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TEST REPORT

FCC/ISED UNII Test for WL1SB21
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2103-FI010

DATE OF ISSUE
March 22, 2021

Tested by
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Technical Manager
Jong Seok Lee

Accredited by KOLAS, Republic of KOREA

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Additional Model
-

Applicant	LG Electronics Inc. 222, LG-ro Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 457-713 Korea
Eut Type Model Name	Wireless Adapter Card WL1SB21
FCC ID IC	BEJ-WL1SB21 2703H-WL1SB21
Modulation type	GFSK
FCC Classification	Unlicensed National Information Infrastructure(NII)
FCC Rule Part(s)	Part 15.407
ISED Rule Part(s)	RSS-247 Issue 2 (February 2017) RSS-Gen Issue 5_Amendment 1 (March 2019)

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	March 22, 2021	Initial Release

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA.(HCT Accreditation No.: KT197)

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. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC / ISED Rules under normal use and maintenance

CONTENTS

1. GENERAL INFORMATION

EUT DESCRIPTION

Model	WL1SB21	
Additional Model	-	
EUT Type	Wireless Adapter Card	
Power Supply	DC 3.3 V	
Modulation Type	GFSK	
Frequency Range (MHz)	UNII 1	5 155 MHz ~ 5 245 MHz
	UNII 3	5 730 MHz ~ 5 845 MHz
Antenna Specification	Manufacturer: LG Innotek Co., Ltd. Antenna type: PCB Antenna	
	Ant.A Peak Gain : 1.47 dBi (5 155 ~ 5 245 MHz UNII1 BAND) 1.39 dBi (5 730 ~ 5 845 MHz UNII3 BAND)	Ant.B Peak Gain : 1.36 dBi (5 155 ~ 5 245 MHz UNII1 BAND) 1.45 dBi (5 730 ~ 5 845 MHz UNII3 BAND)
Date(s) of Tests	February 10, 2021~ March 12, 2021	
PMN (Product Marketing Number)	Wireless Adapter Card	
HVIN (Hardware Version Identification Number)	WL1SB21	
FVIN (Firmware Version Identification Number)	1.0	
HMN (Host Marketing Name)	N/A	

ANTENNA CONFIGURATIONS for 5G-WLAN(U-NII-1, U-NII-3)

1. The device employs 2 Antenna. Below are the possible configurations

Configurations	SISO	
	Ant A	Ant B
U-NII-1 & U-NII-3	O	O

Note:

1. O = Support, X = Not Support
2. SISO = Single Input Single Output

2. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 dated December 14, 2017 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.

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.

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. / RSS-Gen issue 5, RSS-247 issue 2.

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 6.6.5 of ANSI C63.10. (Version: 2013)

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.

3. 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 equipment’s, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

4. FACILITIES AND ACCREDITATIONS

4.1 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, 17383, Rep. of 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 April 02, 2018 (Registration Number: KR0032).
For ISED, test facility was accepted dated February 14, 2019 (CAB identifier: KR0032).

4.2 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.”

5. ANTENNA REQUIREMENTS

According to FCC 47 CFR § 15.203, § 15.407 / RSS-Gen (Issue 5) Section 8:
“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.”
(1) The antennas of this E.U.T are permanently attached.
(2) The E.U.T Complies with the requirement of § 15.203, § 15.407

6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence.

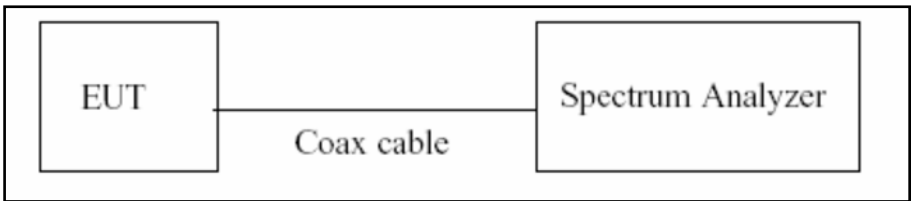
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±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)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05

7. DESCRIPTION OF TESTS

7.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure B.2 in KDB 789033 D02 v02r01.

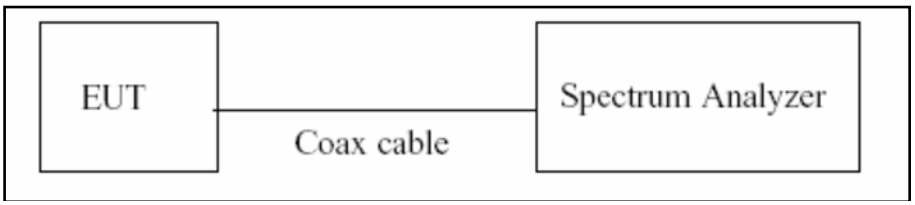
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

7.2. 6dB Bandwidth & 26dB Bandwidth

Limit

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Configuration



Test Procedure(26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure C.1 in KDB 789033 D02 v02r01.

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 %.

Test Procedure (6dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure C.2 in KDB 789033 D02 v02r01.

1. RBW = 100 kHz
2. VBW ≥ 3 x 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 lever measured in the fundamental emission.

Note:

1. We tested X dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.
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.
3. The 26 dB bandwidth is used to determine the conducted power limits.

Test Procedure (99 % Bandwidth for ISED)

The transmitter output is connected to the spectrum analyzer.

RBW = 1% ~ 5% of the occupied bandwidth

VBW ≒ 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

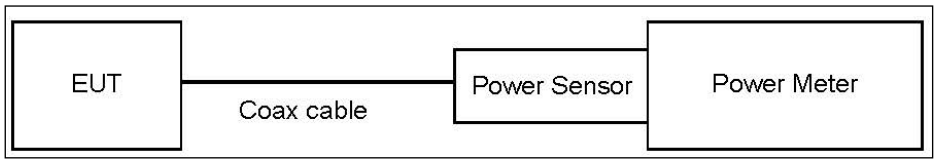
7.3. Output Power Measurement

Limit

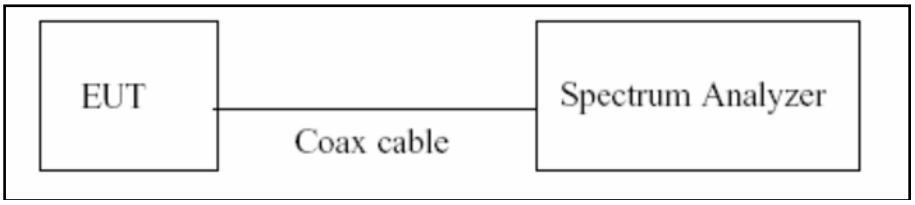
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 2A, 2C	Not exceed the lesser of 250 mW or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(=30dBm)

Test Configuration

Power Meter



Spectrum Analyzer(Only Straddle Channel)



Test Procedure(Power Meter)

We tested according to Procedure E.3.a in KDB 789033 D02 v02r01.

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.

Test Procedure(Spectrum Analyzer)

The transmitter output is connected to the Spectrum Analyzer.

We use the spectrum analyzer's integrated band power measurement function.

We tested according to Procedure E.2.d) in KDB 789033 D02 v02r01.

1. Measure the duty cycle.
2. Set span to encompass the 26 dB EBW of the signal.
3. RBW = 1 MHz.
4. VBW ≥ 3 MHz.
5. Number of points in sweep ≥ 2 x span/RBW.
6. Sweep time = auto.
7. Detector = RMS.
8. Do not use sweep triggering. Allow the sweep to "free run".
9. Trace average at least 100 traces in power averaging(RMS) mode
10. Integrated bandwidth = OBW
11. Add 10log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Sample Calculation

Total Power(dBm) = Reading Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

Note

1. Spectrum reading values are not plot data.
   The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss(20 dB) + Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	21.87
UNII 3	21.87

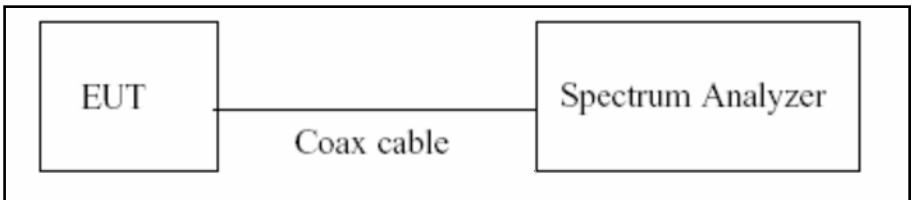
(Actual value of loss for the attenuator and cable combination)

7.4. Power Spectral Density

Limit

Band	Limit
UNII 1	11 dBm/MHz
UNII 3	30 dBm/500 kHz

Test Configuration



Test Procedure

We tested according to Procedure F in KDB 789033 D02 v02r01.

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
3. VBW ≥ 3 MHz
4. Number of points in sweep ≥ 2 x span/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

Total PSD(dBm) = Reading Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

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(20 dB) + Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	21.87
UNII 3	21.87

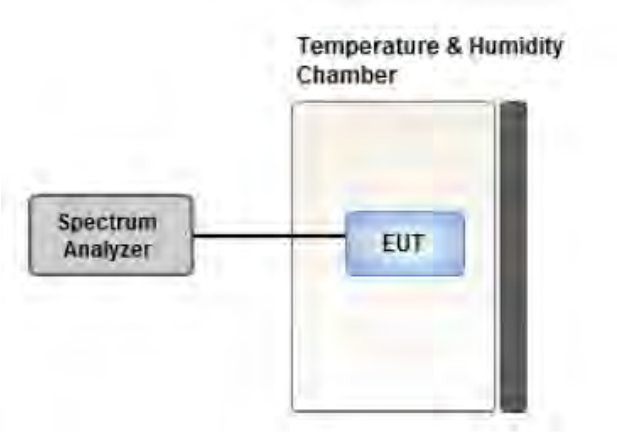
(Actual value of loss for the attenuator and cable combination)

7.5. Frequency Stability

Limit

Maintained within the band

Test Configuration



Test Procedure

1. The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 ℃ and 50 ℃.
2. The temperature was incremented by 10 ℃ 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.
3. The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battety operating end point which shall be specified by the manufacturer.
4. While maintaining a constant temperature inside the environmental chamber, turn the EUT ON
   and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after
   the EUT is energized. Four measurements in total are made.

7.6. AC Power line Conducted Emissions

Limit

For an intentional radiator that 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 the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

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

[a]Decreases with the logarithm of the frequency.

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 Annex A 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 ground plane.
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

7.7. Radiated Test

Limit

1. UNII 1: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz.
2. UNII 2A, 2C: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.
3. UNII 3: 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.
4. All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Section 15.209.

FCC

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

ISED

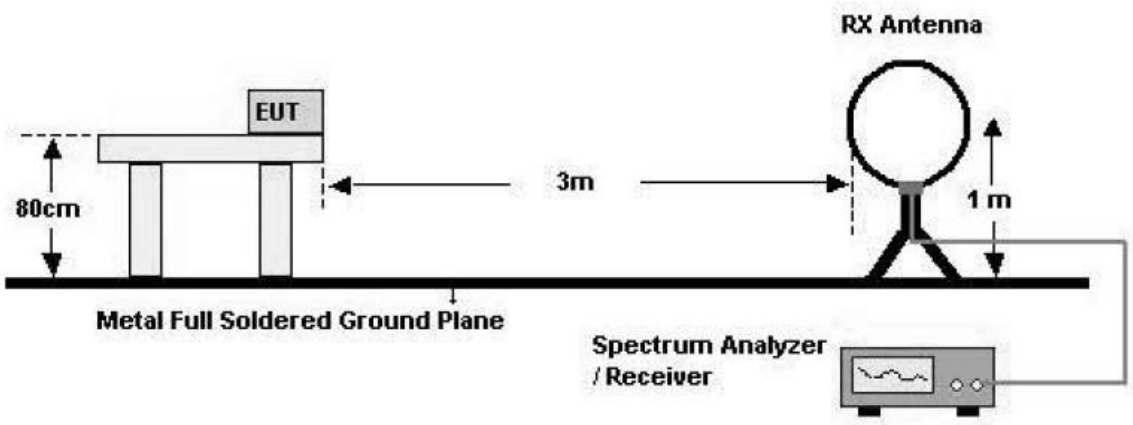
Frequency (MHz)	Field Strength (uA/m)	Measurement Distance (m)
0.009 – 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30

FCC&ISED

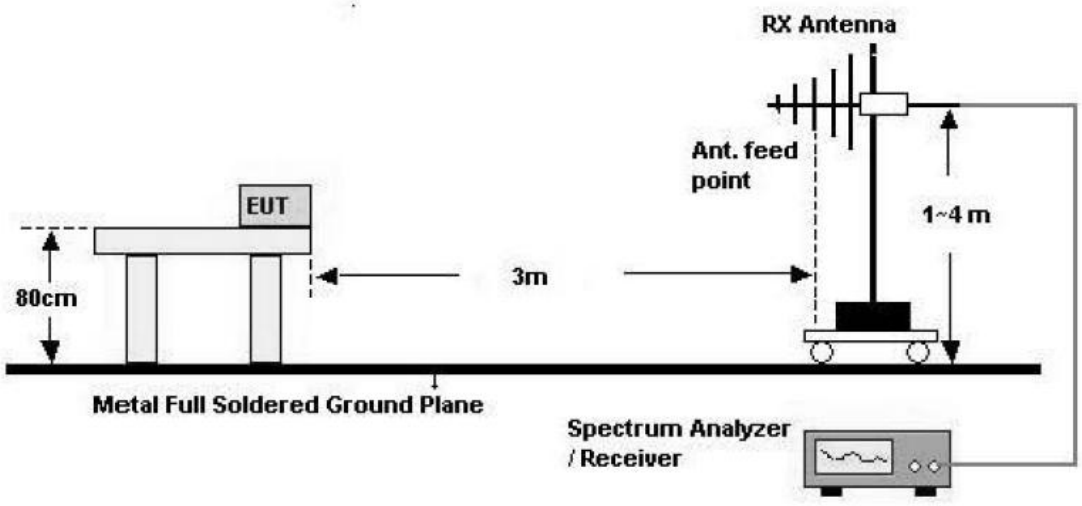
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

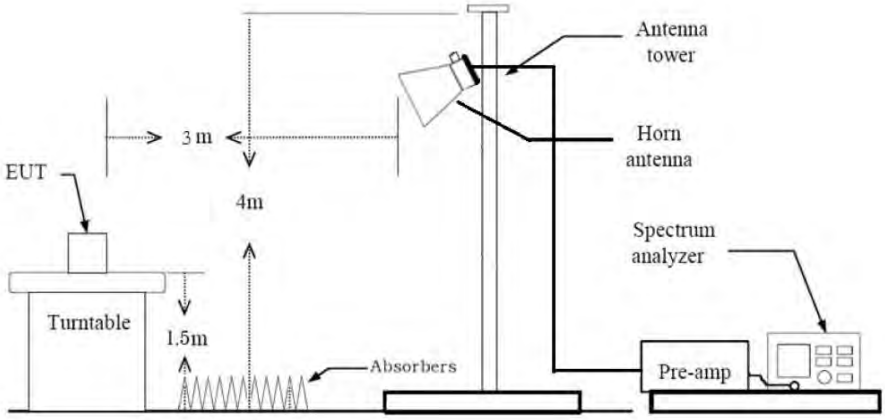
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. .We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB

Measurement Distance : 3 m

8. Spectrum Setting

- Frequency Range = 9 kHz ~ 30 MHz
- Detector = Peak
- Trace = Maxhold
- RBW = 9 kHz
- VBW ≥ 3 x RBW

9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

10. Measurement value 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.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting

(1) Measurement Type(Peak):

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 100 kHz
- VBW ≥ 3 x RBW

(2) Measurement Type(Quasi-peak):

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Quasi-Peak

- RBW = 120 kHz

※In general, (1) is used mainly

7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value 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.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard adapter (for DC Power feed)
8. Spectrum Setting

(1) Measurement Type (Peak, G.5 in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = max hold
- Allow sweeps to continue until the trace stabilizes.

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.

(2) Measurement Type (Average, G.6.d in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW(Duty cycle ≥ 98 percent) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 percent) = VBW ≥ 1/T, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = max hold.

- 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 minimym number of traces by a factor of 1/x, where x is the duty cycle.

9. Measurement value 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
10. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency
11. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
12. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard adapter (for DC Power feed)
8. Spectrum Setting

(1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = max hold
- Allow sweeps to continue until the trace stabilizes.
  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.

(2) Measurement Type (Average, G.6.d in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW(Duty cycle ≥ 98 percent) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 percent) = VBW ≥ 1/T, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = max hold.
- 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 minimym number of traces by a factor of 1/x, where x is the duty cycle.

9. Measured Frequency Range :
   - 4500MHz ~ 5150MHz
   - 5350MHz ~ 5460MHz
   - 5460MHz ~ 5470MHz
   - (75 MHz or more below the 5725MHz) ~ 5725MHz
   - 5850MHz ~ (75 MHz or more above the 5850MHz)
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Attenuator + Distance Factor(D.F)

7.8. Receiver Spurious Emissions

Limit

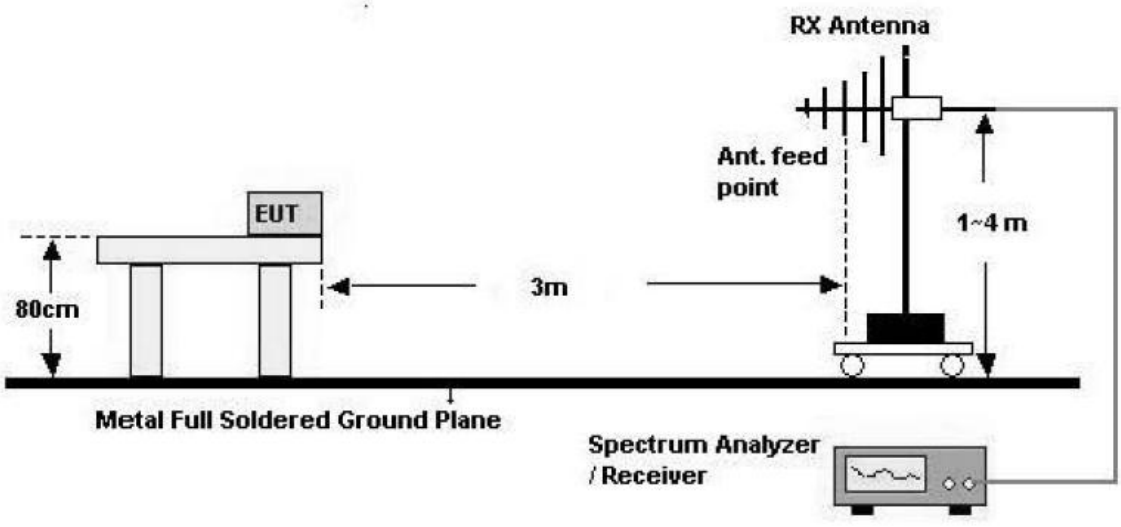
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

Measurements for compliance with the limits in table may be performed at distances other than 3 metres.

Test Configuration

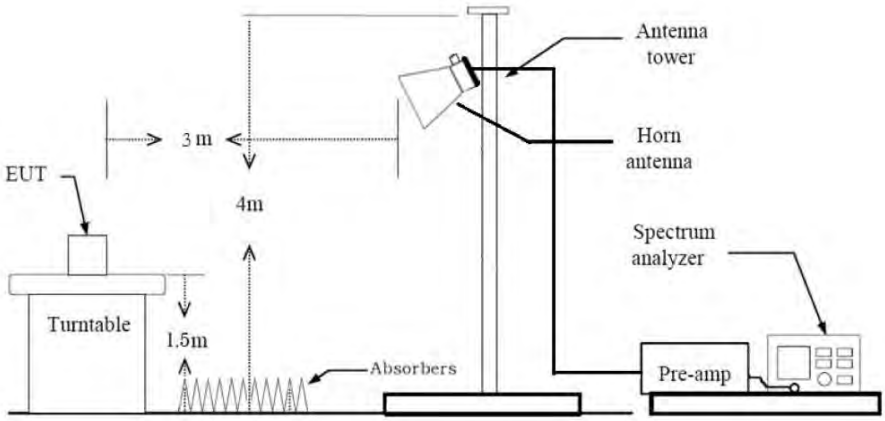
30 MHz - 1 GHz



Test Procedure of Receiver Spurious Emissions (Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 100 kHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Quasi-peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Quasi-Peak
      - RBW = 120 kHz
7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)

Above 1 GHz



Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard adapter (for DC Power feed)
8. Spectrum Setting
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Average):
      - We performed using a reduced video BW method was done with the analyzer in linear mode
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = RMS

- Trace = Average
- RBW = 1 MHz
- VBW ≥ 3 x RBW

9. Measurement value 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.
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

7.9. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.

2. All configurations of antenna were investigated and the worst case configuration results are reported.

2. EUT Axis

- Radiated Spurious Emissions : X
- Radiated Restricted Band Edge : Y

4. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.

- Position : Horizontal, Vertical, Parallel to the ground plane

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.

- Mode : Stand alone
- Worstcase : Stand alone

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.

8. SUMMARY OF TEST RESULTS

FCC Part

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)	< 250 mW(5150-5250 MHz) < 250 mW or 11+10 log $_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10 log $_{10}$ (BW) dBm (5470-5725 MHz) <1 W(5725-5850 MHz)		PASS
Peak Power Spectral Density	§ 15.407(a)(1),(5)	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/ MHz (5250-5350 MHz) <11 dBm/ MHz (5470-5725 MHz) <30 dBm/500 kHz(5725-5850 MHz)		PASS
Frequency Stability	§ 15.407(g) § 2.1055	Maintained within the band		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, 2A, 2C) cf. Section 8.7 (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

ISED Part

Test Description	ISED Part Section(s)	Test Limit	Test Condition	Test Result
99% Bandwidth	RSS-GEN, 6.7	N/A	CONDUCTED	PASS
6 dB Bandwidth	RSS-247, 6.2.4.1	> 500 kHz (5725~5850 MHz)		PASS
Maximum Conducted Output Power,	RSS-247, 6.2	< 250 mW or 11+10 log $_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz) Whichever power is less		PASS
	RSS-247, 6.2.4 1	<1 W (5725-5850 MHz)		
Maximum e.i.r.p	RSS-247, 6.2	< 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5150-5250 MHz) < 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5250-5350 MHz) < 1 W or 17+10 log $_{10}$ (BW) dBm (5470-5725 MHz) Whichever power is less		PASS
Power Spectral Density	RSS-247 6.2	<10 dBm/ MHz(e.i.r.p.) (5150-5250 MHz) <11 dBm/MHz(Conducted) (5250-5350 MHz, 5470-5600 MHz, 5650-5725 MHz)		PASS
	RSS-247, 6.2.4 1	<30 dBm/500 kHz(Conducted) (5725-5850 MHz)		
Frequency Stability	RSS-GEN 8.11	should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation.		PASS
AC Conducted Emissions 150 kHz-30 MHz	RSS-GEN, 8.8	RSS-GEN section 8.8 table 4		PASS
Undesirable Emissions	RSS-247, 6.2.1 2	26 dBc at 5250~5350 MHz (5150~5350 MHz)		PASS
	RSS-247, 6.2	<-27 dBm/ MHz EIRP (5150-5350 MHz, 5470-5725 MHz)	RADIATED	PASS
	RSS-247, 6.2.4 2	cf. Section 9.8.1 (UNII 3)		
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	RSS-Gen, 8.9 RSS-Gen, 8.10	RSS-Gen section 8.9 table 5, 6 section 8.10 table 7		PASS
Receiver Spurious Emissions	RSS-GEN, 5 RSS-GEN, 7.3	RSS-GEN section 7.3 table 3		PASS

9. TEST RESULT

9.1 DUTY CYCLE

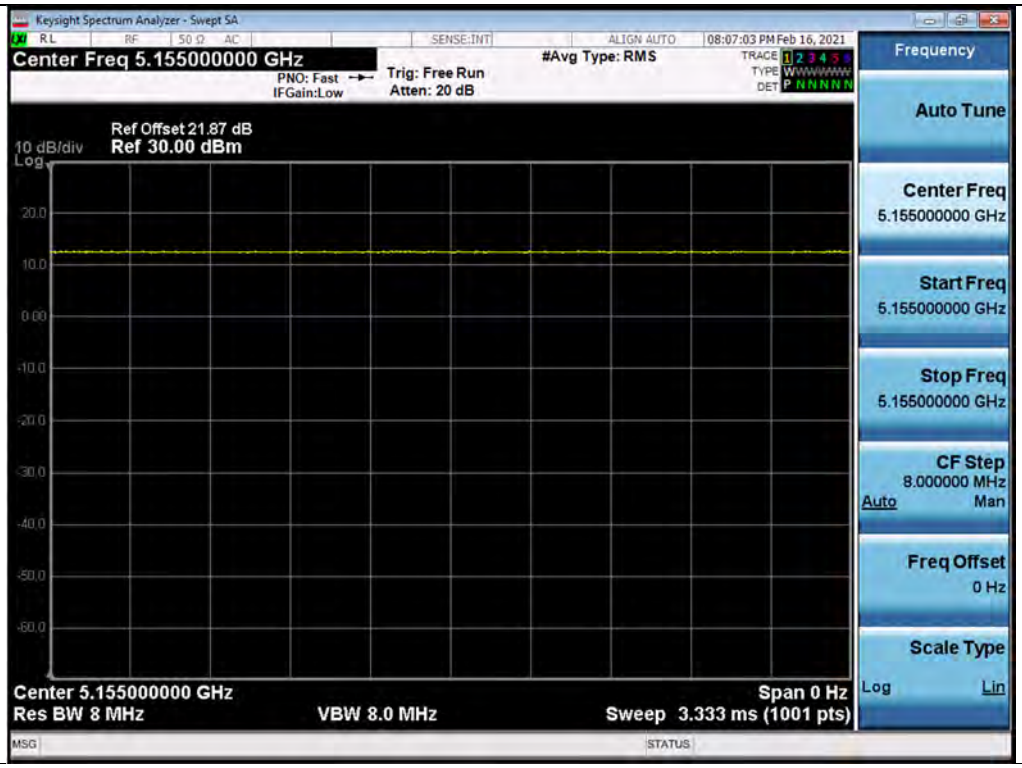
Mode	T_{on} (ms)	T_{total} (ms)	Duty Cycle(%)	Duty Cycle Factor(dB)
UNII(GFSK)	-	-	100	0.000

Note:

Duty Cycle : All test are applied Duty cycle as 100% for the test.

▣ Test Plot

UNII(GFSK)



9.2 26DB BANDWIDTH & 99 % BANDWIDTH

FCC

[ANT A]

UNII 1		26dB Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5155	Low	4.526
5179	Mid	4.527
5200	High-1	4.530
5245	High-2	4.532

UNII 3		26dB Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5730	Low	4.523
5787	Mid	4.530
5845	High	4.529

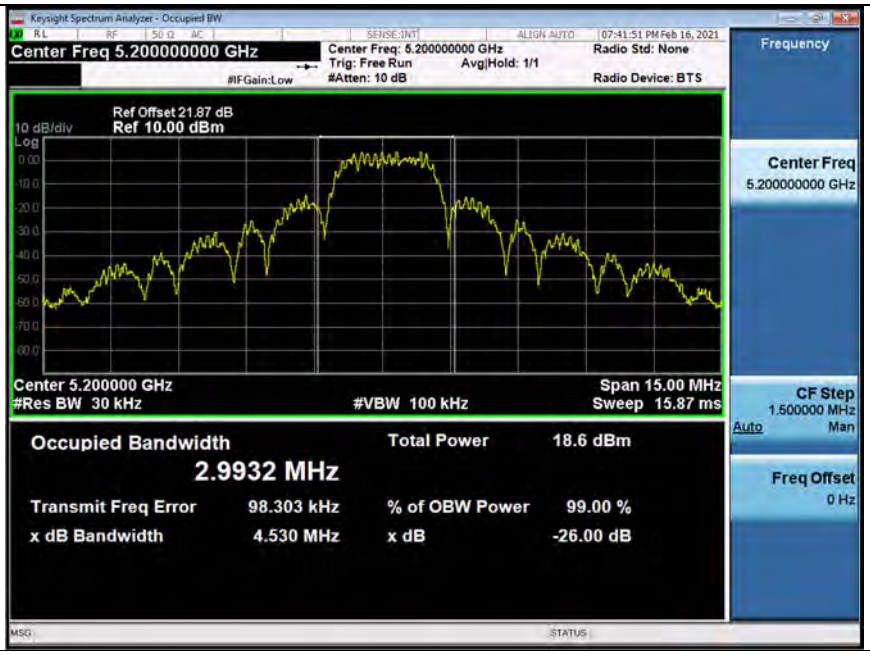
[ANT B]

UNII 1		26dB Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5155	Low	4.519
5179	Mid	4.524
5200	High-1	4.525
5245	High-2	4.531

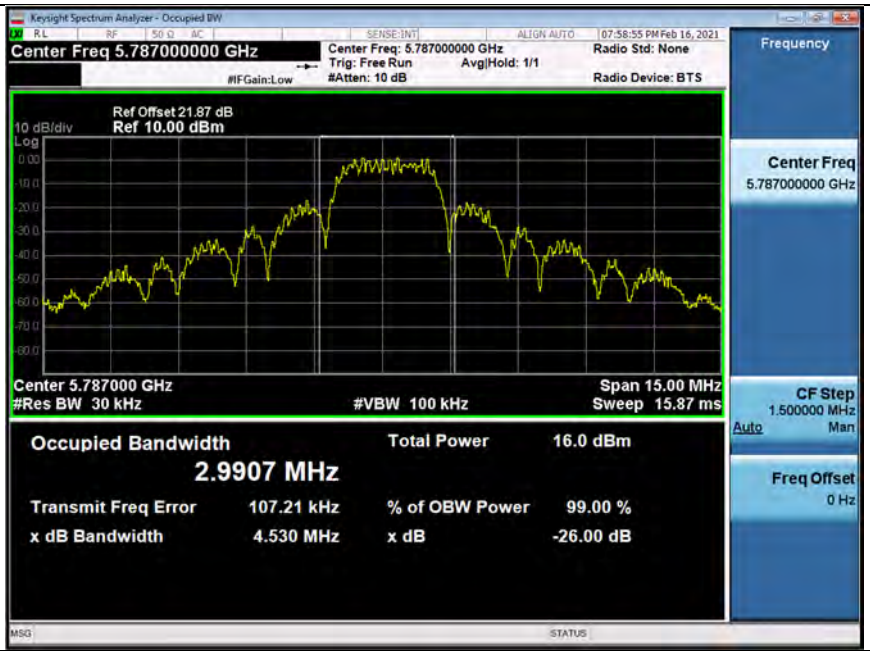
UNII 3		26dB Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5730	Low	4.526
5787	Mid	4.526
5845	High	4.525

▣ Test Plots(UNII)

[ANT A]

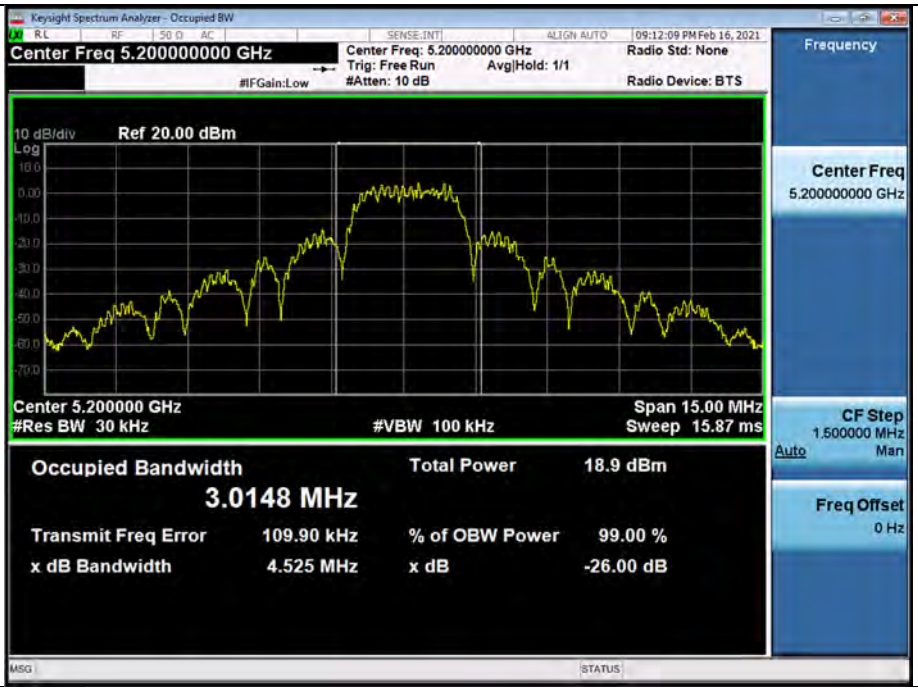
UNII 1 BAND 26dB Bandwidth High


UNII 3 BAND 26dB Bandwidth Mid

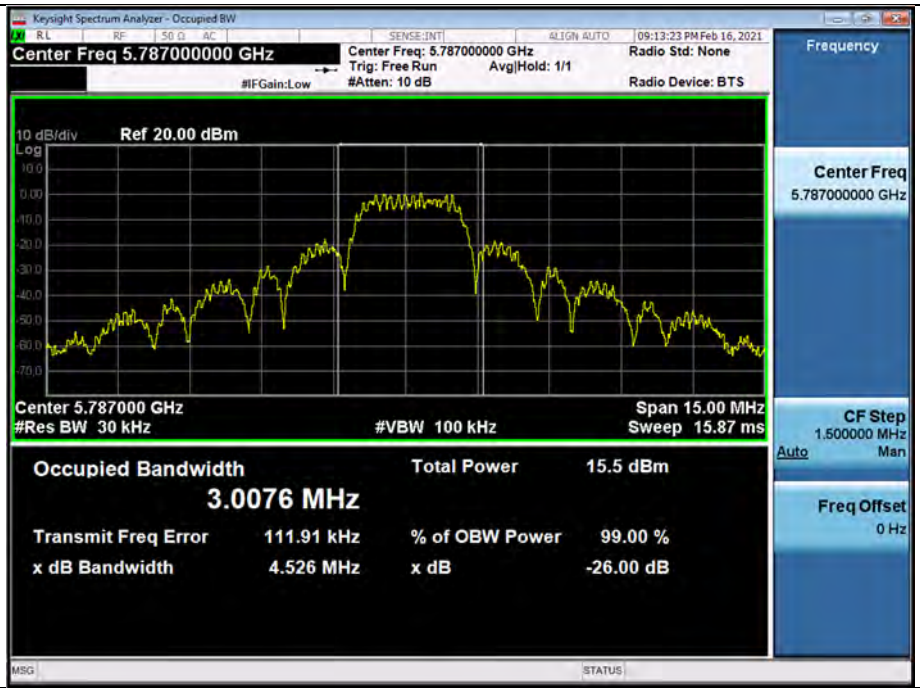


[ANT B]

UNII 1 BAND 26dB Bandwidth High



UNII 3 BAND 26dB Bandwidth Mid



Note:

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

99 % Bandwidth (ISED)

[ANT A]

UNII 1		99% bandwidth [MHz]
Frequency [MHz]	Channel No.	
5155	Low	2.8536
5179	Mid	2.6219
5200	High-1	2.9051
5245	High-2	2.7157

UNII 3		99% bandwidth [MHz]
Frequency [MHz]	Channel No.	
5730	Low	2.5291
5878	Mid	2.9302
5845	High	3.1235

[ANT B]

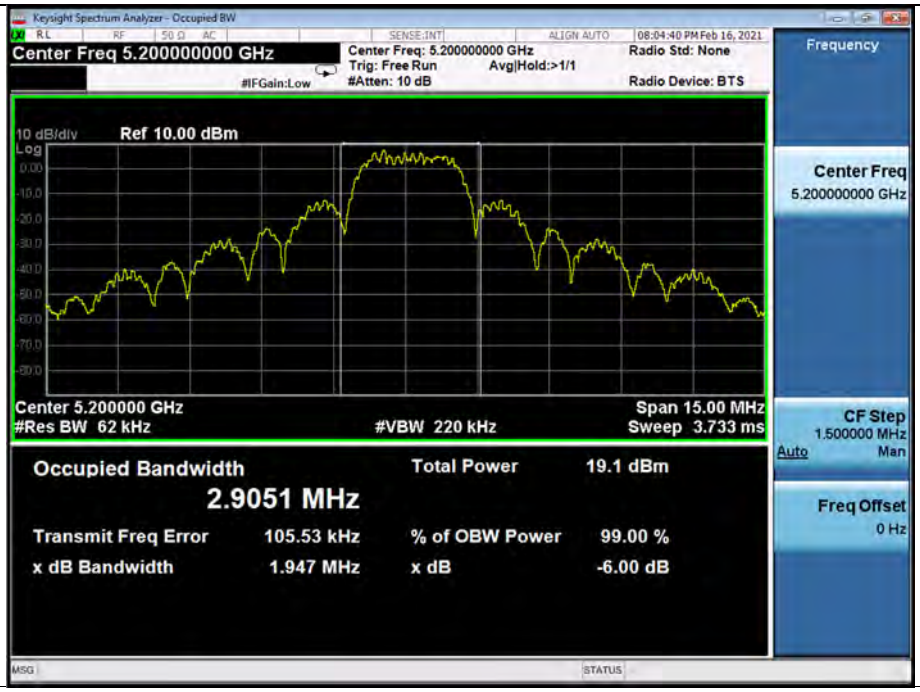
UNII 1		99% bandwidth [MHz]
Frequency [MHz]	Channel No.	
5155	Low	2.5991
5179	Mid	2.6066
5200	High-1	2.7359
5245	High-2	2.7822

UNII 3		99% bandwidth [MHz]
Frequency [MHz]	Channel No.	
5730	Low	2.5584
5878	Mid	2.8617
5845	High	3.0746

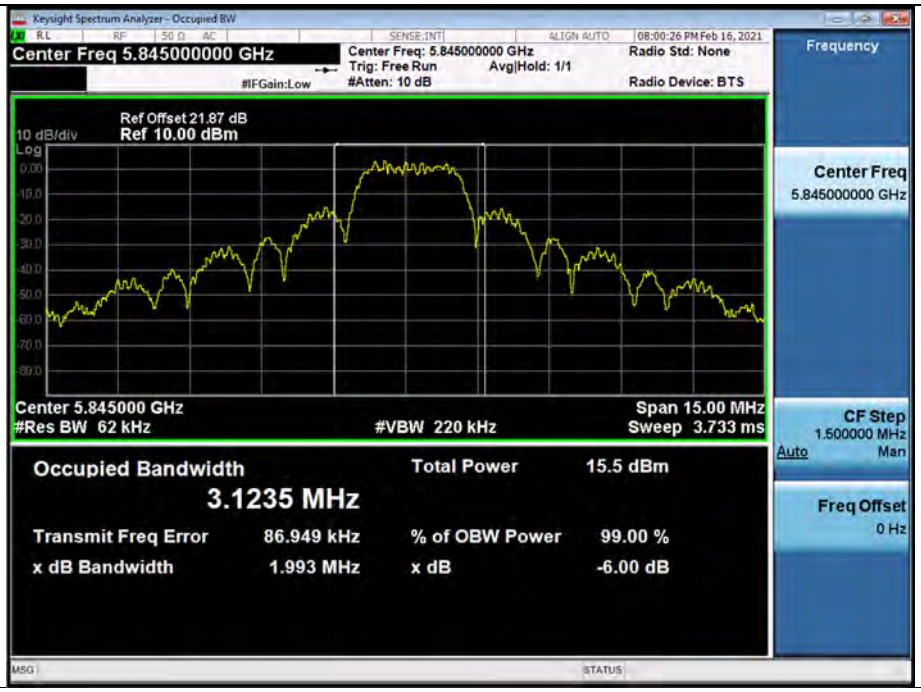
▣ Test Plots(UNII)

[ANT A]

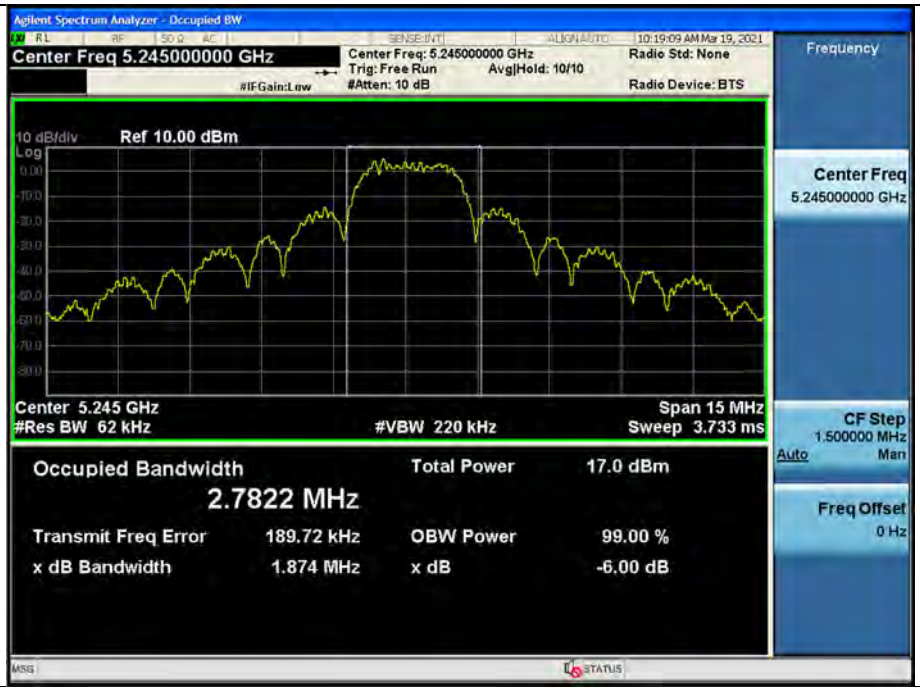
UNII 1 BAND 99 % Bandwidth High



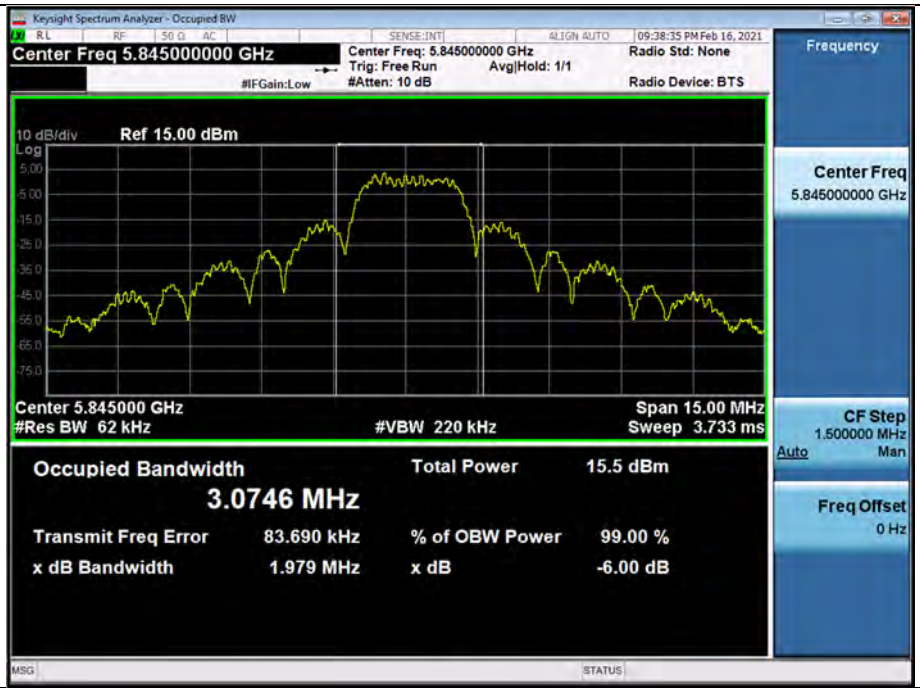
UNII 3 BAND 99 % Bandwidth High



[ANT B]

UNII 1 BAND 99 % Bandwidth High


UNII 3 BAND 99 % Bandwidth High



Note:

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

9.3 6DB BANDWIDTH

[ANT A]

UNII 3		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5730	Low	1.869	> 0.5	Pass
5787	Mid	1.916	> 0.5	Pass
5845	High	1.962	> 0.5	Pass

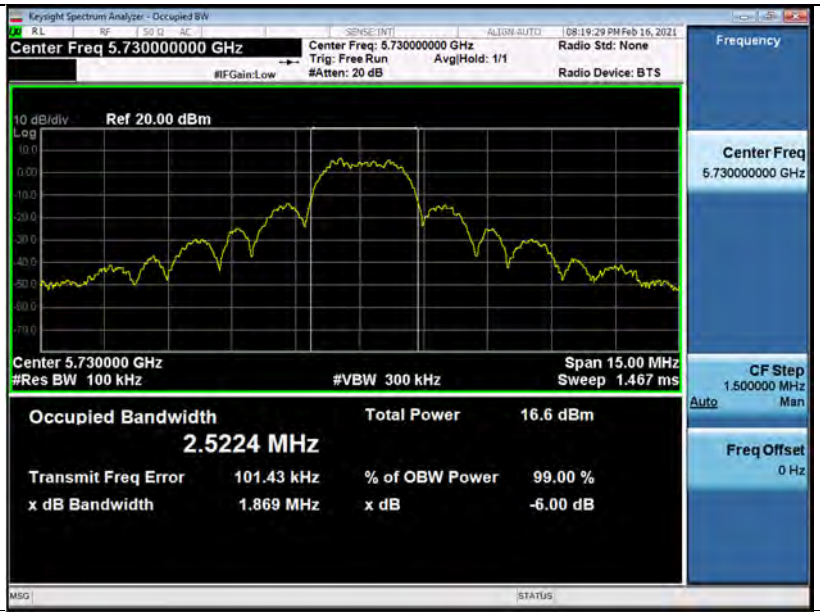
[ANT B]

UNII 3		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5730	Low	1.855	> 0.5	Pass
5787	Mid	1.996	> 0.5	Pass
5845	High	2.999	> 0.5	Pass

▣ Test Plots

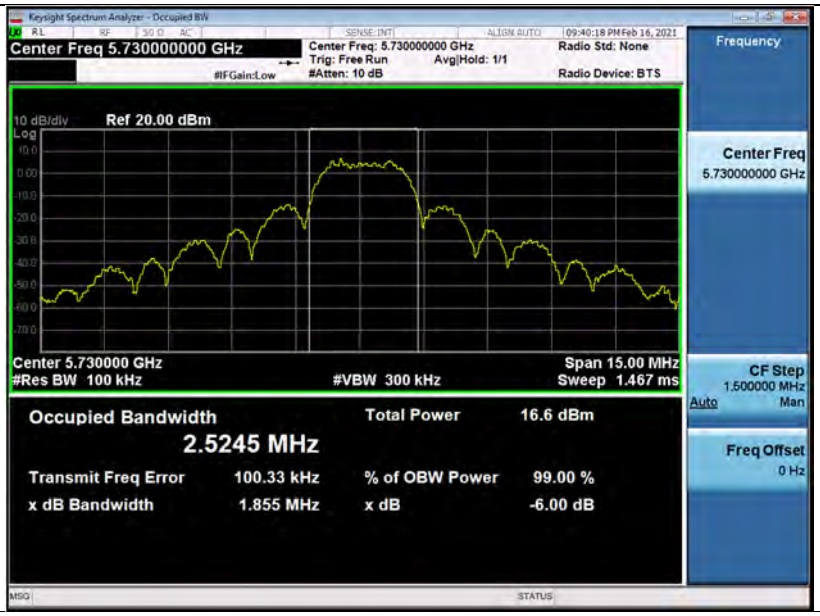
[ANT A]

UNII 3 BAND 6dB Bandwidth Low



[ANT B]

UNII 3 BAND 6dB Bandwidth Low



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

9.4 OUTPUT POWER MEASUREMENT

[ANT A]

FCC Limit

UNII-1 : Total Power < 17.56 dBm

UNII-3 : Total Power < 30 dBm

ISED Limit

UNII-1 : Total Power < 14.19 dBm

UNII-1 : E.I.R.P < 21.19 dBm

UNII-3 : Total Power < 30 dBm

[ANT B]

FCC Limit

UNII-1 : Total Power < 17.55 dBm

UNII-3 : Total Power < 30 dBm

ISED Limit

UNII-1 : Total Power < 14.15 dBm

UNII-1 : E.I.R.P < 21.15 dBm

UNII-3 : Total Power < 30 dBm

[ANT A]

UNII 1		Measured Power [dBm]	E.I.R.P [dBm]
Frequency [MHz]	Channel No.		
5155	Low	9.27	10.74
5179	Mid	9.60	11.07
5200	High-1	9.68	11.15
5245	High-2	9.57	11.04

UNII 3		Measured Power [dBm]
Frequency [MHz]	Channel No.	
5730	Low	11.52
5787	Mid	11.32
5845	High	10.9

[ANT B]

UNII 1		Measured Power [dBm]	E.I.R.P [dBm]
Frequency [MHz]	Channel No.		
5155	Low	9.52	10.85
5179	Mid	9.36	10.69
5200	High-1	9.56	10.89
5245	High-2	9.50	10.86

UNII 3		Measured Power [dBm]
Frequency [MHz]	Channel No.	
5730	Low	11.06
5787	Mid	11.05
5845	High	10.53

9.5 POWER SPECTRAL DENSITY

FCC Limit

UNII-1 : Power Spectral Density < 11dBm/MHz

UNII-3 : Power Spectral Density < 30dBm/500kHz

ISED Limit

UNII-1 : E.I.R.P Spectral Density < 10dBm/MHz

UNII-3 : Power Spectral Density < 30dBm/500kHz

[ANT A]

UNII 1		Measured PSD [dBm/MHz]	E.I.R.P Spectral Density [dBm/MHz]
Frequency [MHz]	Channel No.		
5155	Low	7.005	8.475
5179	Mid	7.396	8.866
5200	High-1	7.225	8.695
5245	High-2	6.932	8.402

UNII 3		Measured PSD [dBm/500kHz]
Frequency [MHz]	Channel No.	
5730	Low	6.464
5787	Mid	6.104
5845	High	5.723

[ANT B]

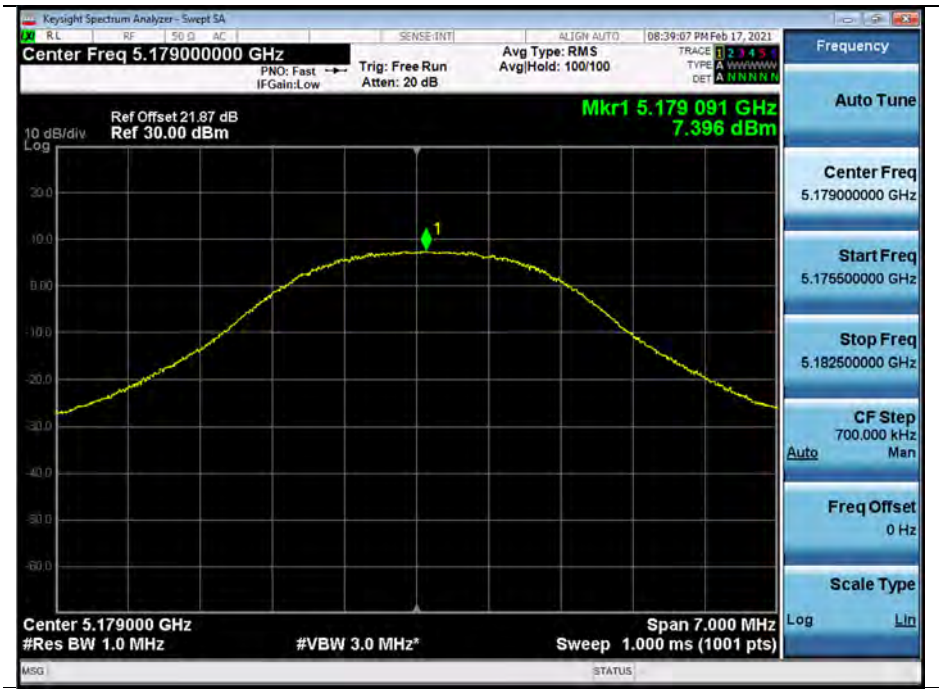
UNII 1		Measured PSD [dBm/MHz]	E.I.R.P Spectral Density [dBm/MHz]
Frequency [MHz]	Channel No.		
5155	Low	7.030	8.360
5179	Mid	7.035	8.365
5200	High-1	6.958	8.288
5245	High-2	7.004	8.364

UNII 3		Measured PSD [dBm/500kHz]
Frequency [MHz]	Channel No.	
5730	Low	6.544
5787	Mid	6.100
5845	High	5.610

▣ Test Plots(UNII)

[ANT A]

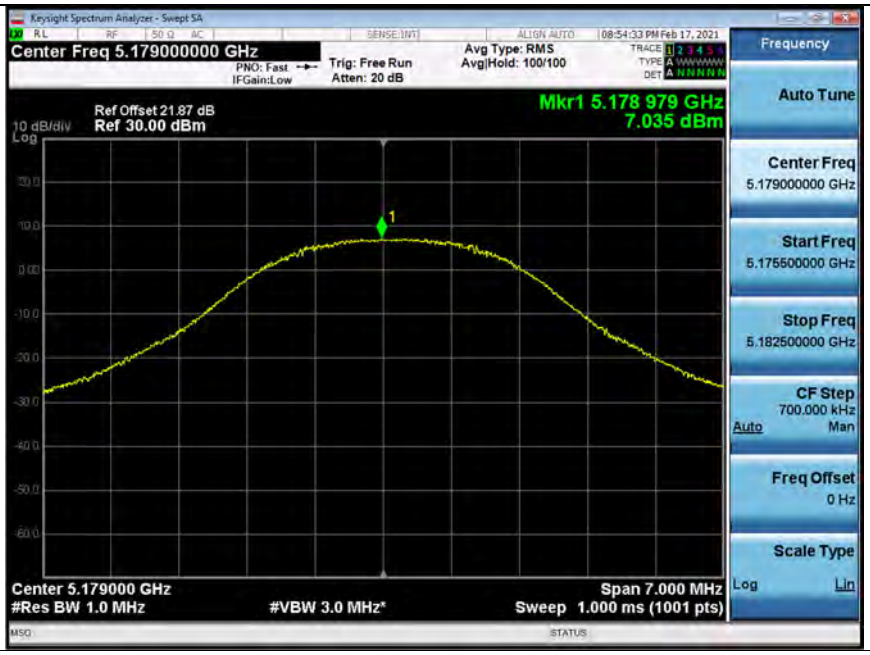
UNII 1 BAND PSD Mid



UNII 3 BAND PSD Low

[ANT B]

UNII 1 BAND PSD Mid



UNII 3 BAND PSD Low

Note:

In order to simplify the report, attached plots were only channel of highest power.

9.6 FREQUENCY STABILITY

[ANT A]

Startup after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,155,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5155092.50	92.50
100%		-30	5155015.82	15.82
100%		-20	5155018.38	18.38
100%		-10	5155067.71	67.71
100%		0	5155016.04	16.04
100%		+10	5155091.35	91.35
100%		+30	5155036.84	36.84
100%		+40	5155083.55	83.55
100%		+50	5155044.69	44.69
High	3.45	+20	5155080.79	80.79
Low	3.15	+20	5155083.02	83.02

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 1
OPERATING FREQUENCY:	5,245,000,000 Hz
CHANNEL:	High-2
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5245083.34	83.34
100%		-30	5245090.68	90.68
100%		-20	5245032.11	32.11
100%		-10	5245033.17	33.17
100%		0	5245038.59	38.59
100%		+10	5245070.89	70.89
100%		+30	5245012.79	12.79
100%		+40	5245085.29	85.29
100%		+50	5245035.49	35.49
High	3.45	+20	5245022.73	22.73
Low	3.15	+20	5245032.10	32.10

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:	5,730,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5730030.48	30.48
100%		-30	5730068.33	68.33
100%		-20	5730006.30	6.30
100%		-10	5730033.08	33.08
100%		0	5730033.89	33.89
100%		+10	5730090.73	90.73
100%		+30	5730002.92	2.92
100%		+40	5730074.60	74.60
100%		+50	5730002.76	2.76
High	3.45	+20	5730056.02	56.02
Low	3.15	+20	5730040.10	40.10

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.

2 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,155,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5155058.73	58.73
100%		-30	5155075.08	75.08
100%		-20	5155012.78	12.78
100%		-10	5155007.47	7.47
100%		0	5155056.36	56.36
100%		+10	5155029.15	29.15
100%		+30	5155096.52	96.52
100%		+40	5155015.57	15.57
100%		+50	5155026.79	26.79
High	3.45	+20	5155087.84	87.84
Low	3.15	+20	5155053.97	53.97

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 1
OPERATING FREQUENCY:	5,245,000,000 Hz
CHANNEL:	High-2
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5245036.21	36.21
100%		-30	5245073.98	73.98
100%		-20	5245093.34	93.34
100%		-10	5245044.59	44.59
100%		0	5245089.93	89.93
100%		+10	5245032.12	32.12
100%		+30	5245093.44	93.44
100%		+40	5245004.57	4.57
100%		+50	5245093.39	93.39
High	3.45	+20	5245070.23	70.23
Low	3.15	+20	5245030.62	30.62

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:	5,730,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5730052.50	52.50
100%		-30	5730040.32	40.32
100%		-20	5730028.21	28.21
100%		-10	5730012.98	12.98
100%		0	5730057.61	57.61
100%		+10	5730092.58	92.58
100%		+30	5730084.65	84.65
100%		+40	5730052.20	52.20
100%		+50	5730076.04	76.04
High	3.45	+20	5730007.64	7.64
Low	3.15	+20	5730078.47	78.47

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.

5 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,155,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5155018.70	18.70
100%		-30	5155049.96	49.96
100%		-20	5155095.84	95.84
100%		-10	5155027.99	27.99
100%		0	5155023.47	23.47
100%		+10	5155029.18	29.18
100%		+30	5155093.60	93.60
100%		+40	5155004.08	4.08
100%		+50	5155062.61	62.61
High	3.45	+20	5155018.23	18.23
Low	3.15	+20	5155040.60	40.60

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 1
OPERATING FREQUENCY:	5,245,000,000 Hz
CHANNEL:	High-2
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5245075.23	75.23
100%		-30	5245099.12	99.12
100%		-20	5245021.96	21.96
100%		-10	5245061.13	61.13
100%		0	5245087.08	87.08
100%		+10	5245007.15	7.15
100%		+30	5245068.09	68.09
100%		+40	5245017.97	17.97
100%		+50	5245052.93	52.93
High	3.45	+20	5245091.05	91.05
Low	3.15	+20	5245014.25	14.25

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:	5,730,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5730097.20	97.20
100%		-30	5730004.23	4.23
100%		-20	5730024.38	24.38
100%		-10	5730097.16	97.16
100%		0	5730003.13	3.13
100%		+10	5730069.62	69.62
100%		+30	5730041.14	41.14
100%		+40	5730023.50	23.50
100%		+50	5730015.61	15.61
High	3.45	+20	5730002.90	2.90
Low	3.15	+20	5730070.20	70.20

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.

10 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,155,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5155003.20	3.20
100%		-30	5155008.69	8.69
100%		-20	5155099.15	99.15
100%		-10	5155011.04	11.04
100%		0	5155028.06	28.06
100%		+10	5155095.98	95.98
100%		+30	5155014.35	14.35
100%		+40	5155086.49	86.49
100%		+50	5155079.93	79.93
High	3.45	+20	5155075.78	75.78
Low	3.15	+20	5155059.40	59.40

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 1
OPERATING FREQUENCY:	5,245,000,000 Hz
CHANNEL:	High-2
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5245053.65	53.65
100%		-30	5245051.98	51.98
100%		-20	5245080.57	80.57
100%		-10	5245031.61	31.61
100%		0	5245002.12	2.12
100%		+10	5245053.86	53.86
100%		+30	5245061.50	61.50
100%		+40	5245094.69	94.69
100%		+50	5245046.57	46.57
High	3.45	+20	5245026.15	26.15
Low	3.15	+20	5245073.93	73.93

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:	5,730,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5730083.71	83.71
100%		-30	5730086.08	86.08
100%		-20	5730075.25	75.25
100%		-10	5730094.03	94.03
100%		0	5730041.17	41.17
100%		+10	5730085.81	85.81
100%		+30	5730021.43	21.43
100%		+40	5730010.22	10.22
100%		+50	5730077.62	77.62
High	3.45	+20	5730014.28	14.28
Low	3.15	+20	5730039.55	39.55

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.

[ANT B]

Startup after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,155,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5155064.40	64.40
100%		-30	5155069.20	69.20
100%		-20	5155027.72	27.72
100%		-10	5155061.77	61.77
100%		0	5155025.92	25.92
100%		+10	5155058.53	58.53
100%		+30	5155094.94	94.94
100%		+40	5155086.27	86.27
100%		+50	5155081.06	81.06
High	3.45	+20	5155068.59	68.59
Low	3.15	+20	5155005.91	5.91

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 1
OPERATING FREQUENCY:	5,245,000,000 Hz
CHANNEL:	High-2
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5245055.96	55.96
100%		-30	5245071.33	71.33
100%		-20	5245068.03	68.03
100%		-10	5245007.84	7.84
100%		0	5245032.08	32.08
100%		+10	5245021.66	21.66
100%		+30	5245072.73	72.73
100%		+40	5245035.72	35.72
100%		+50	5245088.64	88.64
High	3.45	+20	5245089.33	89.33
Low	3.15	+20	5245003.04	3.04

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:	5,730,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5730087.43	87.43
100%		-30	5730021.40	21.40
100%		-20	5730022.71	22.71
100%		-10	5730009.95	9.95
100%		0	5730077.71	77.71
100%		+10	5730073.87	73.87
100%		+30	5730087.19	87.19
100%		+40	5730095.37	95.37
100%		+50	5730014.29	14.29
High	3.45	+20	5730071.06	71.06
Low	3.15	+20	5730027.47	27.47

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.

2 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,155,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5155088.33	88.33
100%		-30	5155062.27	62.27
100%		-20	5155017.69	17.69
100%		-10	5155017.37	17.37
100%		0	5155084.52	84.52
100%		+10	5155060.48	60.48
100%		+30	5155017.89	17.89
100%		+40	5155011.14	11.14
100%		+50	5155043.70	43.70
High	3.45	+20	5155058.81	58.81
Low	3.15	+20	5155027.57	27.57

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 1
OPERATING FREQUENCY:	5,245,000,000 Hz
CHANNEL:	High-2
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5245025.02	25.02
100%		-30	5245018.55	18.55
100%		-20	5245046.48	46.48
100%		-10	5245060.59	60.59
100%		0	5245003.33	3.33
100%		+10	5245057.86	57.86
100%		+30	5245058.11	58.11
100%		+40	5245037.35	37.35
100%		+50	5245095.09	95.09
High	3.45	+20	5245088.25	88.25
Low	3.15	+20	5245091.70	91.70

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:	5,730,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5730046.32	46.32
100%		-30	5730024.55	24.55
100%		-20	5730011.58	11.58
100%		-10	5730056.62	56.62
100%		0	5730017.40	17.40
100%		+10	5730086.39	86.39
100%		+30	5730054.22	54.22
100%		+40	5730052.46	52.46
100%		+50	5730066.15	66.15
High	3.45	+20	5730065.12	65.12
Low	3.15	+20	5730072.09	72.09

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.

5 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,155,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5155061.20	61.20
100%		-30	5155039.64	39.64
100%		-20	5155041.81	41.81
100%		-10	5155002.76	2.76
100%		0	5155086.33	86.33
100%		+10	5155088.57	88.57
100%		+30	5155036.41	36.41
100%		+40	5155022.06	22.06
100%		+50	5155092.72	92.72
High	3.45	+20	5155081.26	81.26
Low	3.15	+20	5155032.84	32.84

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.

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,245,000,000 Hz
CHANNEL:	High-2
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5245003.02	3.02
100%		-30	5245092.35	92.35
100%		-20	5245064.14	64.14
100%		-10	5245031.76	31.76
100%		0	5245039.84	39.84
100%		+10	5245033.87	33.87
100%		+30	5245086.02	86.02
100%		+40	5245011.55	11.55
100%		+50	5245032.51	32.51
High	3.45	+20	5245041.82	41.82
Low	3.15	+20	5245031.31	31.31

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.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,730,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5730079.66	79.66
100%		-30	5730090.23	90.23
100%		-20	5730045.82	45.82
100%		-10	5730081.50	81.5
100%		0	5730009.53	9.53
100%		+10	5730024.73	24.73
100%		+30	5730026.15	26.15
100%		+40	5730004.82	4.82
100%		+50	5730087.83	87.83
High	3.45	+20	5730057.25	57.25
Low	3.15	+20	5730065.98	65.98

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.

10 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,155,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5155048.38	48.38
100%		-30	5155035.63	35.63
100%		-20	5155014.22	14.22
100%		-10	5155067.90	67.90
100%		0	5155022.58	22.58
100%		+10	5155048.41	48.41
100%		+30	5155053.68	53.68
100%		+40	5155094.29	94.29
100%		+50	5155017.64	17.64
High	3.45	+20	5155010.80	10.80
Low	3.15	+20	5155036.70	36.70

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 1
OPERATING FREQUENCY:	5,245,000,000 Hz
CHANNEL:	High-2
REFERENCE VOLTAGE:	3.3 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.3	+20(Ref)	5245031.20	31.20
100%		-30	5245075.26	75.26
100%		-20	5245031.46	31.46
100%		-10	5245048.54	48.54
100%		0	5245068.12	68.12
100%		+10	5245051.16	51.16
100%		+30	5245080.94	80.94
100%		+40	5245052.51	52.51
100%		+50	5245009.34	9.34
High	3.45	+20	5245033.39	33.39
Low	3.15	+20	5245094.70	94.70

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:	5,730,000,000 Hz
CHANNEL:	Low
REFERENCE VOLTAGE:	3.3 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	3.3	+20(Ref)	5730016.33	16.33
100%		-30	5730085.79	85.79
100%		-20	5730046.50	46.5
100%		-10	5730092.49	92.49
100%		0	5730098.34	98.34
100%		+10	5730077.47	77.47
100%		+30	5730004.94	4.94
100%		+40	5730077.64	77.64
100%		+50	5730086.10	86.10
High	3.45	+20	5730047.24	47.24
Low	3.15	+20	5730068.50	68.50

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.

9.7 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30MHz

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

Note:

1. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
2. Distance extrapolation factor = 40log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dBuV) + Distance extrapolation factor

Frequency Range : Below 1 GHz

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

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode

Frequency Range : Above 1 GHz

[ANT A]

Band :	UNII 1
Operating Frequency	5155 MHz
Channel No.	Low

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10310	55.90	5.02	V	60.92	68.20	7.28	PK
15465	48.03	5.03	V	53.06	73.98	20.92	PK
15465	34.93	5.03	V	39.96	53.98	14.02	AV
10310	54.28	5.02	H	59.30	68.20	8.90	PK
15465	47.87	5.03	H	52.90	73.98	21.08	PK
15465	33.69	5.03	H	38.72	53.98	15.26	AV

Band :	UNII 1
Operating Frequency	5179 MHz
Channel No.	Mid

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10358	55.14	5.63	V	60.77	68.20	7.43	PK
15537	47.66	6.11	V	53.77	73.98	20.21	PK
15537	34.46	6.11	V	40.57	53.98	13.41	AV
10358	53.75	5.63	H	59.38	68.20	8.82	PK
15537	46.87	6.11	H	52.98	73.98	21.00	PK
15537	33.89	6.11	H	40.00	53.98	13.98	AV

Band :	UNII 1
Operating Frequency	5200 MHz
Channel No.	High-1

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	54.48	5.06	V	59.54	68.20	8.66	PK
15600	47.15	4.93	V	52.08	73.98	21.90	PK
15600	36.64	4.93	V	41.57	53.98	12.41	AV
10400	54.97	5.06	H	60.03	68.20	8.17	PK
15600	46.75	4.93	H	51.68	73.98	22.30	PK
15600	36.09	4.93	H	41.02	53.98	12.96	AV

Band :	UNII 1
Operating Frequency	5245 MHz
Channel No.	High-2

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10490	53.50	5.45	V	58.95	68.20	9.25	PK
15735	48.06	4.57	V	52.63	73.98	21.35	PK
15735	35.92	4.57	V	40.49	53.98	13.49	AV
10490	53.94	5.45	H	59.39	68.20	8.81	PK
15735	47.15	4.57	H	51.72	73.98	22.26	PK
15735	35.11	4.57	H	39.68	53.98	14.30	AV

Band :	UNII 3
Operating Frequency	5730 MHz
Channel No.	Low

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11460	52.96	6.26	V	59.22	73.98	14.76	PK
11460	41.71	6.26	V	47.97	53.98	6.01	AV
17190	47.41	10.11	V	57.52	68.20	10.68	PK
11460	53.61	6.26	H	59.87	73.98	14.11	PK
11460	43.20	6.26	H	49.46	53.98	4.52	AV
17190	46.87	10.11	H	56.98	68.20	11.22	PK

Band :	UNII 3
Operating Frequency	5787 MHz
Channel No.	Mid

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11574	53.92	6.47	V	60.39	73.98	13.59	PK
11574	43.52	6.47	V	49.99	53.98	3.99	AV
17361	46.69	10.98	V	57.67	68.20	10.53	PK
11574	54.22	6.47	H	60.69	73.98	13.29	PK
11574	44.05	6.47	H	50.52	53.98	3.46	AV
17361	46.09	10.98	H	57.07	68.20	11.13	PK

Band :	UNII 3
Operating Frequency	5845 MHz
Channel No.	High

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11690	55.95	6.13	V	62.08	73.98	11.90	PK
11690	45.36	6.13	V	51.49	53.98	2.49	AV
17535	47.45	11.34	V	58.79	68.20	9.41	PK
11690	54.01	6.13	H	60.14	73.98	13.84	PK
11690	43.69	6.13	H	49.82	53.98	4.16	AV
17535	47.00	11.34	H	58.34	68.20	9.86	PK

[ANT B]

Band :	UNII 1
Operating Frequency	5155 MHz
Channel No.	Low

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10310	56.57	5.02	V	61.59	68.20	6.61	PK
15465	47.34	5.03	V	52.37	73.98	21.61	PK
15465	33.97	5.03	V	39.00	53.98	14.98	AV
10310	56.69	5.02	H	61.71	68.20	6.49	PK
15465	47.61	5.03	H	52.64	73.98	21.34	PK
15465	34.07	5.03	H	39.10	53.98	14.88	AV

Band :	UNII 1
Operating Frequency	5179 MHz
Channel No.	Mid

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10358	55.12	5.63	V	60.75	68.20	7.45	PK
15537	47.16	6.11	V	53.27	73.98	20.71	PK
15537	33.76	6.11	V	39.87	53.98	14.11	AV
10358	55.01	5.63	H	60.64	68.20	7.56	PK
15537	46.49	6.11	H	52.60	73.98	21.38	PK
15537	33.08	6.11	H	39.19	53.98	14.79	AV

Band :	UNII 1
Operating Frequency	5200 MHz
Channel No.	High-1

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	55.22	5.06	V	60.28	68.20	7.92	PK
15600	46.86	4.93	V	51.79	73.98	22.19	PK
15600	34.18	4.93	V	39.11	53.98	14.87	AV
10400	55.67	5.06	H	60.73	68.20	7.47	PK
15600	46.11	4.93	H	51.04	73.98	22.94	PK
15600	34.02	4.93	H	38.95	53.98	15.03	AV

Band :	UNII 1
Operating Frequency	5245 MHz
Channel No.	High-2

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10490	54.48	5.45	V	59.93	68.20	8.27	PK
15735	48.13	4.57	V	52.70	73.98	21.28	PK
15735	34.28	4.57	V	38.85	53.98	15.13	AV
10490	56.19	5.45	H	61.64	68.20	6.56	PK
15735	48.36	4.57	H	52.93	73.98	21.05	PK
15735	34.80	4.57	H	39.37	53.98	14.61	AV

Band :	UNII 3
Operating Frequency	5730 MHz
Channel No.	Low

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11460	53.06	6.26	V	59.32	73.98	14.66	PK
11460	42.70	6.26	V	48.96	53.98	5.02	AV
17190	47.55	10.11	V	57.66	68.20	10.54	PK
11460	52.97	6.26	H	59.23	73.98	14.75	PK
11460	41.65	6.26	H	47.91	53.98	6.07	AV
17190	47.34	10.11	H	57.45	68.20	10.75	PK

Band :	UNII 3
Operating Frequency	5787 MHz
Channel No.	Mid

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11574	53.81	6.47	V	60.28	73.98	13.70	PK
11574	43.38	6.47	V	49.85	53.98	4.13	AV
17361	46.67	10.98	V	57.65	68.20	10.55	PK
11574	53.40	6.47	H	59.87	73.98	14.11	PK
11574	43.07	6.47	H	49.54	53.98	4.44	AV
17361	46.28	10.98	H	57.26	68.20	10.94	PK

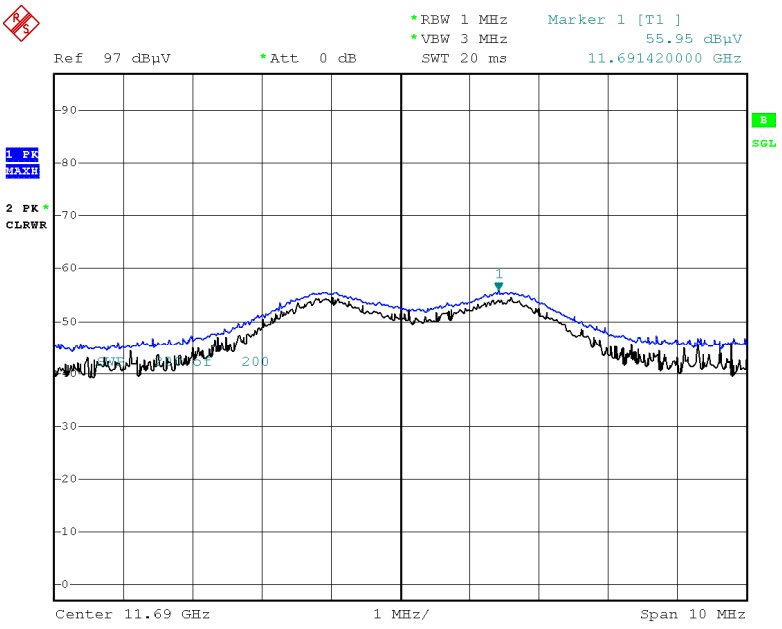
Band :	UNII 3
Operating Frequency	5845 MHz
Channel No.	High

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11690	55.55	6.13	V	61.68	73.98	12.30	PK
11690	45.47	6.13	V	51.60	53.98	2.38	AV
17535	46.90	11.34	V	58.24	68.20	9.96	PK
11690	54.78	6.13	V	60.91	73.98	13.07	PK
11690	44.34	6.13	V	50.47	53.98	3.51	AV
17535	48.25	11.34	H	59.59	68.20	8.61	PK

▣ Test Plots

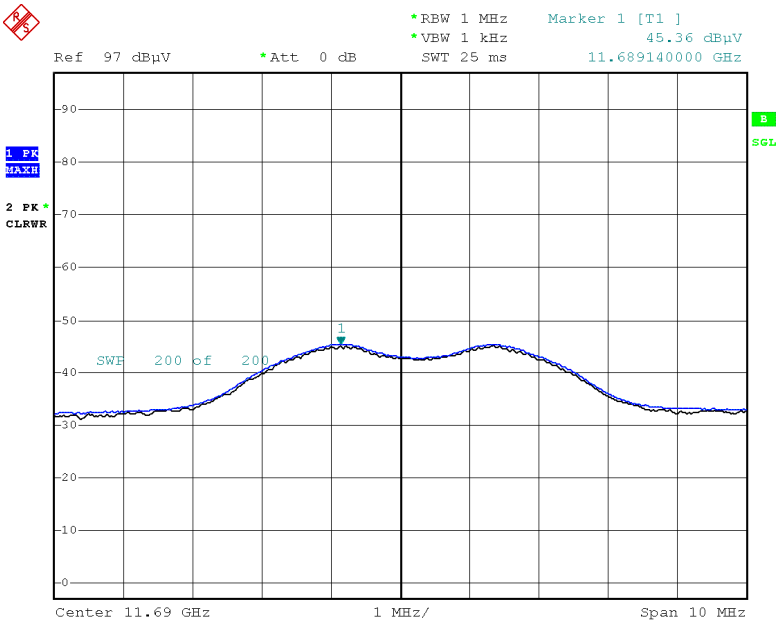
[ANT A]

Peak Reading (UNII 3, High Ch. 2nd Harmonic, Y-V)



Date: 10.MAR.2021 11:29:53

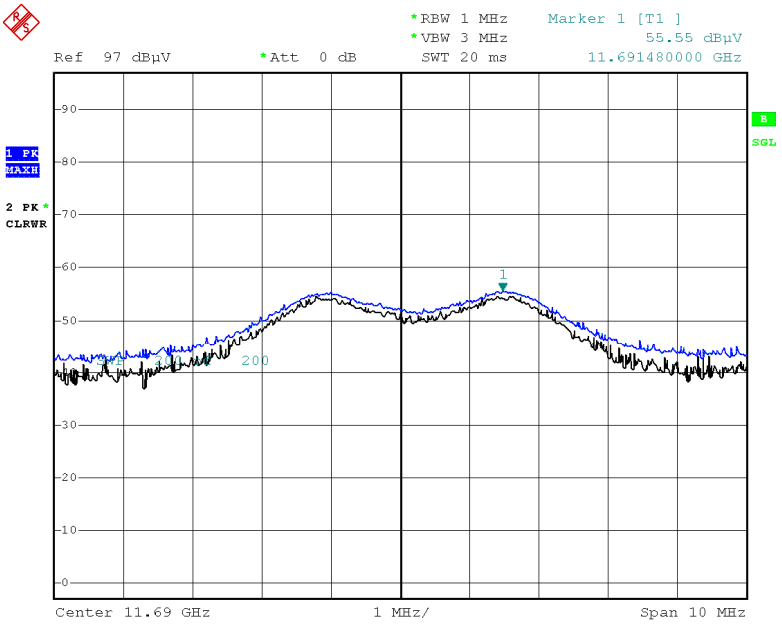
Average Reading (UNII 3, High Ch. 2nd Harmonic, Y-V)



Date: 10.MAR.2021 11:29:18

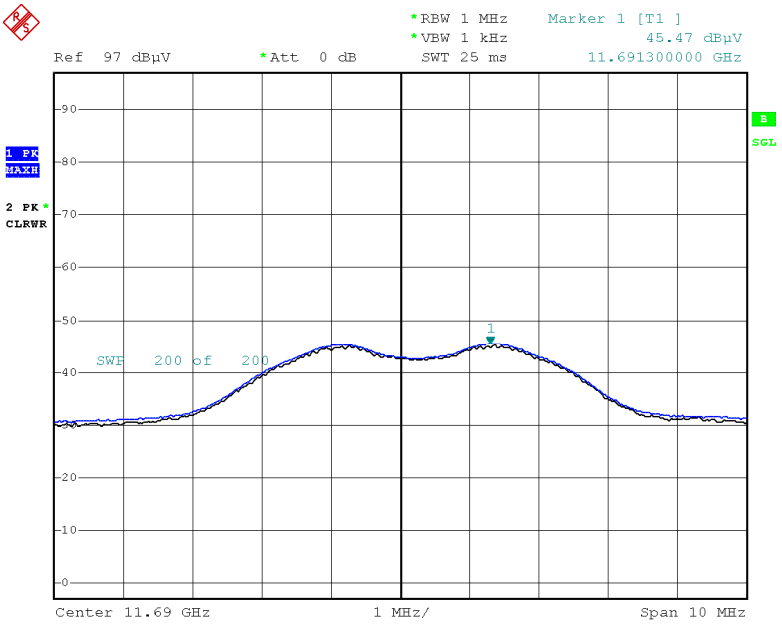
[ANT B]

Peak Reading (UNII 3, High Ch. 2nd Harmonic, X-V)



Date: 11.MAR.2021 10:34:03

Average Reading (UNII 3, High Ch. 2nd Harmonic, X-V)



Date: 11.MAR.2021 10:33:51

Note:

Only the worst case plots for Radiated Spurious Emissions.

9.8 RADIATED RESTRICTED BAND EDGE

[ANT A]

Band :	UNII 1
Operating Frequency	5155 MHz
Channel No.	Low

Frequency [MHz]	Reading dBuV	CL+AF+DF-AG [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	46.99	12.69	H	59.68	73.98	14.30	PK
5150	38.04	12.69	H	50.73	53.98	3.25	AV
5150	47.65	12.69	V	60.34	73.98	13.64	PK
5150	38.29	12.69	V	50.98	53.98	3.00	AV

[ANT B]

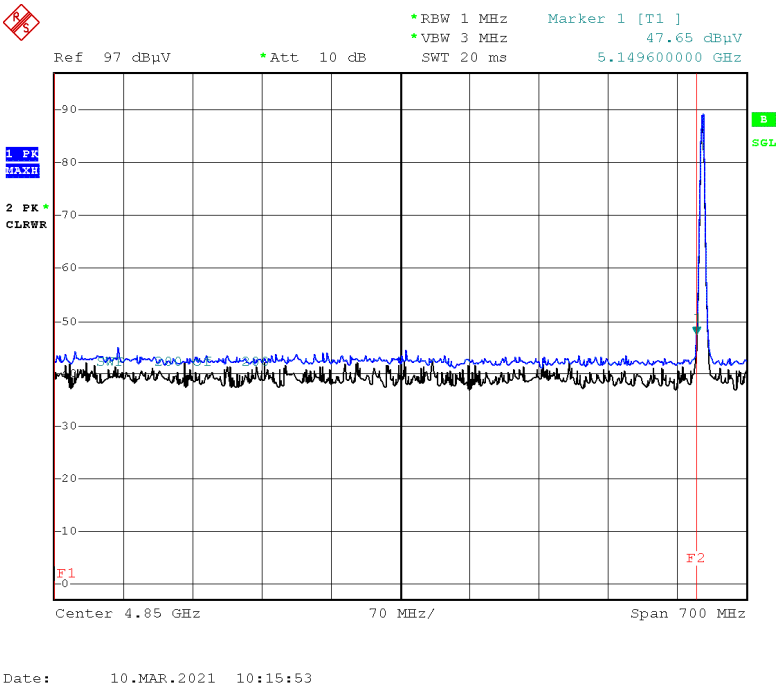
Band :	UNII 1
Operating Frequency	5155 MHz
Channel No.	Low

Frequency [MHz]	Reading dBuV	CL+AF+DF-AG [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	48.91	12.69	H	61.60	73.98	12.38	PK
5150	38.29	12.69	H	50.98	53.98	3.00	AV
5150	48.43	12.69	V	61.12	73.98	12.86	PK
5150	37.61	12.69	V	50.30	53.98	3.68	AV

▣ Test Plots

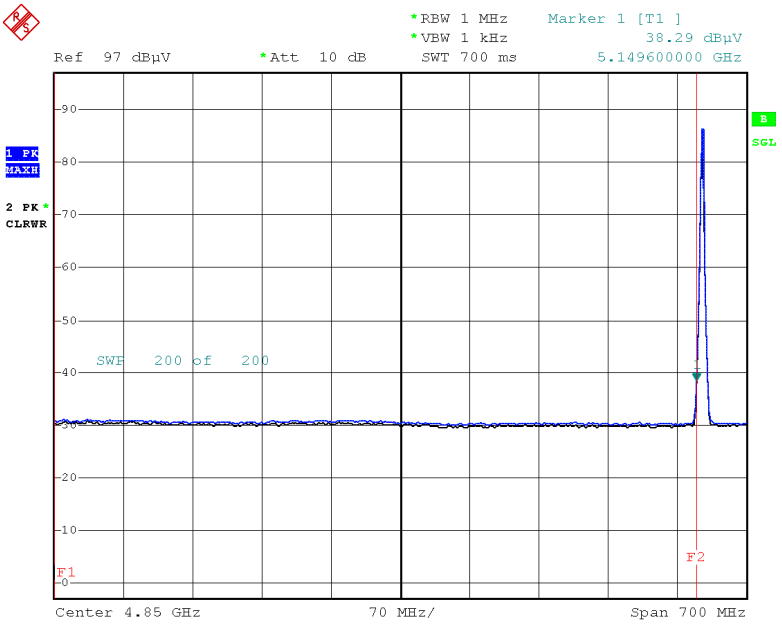
[ANT A]

Peak Reading (UNII 1, Low, Y-V)_ 5 155 MHz



Date: 10.MAR.2021 10:15:53

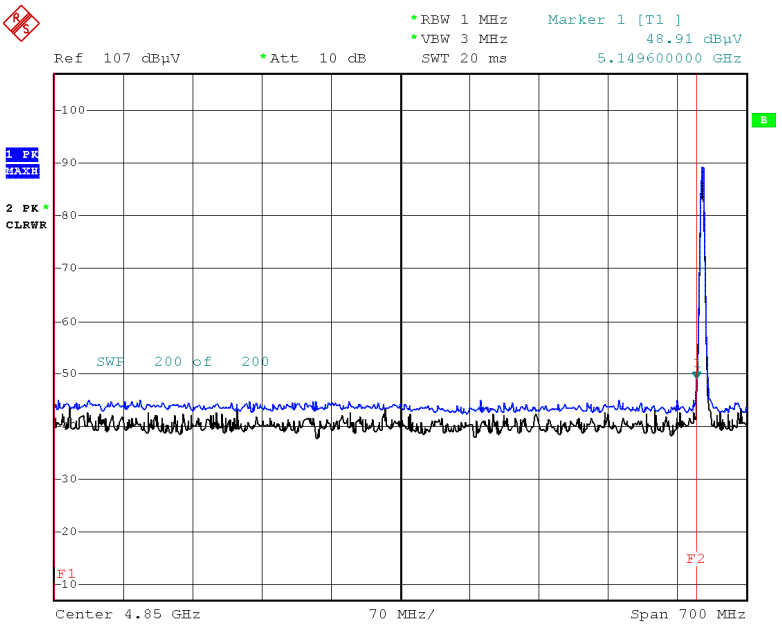
Average Reading (UNII 1, Low, Y-V)_ 5 155 MHz



Date: 10.MAR.2021 10:21:36

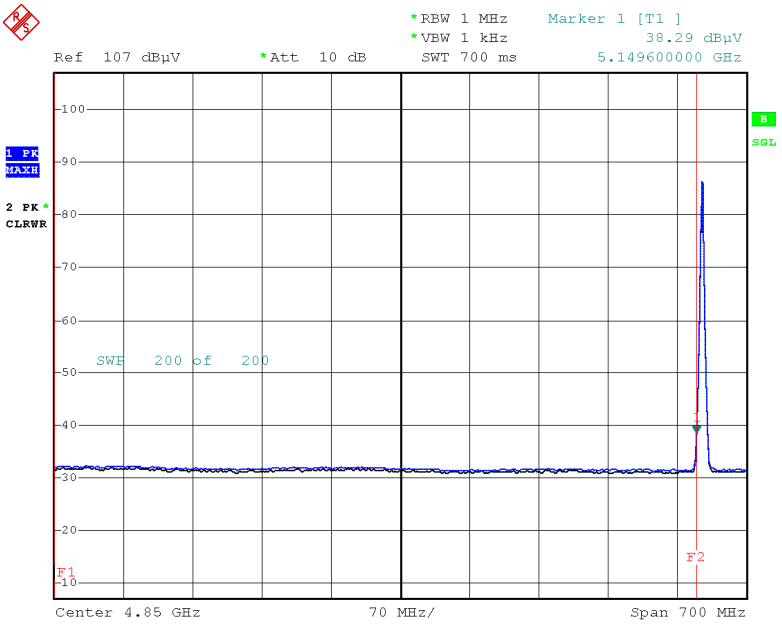
[ANT B]

Peak Reading (UNII 1, Low, Y-H)_ 5 155 MHz



Date: 9.MAR.2021 14:20:28

Average Reading (UNII 1, Low, Y-H)_ 5 155 MHz



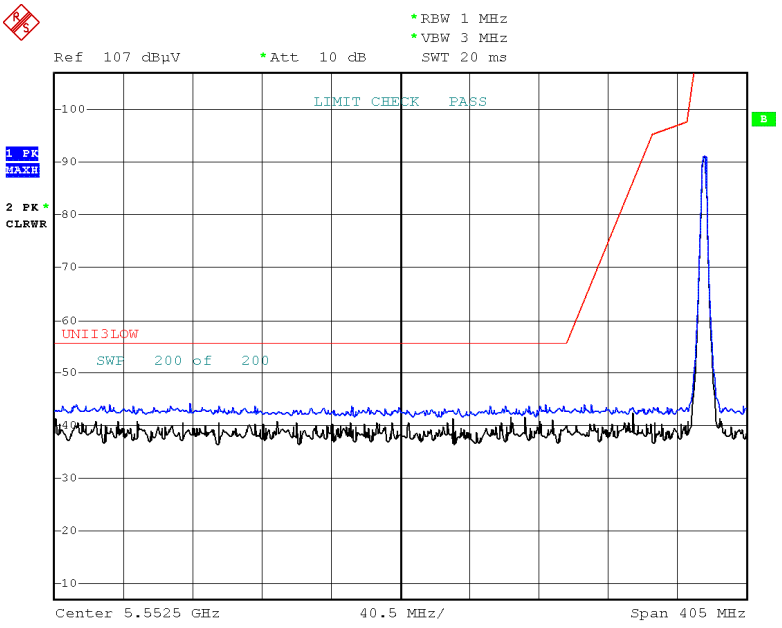
Date: 9.MAR.2021 14:35:15

Note:

Only the worst case plots for Radiated Restricted Band Edge.

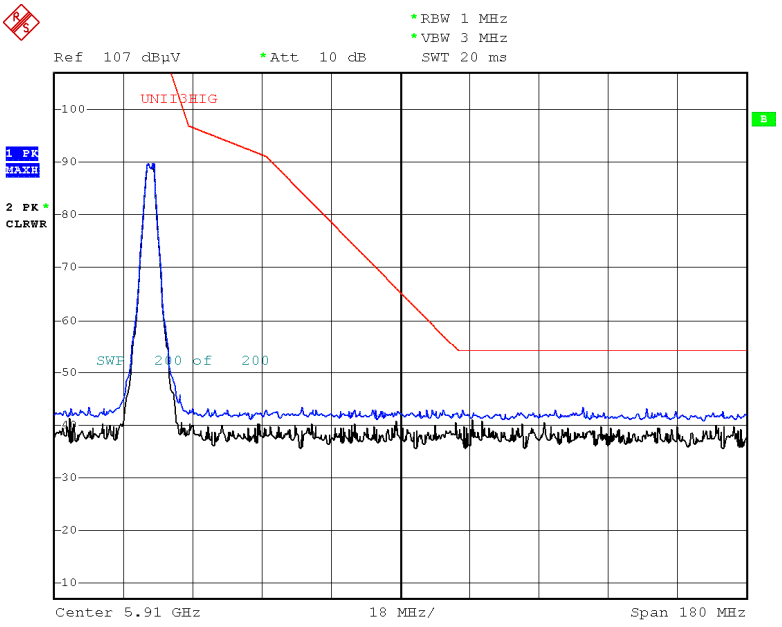
▣ Test Plots(UNII 3)

Peak Reading (UNII 3, Low, Ant A)



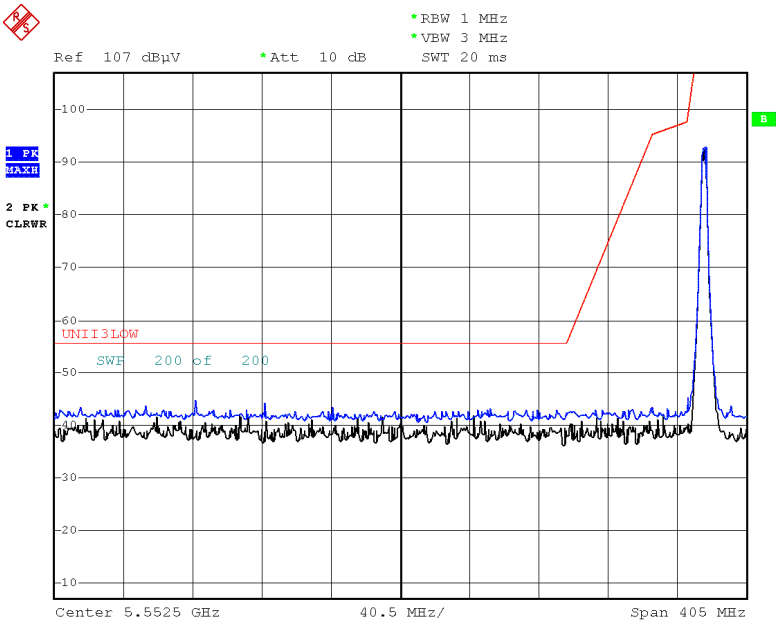
Date: 15.FEB.2021 11:01:42

Peak Reading (UNII 3, High, Ant A)



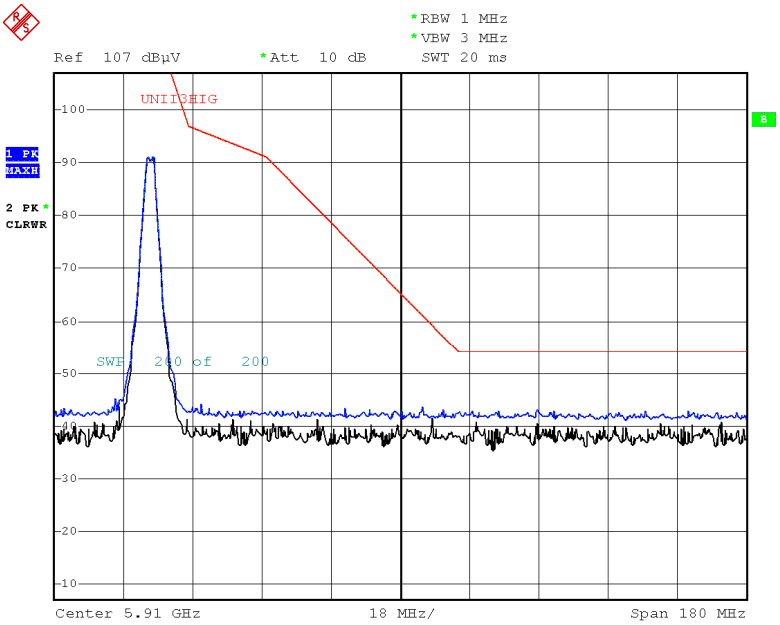
Date: 15.FEB.2021 11:14:21

Peak Reading (UNII 3, Low, Ant B)



Date: 15.FEB.2021 19:46:18

Peak Reading (UNII 3, High, Ant B)



Date: 15.FEB.2021 19:55:20

9.9 RECEIVER SPURIOUS EMISSIONS

Frequency Range : Below 1 GHz

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

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

Frequency Range : Above 1 GHz

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

9.10 POWERLINE CONDUCTED EMISSIONS

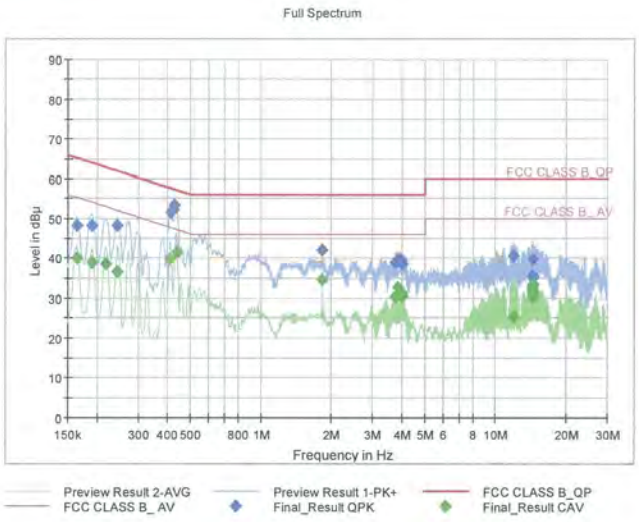
Conducted Emissions (Line 1)

Test 1 / 2

Test Report

Common Information

EUT :	WL1SB21
Manufacturer :	LG Electronics, Inc.
Test Site:	SHIELD ROOM
Operating Conditions :	L1
Operator Name:	
Comment:	



Final_Result_QPK

Frequency (MHz)	QuasiPeak	Limit (dBuV	Margin	Bandwidth	Line	Filter	Corr. (dB)
0.1635	48.14	65.28	17.14	9.000	L1	OFF	9.6
0.1905	48.10	64.02	15.92	9.000	L1	OFF	9.6
0.2445	48.22	61.94	13.72	9.000	L1	OFF	9.6
0.4133	51.62	57.58	5.96	9.000	L1	OFF	9.6
0.4200	52.21	57.45	5.24	9.000	L1	OFF	9.6
0.4290	53.27	57.27	4.00	9.000	L1	OFF	9.6
1.8253	42.13	56.00	13.87	9.000	L1	OFF	9.6
3.7310	38.88	56.00	17.12	9.000	L1	OFF	9.7
3.8458	39.66	56.00	16.34	9.000	L1	OFF	9.7
3.9245	39.54	56.00	16.46	9.000	L1	OFF	9.7
3.9628	39.40	56.00	16.60	9.000	L1	OFF	9.7
4.0010	38.56	56.00	17.44	9.000	L1	OFF	9.7
11.8985	40.58	60.00	19.42	9.000	L1	OFF	9.9
14.2453	35.51	60.00	24.49	9.000	L1	OFF	9.9
14.3983	39.83	60.00	20.17	9.000	L1	OFF	9.9
14.4365	35.58	60.00	24.42	9.000	L1	OFF	9.9
14.4748	39.78	60.00	20.22	9.000	L1	OFF	9.9
14.5130	35.34	60.00	24.66	9.000	L1	OFF	9.9

Final_Result_CAV

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Test 2 / 2

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1635	40.13	55.28	15.15	9.000	L1	OFF	9.6
0.1905	38.89	54.02	15.13	9.000	L1	OFF	9.6
0.2175	38.56	52.91	14.35	9.000	L1	OFF	9.6
0.2445	36.75	51.94	15.19	9.000	L1	OFF	9.6
0.4088	39.79	47.67	7.88	9.000	L1	OFF	9.6
0.4358	41.57	47.14	5.57	9.000	L1	OFF	9.6
1.8253	34.55	46.00	11.45	9.000	L1	OFF	9.6
3.7310	30.40	46.00	15.60	9.000	L1	OFF	9.7
3.8458	32.73	46.00	13.27	9.000	L1	OFF	9.7
3.9245	31.67	46.00	14.33	9.000	L1	OFF	9.7
3.9628	31.35	46.00	14.65	9.000	L1	OFF	9.7
4.0010	30.51	46.00	15.49	9.000	L1	OFF	9.7
11.8985	25.46	50.00	24.54	9.000	L1	OFF	9.9
14.3218	32.55	50.00	17.45	9.000	L1	OFF	9.9
14.3983	31.39	50.00	18.61	9.000	L1	OFF	9.9
14.4365	33.33	50.00	16.67	9.000	L1	OFF	9.9
14.4748	30.38	50.00	19.62	9.000	L1	OFF	9.9
14.5130	30.94	50.00	19.06	9.000	L1	OFF	9.9

2021-02-17 오전 10:50:38

Conducted Emissions (Line 2)

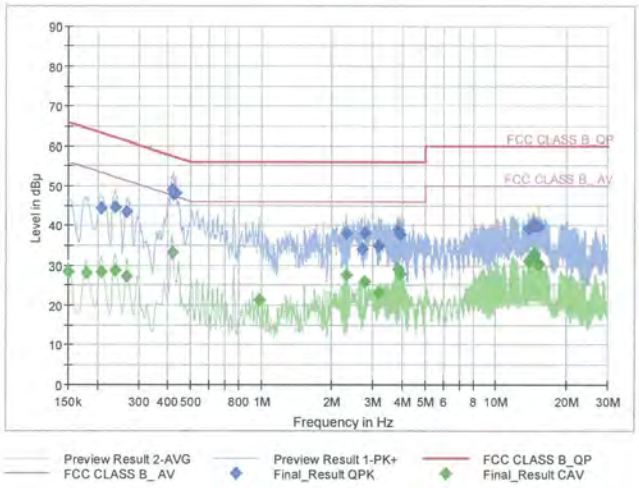
Test 1 / 2

Test Report

Common Information

EUT :	WL1SB21
Manufacturer :	LG Electronics, Inc.
Test Site:	SHIELD ROOM
Operating Conditions :	N
Operator Name:	
Comment:	

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak	Limit (dBuV	Margin	Bandwidth	Line	Filter	Corr. (dB)
0.2085	44.30	63.27	18.97	9.000	N	OFF	9.6
0.2378	44.68	62.17	17.49	9.000	N	OFF	9.6
0.2670	43.63	61.21	17.58	9.000	N	OFF	9.6
0.4155	49.08	57.54	8.46	9.000	N	OFF	9.6
0.4223	48.02	57.40	9.39	9.000	N	OFF	9.6
0.4313	48.07	57.23	9.16	9.000	N	OFF	9.6
2.2978	38.00	56.00	18.00	9.000	N	OFF	9.6
2.6960	34.18	56.00	21.82	9.000	N	OFF	9.7
2.7568	37.94	56.00	18.06	9.000	N	OFF	9.7
3.1550	34.97	56.00	21.03	9.000	N	OFF	9.7
3.8458	38.81	56.00	17.19	9.000	N	OFF	9.7
3.9223	37.87	56.00	18.13	9.000	N	OFF	9.7
13.8448	39.20	60.00	20.80	9.000	N	OFF	9.9
14.4590	40.31	60.00	19.69	9.000	N	OFF	9.9
14.4995	40.48	60.00	19.52	9.000	N	OFF	9.9
14.5355	40.71	60.00	19.29	9.000	N	OFF	9.9
14.5738	39.79	60.00	20.21	9.000	N	OFF	9.9
15.3073	39.71	60.00	20.29	9.000	N	OFF	9.9

Final_Result_CAV

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Test 2 / 2

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	28.64	56.00	27.36	9.000	N	OFF	9.6
0.1793	28.16	54.52	26.36	9.000	N	OFF	9.6
0.2085	28.54	53.27	24.73	9.000	N	OFF	9.6
0.2378	28.76	52.17	23.41	9.000	N	OFF	9.6
0.2670	27.33	51.21	23.88	9.000	N	OFF	9.6
0.4155	33.20	47.54	14.34	9.000	N	OFF	9.6
0.9793	21.21	46.00	24.79	9.000	N	OFF	9.6
2.2955	27.75	46.00	18.25	9.000	N	OFF	9.6
2.7568	26.07	46.00	19.93	9.000	N	OFF	9.7
3.1550	23.00	46.00	23.00	9.000	N	OFF	9.7
3.8458	29.21	46.00	16.79	9.000	N	OFF	9.7
3.9223	27.96	46.00	18.04	9.000	N	OFF	9.7
13.8448	31.21	50.00	18.79	9.000	N	OFF	9.9
14.4590	32.63	50.00	17.37	9.000	N	OFF	9.9
14.4973	32.64	50.00	17.36	9.000	N	OFF	9.9
14.5355	32.83	50.00	17.17	9.000	N	OFF	9.9
14.5738	32.29	50.00	17.71	9.000	N	OFF	9.9
15.3073	30.30	50.00	19.70	9.000	N	OFF	9.9

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10. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/04/2020	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/10/2020	Annual	100584
ESPAC	SU-642 /Temperature Chamber	03/15/2022	Annual	0093008124
Agilent	N9030A / Signal Analyzer	01/11/2021	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/02/2020	Annual	101231
Agilent	N1911A / Power Meter	04/07/2020	Annual	MY45100523
Keysight	N1921A / Power Sensor	06/08/2020	Annual	MY57820067
Agilent	87300B / Directional Coupler	11/10/2020	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	05/25/2020	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/12/2020	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	06/26/2020	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	N/A	N/A
Rohde & Schwarz	CBT / Bluetooth Tester	05/12/2020	Annual	100422
Agilent	11636A / Power Divider	07/24/2020	Annual	9109
Agilent	N5182A / Vector Signal Generator	08/26/2020	Annual	MY50140312

Note:
1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

Radiated Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Emco	2090 / Controller	N/A	N/A	060520
Ets	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	05/18/2020	Biennial	1513-175
Schwarzbeck	VULB 9160 / Hybrid Antenna	08/19/2020	Biennial	9160-3368
Schwarzbeck	VULB 9168 / Hybrid Antenna	09/04/2020	Biennial	9168-0895
Schwarzbeck	BBHA 9120D / Horn Antenna	11/18/2019	Biennial	9120D-1191
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	11/29/2019	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	09/14/2020	Annual	836650/016
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/22/2020	Annual	101068-SZ
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/06/2021	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/08/2021	Annual	1
CERNEX WEINSCHEL	CBLU1183540B-01/Broadband Bench Top LNA 56-10 / Attenuator(10 dB)	12/23/2020	Annual	N/A
CERNEX Api tech.	CBL06185030 / Broadband Low Noise Amplifier 18B-03 / Attenuator (3 dB)	12/23/2020	Annual	N/A
Wainwright Instruments	WHKX10-2700-3000-18000-40SS / High Pass Filter	12/23/2020	Annual	N/A
Wainwright Instruments	WHKX8-6090-7000-18000-40SS / High Pass Filter	12/23/2020	Annual	N/A
T&M SYSTEM	COAXIAL ATTENUATOR / Thru	12/23/2020	Annual	N/A
CERNEX	CBL18265035 / Power Amplifier	12/04/2020	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2020	Annual	25956

Note:
1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).

11. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2103-FI010-P