.9	56.0
1.530000	41.0	9.000	Off	L1	9.8	15.0	56.0
1.726000	41.2	9.000	Off	L1	9.8	14.8	56.0
7.882000	38.7	9.000	Off	L1	10.0	21.3	60.0
7.926000	38.7	9.000	Off	L1	10.0	21.3	60.0
16.654000	36.9	9.000	Off	L1	10.3	23.1	60.0
19.616000	30.6	9.000	Off	L1	10.3	29.4	60.0
20.354000	30.7	9.000	Off	L1	10.4	29.3	60.0
20.360000	31.1	9.000	Off	L1	10.4	28.9	60.0

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EMI Auto Test(9)

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Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	23.1	9.000	Off	L1	9.6	32.9	56.0
0.192000	19.3	9.000	Off	L1	9.6	34.6	53.9
0.200000	35.4	9.000	Off	L1	9.6	18.2	53.6
0.204000	39.7	9.000	Off	L1	9.6	13.8	53.4
0.272000	39.8	9.000	Off	L1	9.7	11.2	51.1
0.276000	40.2	9.000	Off	L1	9.7	10.8	50.9
1.502000	27.1	9.000	Off	L1	9.8	18.9	46.0
1.506000	26.8	9.000	Off	L1	9.8	19.2	46.0
1.510000	26.0	9.000	Off	L1	9.8	20.0	46.0
1.518000	26.4	9.000	Off	L1	9.8	19.6	46.0
1.522000	26.0	9.000	Off	L1	9.8	20.0	46.0
1.530000	26.9	9.000	Off	L1	9.8	19.1	46.0
7.882000	25.0	9.000	Off	L1	10.0	25.0	50.0
7.926000	24.7	9.000	Off	L1	10.0	25.3	50.0
7.968000	26.6	9.000	Off	L1	10.0	23.4	50.0
8.100000	26.0	9.000	Off	L1	10.0	24.0	50.0
19.616000	23.2	9.000	Off	L1	10.3	26.8	50.0
20.356000	23.4	9.000	Off	L1	10.4	26.6	50.0

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Conducted Emissions (Line 2)

EMI Auto Test(9)

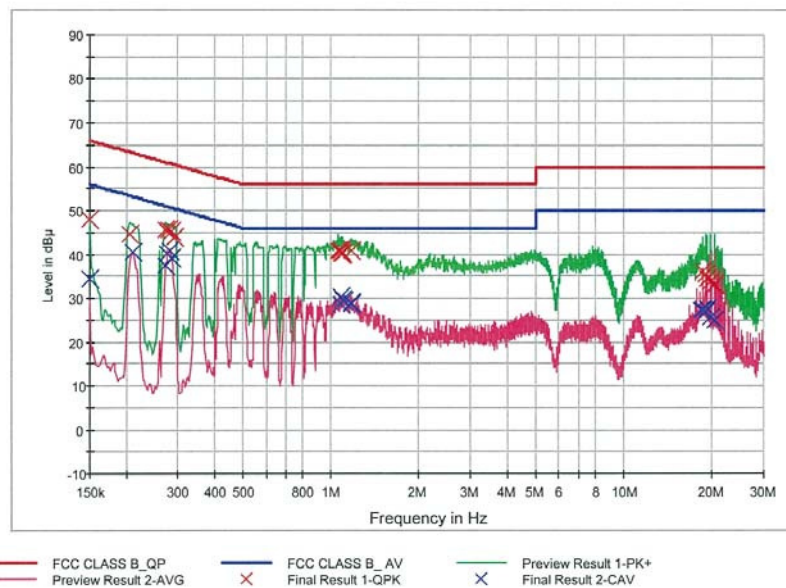
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HCT TEST Report

Common Information

EUT: LTE-U (9501G POE)
Manufacturer: SAMSUNG
Test Site: SHIELD ROOM
Operating Conditions: LTE-U (5G)

FCC CLASS B



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	48.0	9.000	Off	N	9.6	18.0	66.0
0.206000	44.7	9.000	Off	N	9.6	18.7	63.4
0.272000	45.5	9.000	Off	N	9.6	15.6	61.1
0.280000	45.5	9.000	Off	N	9.6	15.3	60.8
0.286000	45.4	9.000	Off	N	9.6	15.2	60.6
0.292000	44.0	9.000	Off	N	9.6	16.4	60.5
1.062000	40.9	9.000	Off	N	9.7	15.1	56.0
1.068000	41.0	9.000	Off	N	9.7	15.0	56.0
1.078000	40.0	9.000	Off	N	9.7	16.0	56.0
1.086000	40.7	9.000	Off	N	9.7	15.3	56.0
1.094000	40.0	9.000	Off	N	9.7	16.0	56.0
1.170000	40.9	9.000	Off	N	9.7	15.1	56.0
18.534000	36.1	9.000	Off	N	10.3	23.9	60.0
18.904000	35.4	9.000	Off	N	10.3	24.6	60.0
19.276000	34.4	9.000	Off	N	10.3	25.6	60.0
19.644000	33.7	9.000	Off	N	10.3	26.3	60.0
19.648000	33.8	9.000	Off	N	10.3	26.2	60.0
20.388000	32.9	9.000	Off	N	10.3	27.1	60.0

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EMI Auto Test(9)

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Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	34.6	9.000	Off	N	9.6	21.4	56.0
0.210000	40.6	9.000	Off	N	9.6	12.6	53.2
0.272000	37.6	9.000	Off	N	9.6	13.4	51.1
0.276000	40.0	9.000	Off	N	9.6	10.9	50.9
0.282000	40.9	9.000	Off	N	9.6	9.9	50.8
0.286000	39.1	9.000	Off	N	9.6	11.6	50.6
1.078000	28.6	9.000	Off	N	9.7	17.4	46.0
1.088000	30.4	9.000	Off	N	9.7	15.6	46.0
1.096000	29.7	9.000	Off	N	9.7	16.3	46.0
1.112000	29.4	9.000	Off	N	9.7	16.6	46.0
1.170000	29.1	9.000	Off	N	9.7	16.9	46.0
1.174000	28.8	9.000	Off	N	9.7	17.2	46.0
18.332000	27.1	9.000	Off	N	10.3	22.9	50.0
18.534000	27.3	9.000	Off	N	10.3	22.7	50.0
18.906000	27.1	9.000	Off	N	10.3	22.9	50.0
19.276000	27.8	9.000	Off	N	10.3	22.2	50.0
19.646000	25.5	9.000	Off	N	10.3	24.5	50.0
20.386000	25.0	9.000	Off	N	10.3	25.0	50.0

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10. LIST OF TEST EQUIPMENT

10.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/23/2016	Annual	100073
Rohde & Schwarz	ESCI / Test Receiver	12/23/2016	Annual	100584
Agilent	N9020A / Signal Analyzer	06/24/2016	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/30/2016	Annual	MY49431210
Agilent	N1911A / Power Meter	09/28/2016	Annual	MY45101406
Agilent	N1921A / Power Sensor	08/24/2016	Annual	MY55220026
Agilent	87300B / Directional Coupler	11/23/2016	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/14/2016	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	03/09/2016	Annual	KR75303962
Agilent	8493C / Attenuator(10 dB)	07/15/2016	Annual	07560
EXP	EX-TH064/Temperature Chamber	03/13/2017	Annual	N/A

10.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	MA4000-EP / Antenna Position Tower	N/A	N/A	N/A
Innco system	CT0800 / Turn Table	N/A	N/A	N/A
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
ETS	2090 / Controller(Turn table)	N/A	N/A	1646
Rohde & Schwarz	Loop Antenna	02/23/2016	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/15/2015	Biennial	255
Schwarzbeck	BBHA 9120D / Horn Antenna	05/07/2015	Biennial	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	09/03/2015	Biennial	BBHA9170541
Rohde & Schwarz	FSP / Spectrum Analyzer	09/10/2016	Annual	836650/016
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/23/2016	Annual	101068-SZ
Agilent	E4440A/ Spectrum Analyzer	03/16/2017	Annual	US45303008
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	06/24/2016	Annual	8
Wainwright Instruments	WHFX7.0/18G-8SS / High Pass Filter	05/13/2016	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	07/06/2016	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/24/2017	Annual	2
Agilent	8493C-10 / Attenuator(10 dB)	08/11/2016	Annual	76649
HP	8493C / Attenuator(20 dB)	04/14/2016	Annual	09307
CERNEX	CBLU1183540 / Power Amplifier	07/15/2016	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/15/2016	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	07/11/2016	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	07/11/2016	Annual	25956