FCC RADIO TEST REPORT

FCC ID	:	**MMATC150**
Equipment	:	**Midland Wireless Audio System - Headset**
Brand Name	:	**Midland TeamComm®**
Model Name	:	**TC150**
Marketing Name	:	**Midland TeamComm® Headset**
Applicant	:	**Midland Radio** **5900 Parretta Drive Kansas City, MO 64120**
Manufacturer	:	**Midland Radio** **5900 Parretta Drive Kansas City, MO 64120**
Standard	:	**FCC Part 15 Subpart C §15.247**

The product was received on May 25, 2021 and testing was started from May 25, 2021 and completed on Jul. 14, 2021. We, Sporton International (USA) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (USA) Inc., the test report shall not be reproduced except in full.

Approved by: Neil Kao

Sporton International (USA) Inc.
1175 Montague Expressway, Milpitas, CA 95035

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR210525002	01	Initial issue of report	Jul. 29, 2021

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(1)	Number of Channels	Pass	-
3.2	15.247(a)(1)	Hopping Channel Separation	Pass	-
3.3	15.247(a)(1)	Dwell Time of Each Channel	Pass	-
3.4	15.247(a)(1)	20dB Bandwidth	Pass	-
3.4	2.1049	99% Occupied Bandwidth	Reporting only	-
3.5	15.247(b)(1)	Peak Output Power	Pass	-
3.6	15.247(d)	Conducted Band Edges	Pass	-
3.7	15.247(d)	Conducted Spurious Emission	Pass	-
3.8	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 6.02 dB at 2486.160 MHz
3.9	15.207	AC Conducted Emission	Pass	Under limit 18.40 dB at 0.157 MHz
3.10	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Product Feature of Equipment Under Test

2.4GHz Proprietary Radio

Product Specification subjective to this standard	
Antenna Type	Monopole Antenna

Antenna information		
2400 MHz ~ 2483.5 MHz	Peak Gain (dBi)	-1.0

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

1.2 Modification of EUT

No modifications are made to the EUT during all test items.

1.3 Testing Location

Test Site	Sporton International (USA) Inc.
Test Site Location	1175 Montague Expressway, Milpitas, CA 95035 TEL : 408 9043300
Test Site No.	**Sporton Site No.**
	TH01-CA, CO01-CA, 03CH02-CA

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	15	2440
	2	2414	16	2442
	3	2416	17	2444
	4	2418	18	2446
	5	2420	19	2448
	6	2422	20	2450
	7	2424	21	2452
	8	2426	22	2454
	9	2428	23	2456
	10	2430	24	2458
	11	2432	25	2460
	12	2434	26	2462
	13	2436	27	2464
	14	2438		

2.2 Test Mode

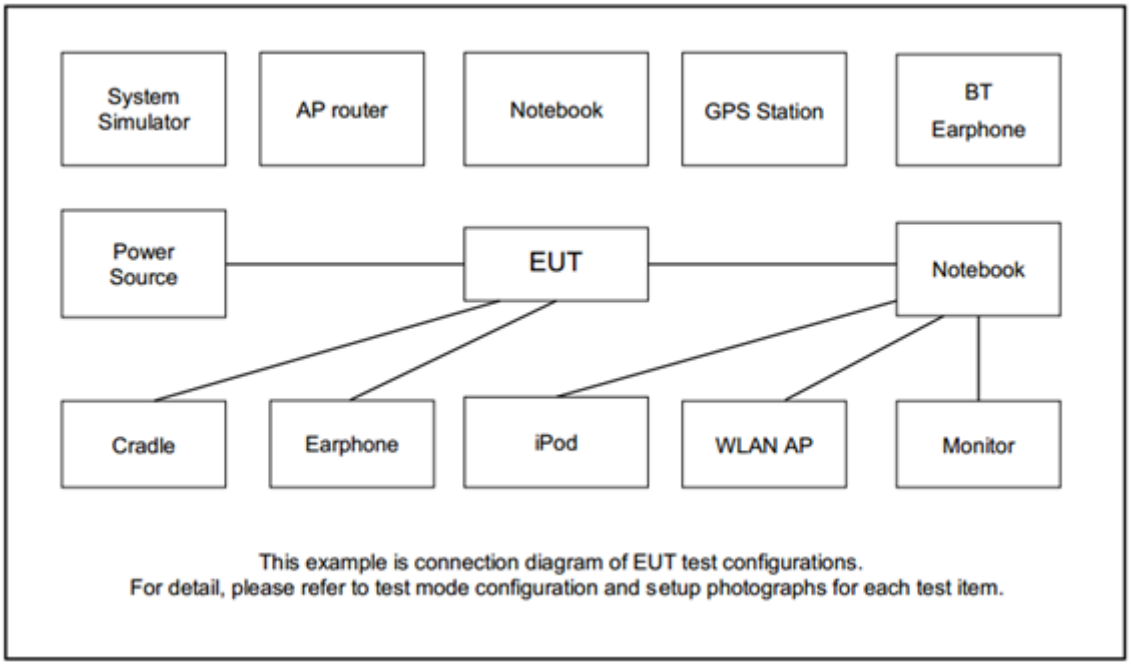
a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). The measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find X plane as worst plane.

b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	**Data Rate / Modulation**
Conducted Test Cases	**2.4GHz Proprietary Radio FHSS**
	Mode 1: CH05_2412 MHz Mode 2: CH18_2438 MHz Mode 3: CH31_2464 MHz
Radiated Test Cases	**2.4GHz Proprietary Radio FHSS**
	Mode 1: CH05_2412 MHz Mode 2: CH18_2438 MHz Mode 3: CH31_2464 MHz
AC Conducted Emission	Mode 1 : EUT with 6-Earbud Charger + 2.4GHz Proprietary Radio Link with Repeater + AC Adapter Mode 2 EUT with 2-Earbud Charger + 2.4GHz Proprietary Radio Link with Repeater + AC Adapter
Remark: The worst case of conducted emission is mode 1; only the test data of it was reported.	

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Repeater	Midland Radio	TRP150	MMATRP150	N/A	N/A
2.	6-earbud charge	Midland Radio	TGC150	MMATGC150	N/A	N/A
3.	2-earbud charge	Midland Radio	TGC150	MMATDC150	N/A	N/A
4.	AC adapter	Midland Radio	HT-0051500R00USH	N/A	N/A	1 meter, non-shielded cable, w/o ferrite core

2.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

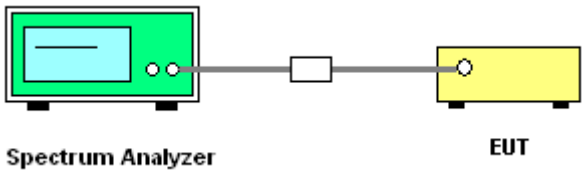
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW = 300 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

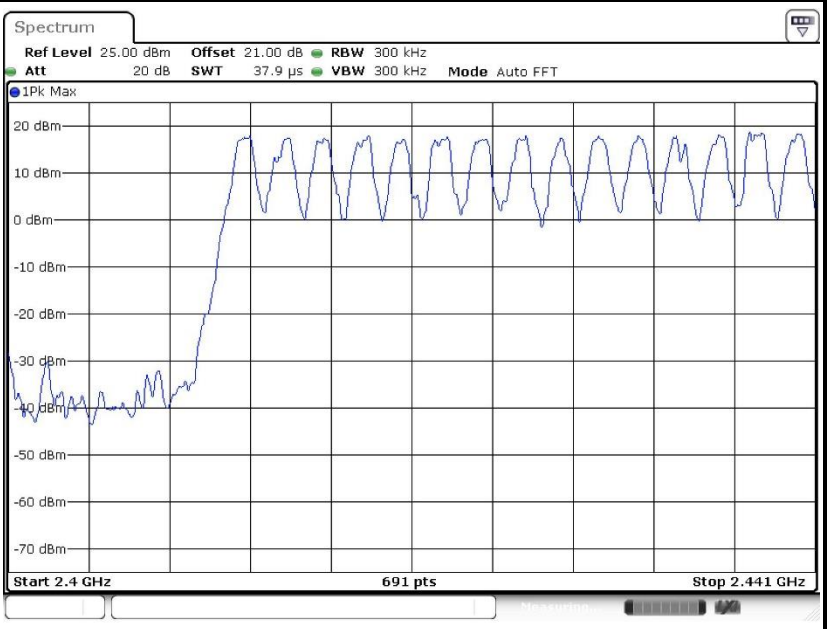
3.1.4 Test Setup



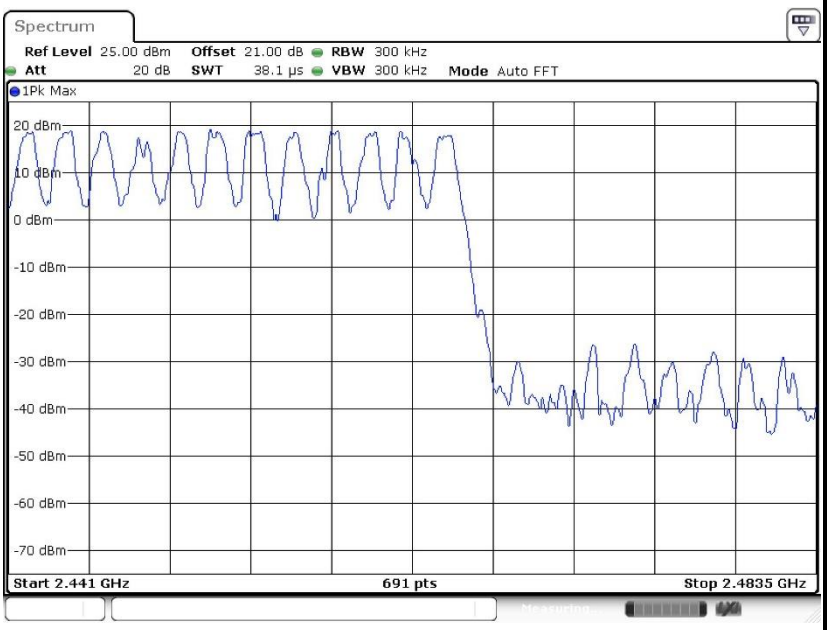
3.1.5 Test Result of Number of Hopping Frequency

Please refer to Appendix A.

Number of Hopping Channel Plot on Channel 01 - 27



Date: 2.JUL.2021 19:46:55



Date: 2.JUL.2021 19:49:54

3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

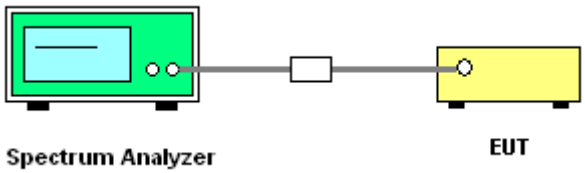
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.2.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels;
   RBW = 300 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Hopping Channel Separation

Please refer to Appendix A.

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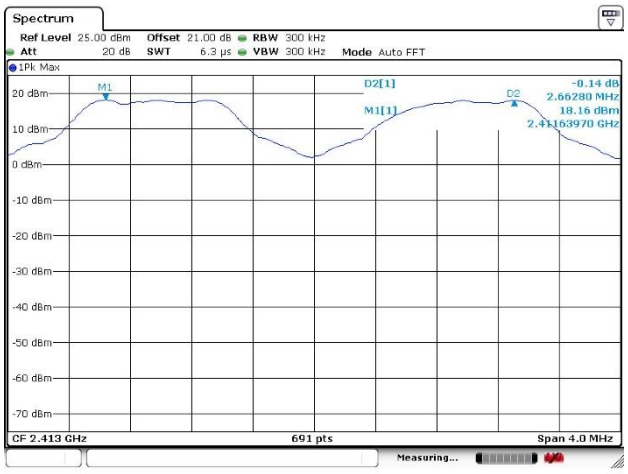
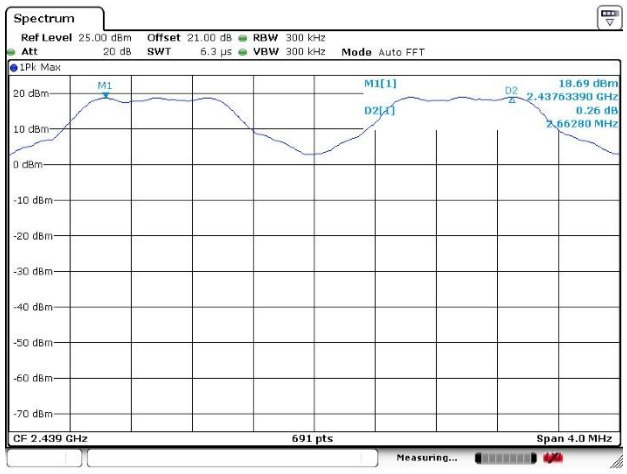
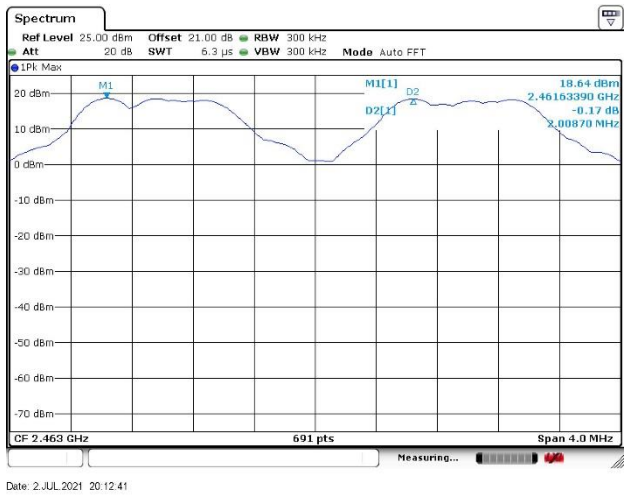
Channel Separation Plot on Channel 01 - 02	Channel Separation Plot on Channel 14 - 15
	
Channel Separation Plot on Channel 26 - 27	**N/A**
	

3.3 Dwell Time Measurement

3.3.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

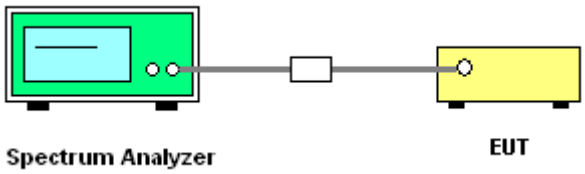
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

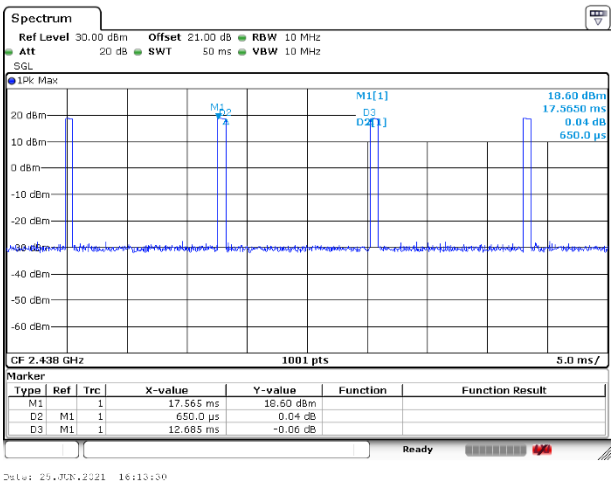
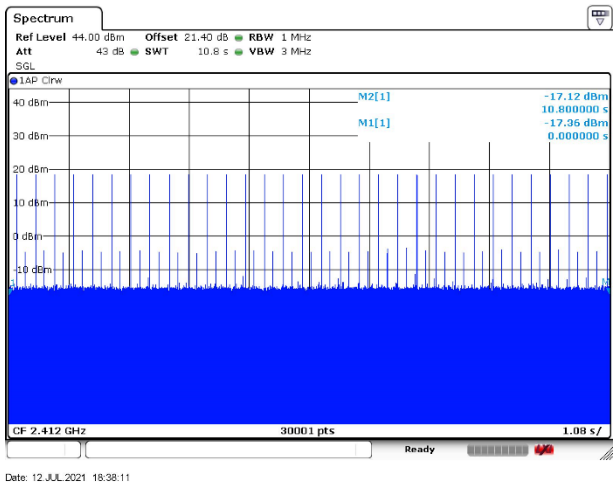
1. The testing follows ANSI C63.10-2013 clause 7.8.4.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.3.4 Test Setup



3.3.5 Test Result of Dwell Time

Please refer to Appendix A.

Package transfer time = 0.65 msec	Hops on observation time = 32
	

Remark:

1. EUT hopping on 27 channels.
2. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
3. Observation period = 27 channel x 0.4 second = 10.8 seconds.
4. Dwell time = Package transfer time x Hops on observation time = 0.65 x 32 = 20.8 msec

3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Use the following spectrum analyzer settings for 20 dB Bandwidth measurement.
   Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel;
   RBW ≥ 1% of the 20 dB bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
5. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
   Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel;
   RBW ≥ 1-5% of the 99% bandwidth; VBW ≥ 3 * RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
6. Measure and record the results in the test report.

3.4.4 Test Setup

3.4.5 Test Result of 20dB Bandwidth

Please refer to Appendix A.

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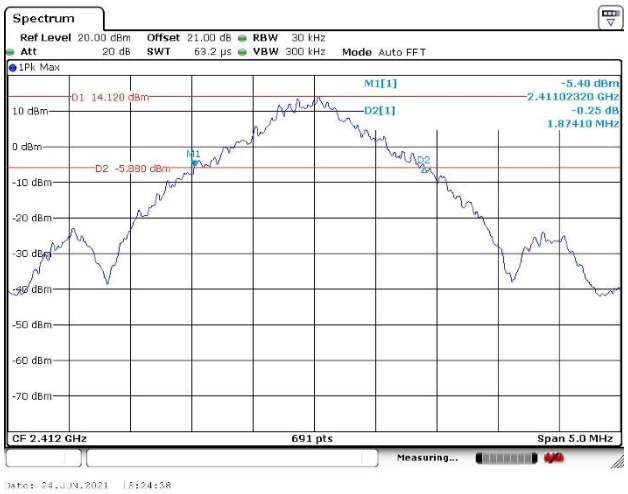
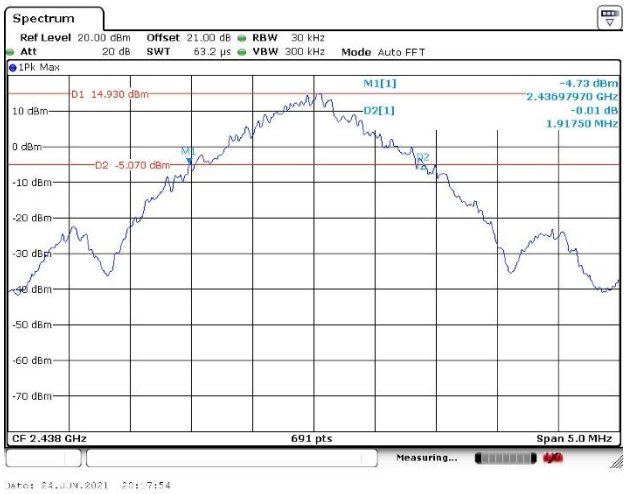
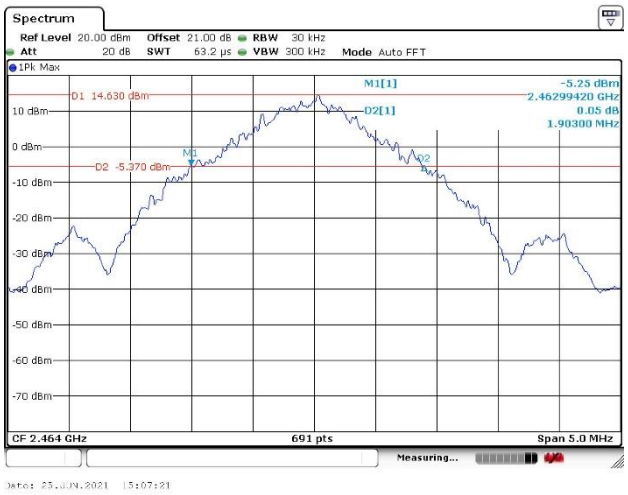
	
20 dB Bandwidth Plot on Channel 27	**N/A**
	

3.4.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

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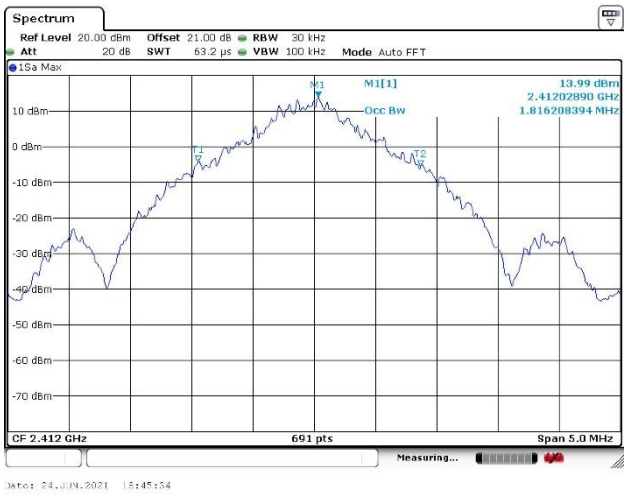
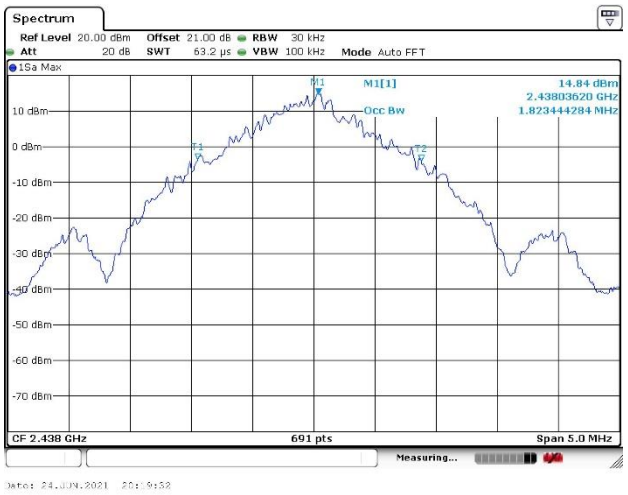
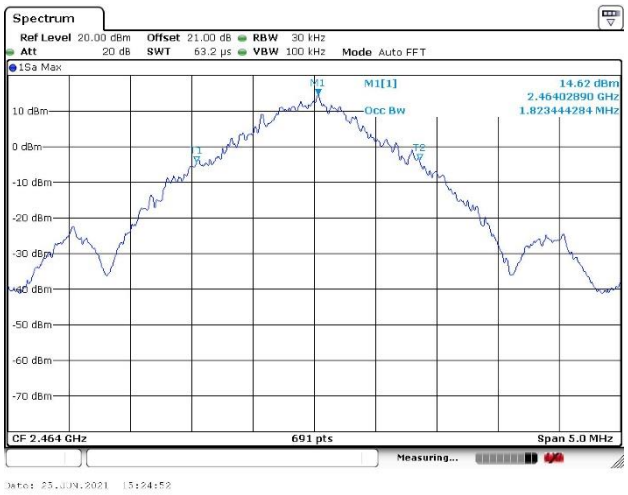
99% Occupied Bandwidth Plot on Channel 01	99% Occupied Bandwidth Plot on Channel 14
	
99% Occupied Bandwidth Plot on Channel 27	**N/A**
	

Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.5 Output Power Measurement

3.5.1 Limit of Output Power

The maximum peak conducted output power of the intentional radiator shall not exceed the following: For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.

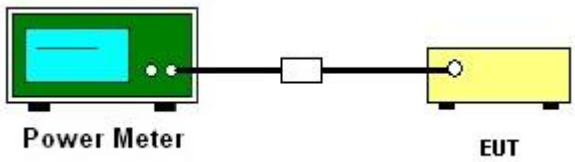
3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.5.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

3.5.4 Test Setup



3.5.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.5.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.

3.6 Conducted Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

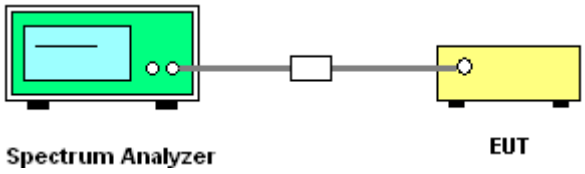
3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

3.6.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.6.
2. Set the maximum power setting and enable the EUT to transmit continuously.
3. Set RBW = 100 kHz, VBW = 300 kHz. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2 and 3.
5. Measure and record the results in the test report.

3.6.4 Test Setup



3.6.5 Test Result of Conducted Band Edges

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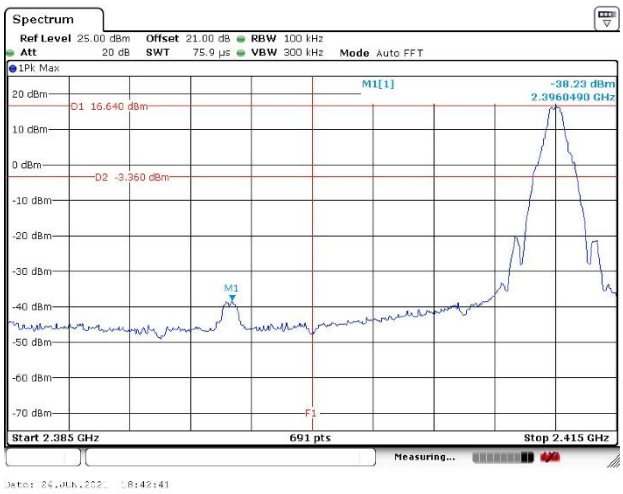
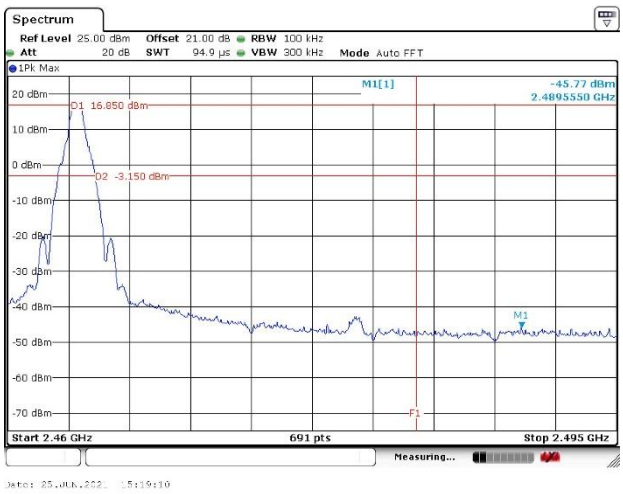
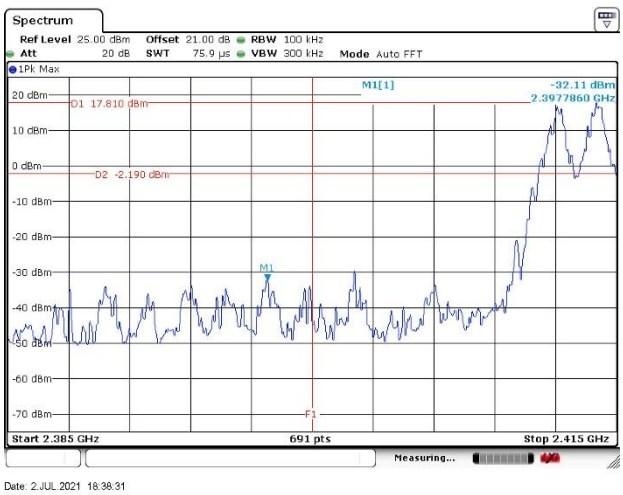
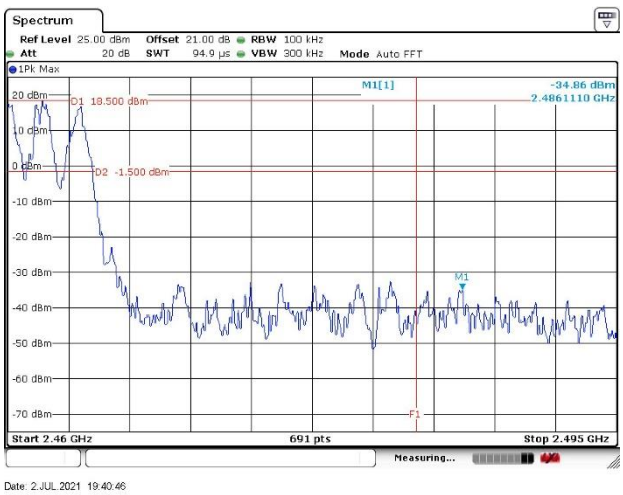
Low Band Edge Plot on Channel 01	High Band Edge Plot on Channel 27
	

3.6.6 Test Result of Conducted Hopping Mode Band Edges

<2Mbps>

Hopping Mode Low Band Edge Plot	Hopping Mode High Band Edge Plot
	

3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

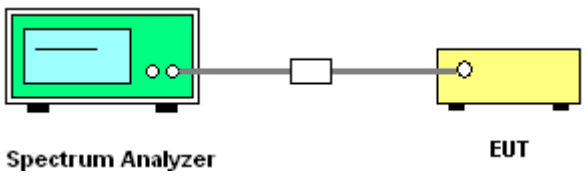
3.7.2 Measuring Instruments

See list of measuring equipment of this test report.

3.7.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.8.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Set RBW = 100 kHz, VBW = 300 kHz, scan up through 10th harmonic. All harmonics / spurious must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.7.4 Test Setup



3.7.5 Test Result of Conducted Spurious Emission

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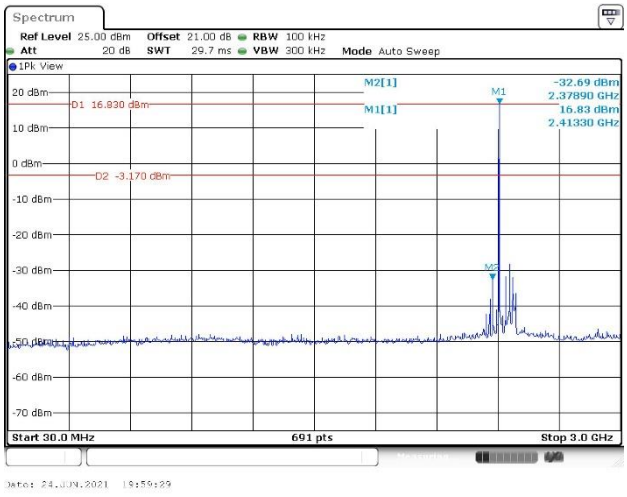
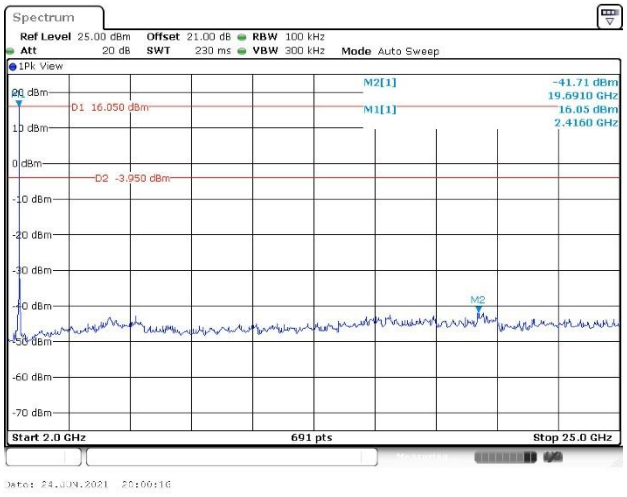
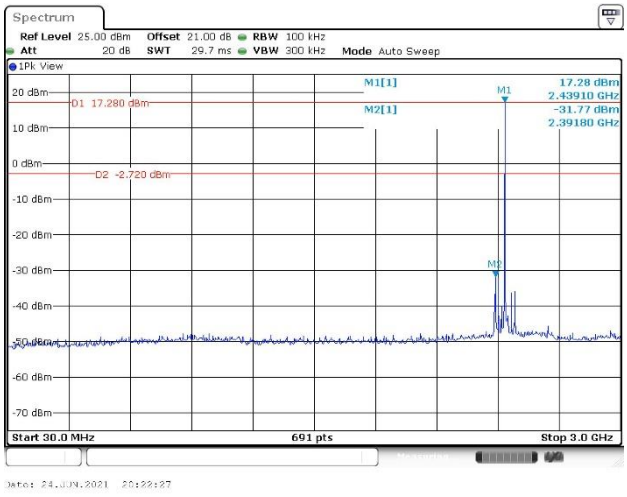
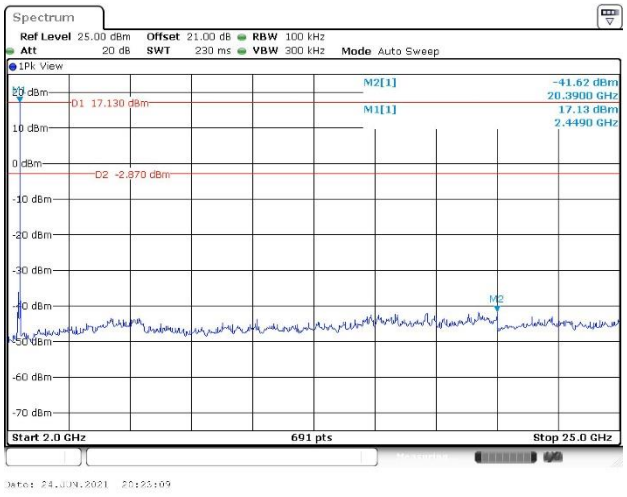
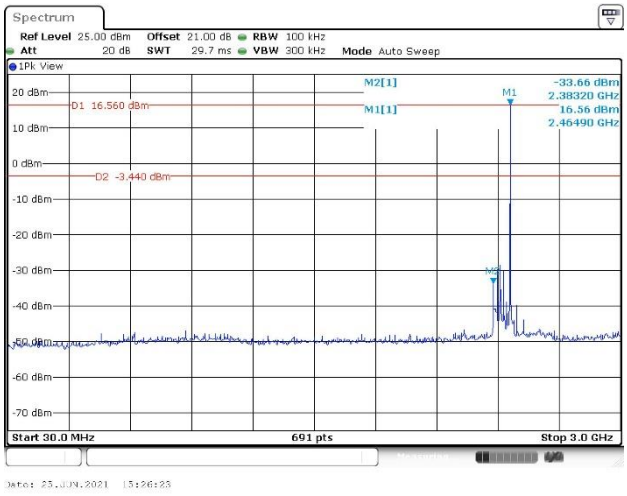
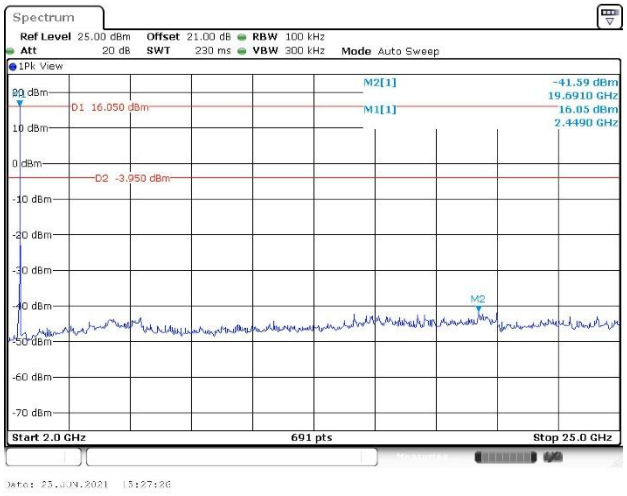
CSE Plot on CH 01 between 30 MHz ~ 3 GHz	CSE Plot on CH 01 between 2 GHz ~ 25 GHz
	
CSE Plot on CH 14 between 30 MHz ~ 3 GHz	**CSE Plot on CH 14 between 2 GHz ~ 25 GHz**
	

CSE Plot on CH 27 between 30 MHz ~ 3 GHz	CSE Plot on CH 27 between 2 GHz ~ 25 GHz
	

3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics / spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.8.2 Measuring Instruments

See list of measuring equipment of this test report.

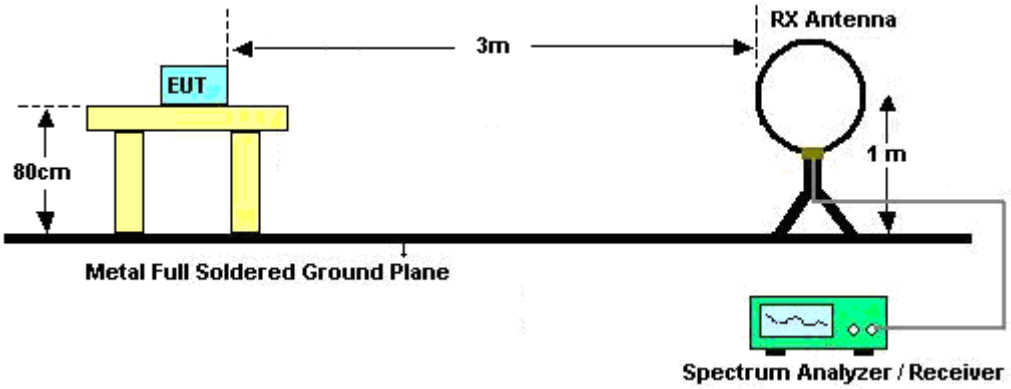
3.8.3 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set the maximum power setting and enable the EUT to transmit continuously.
5. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW = 100 kHz for f < 1 GHz, RBW = 1 MHz for f>1 GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
   (3) For average measurement: use duty cycle correction factor method per 15.35(c).
   Duty cycle = On time/100 milliseconds
   On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$
   Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
   Average Emission Level = Peak Emission Level + 20*log(Duty cycle)
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
7. For testing below 1 GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
8. For testing above 1 GHz, the emission level of the EUT in peak mode was 20 dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

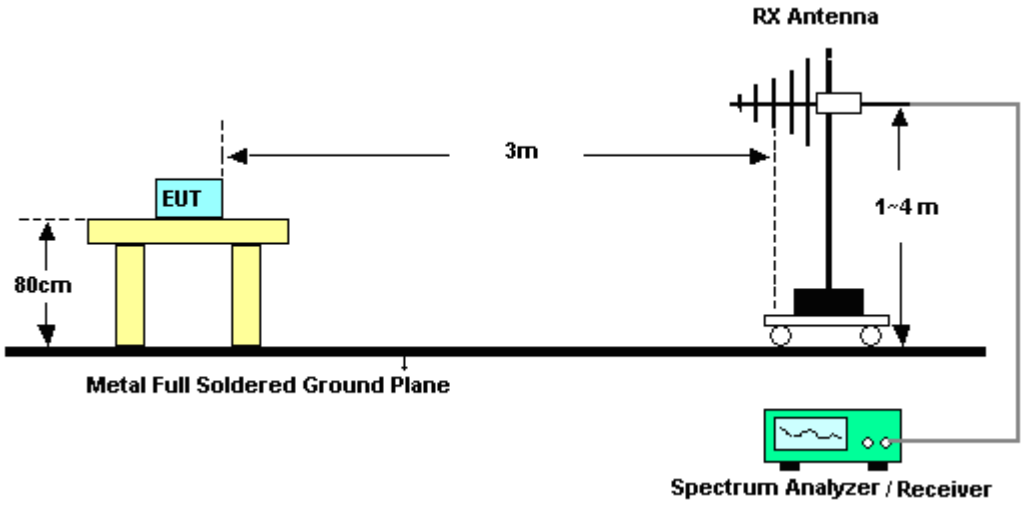
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-26.50dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

3.8.4 Test Setup

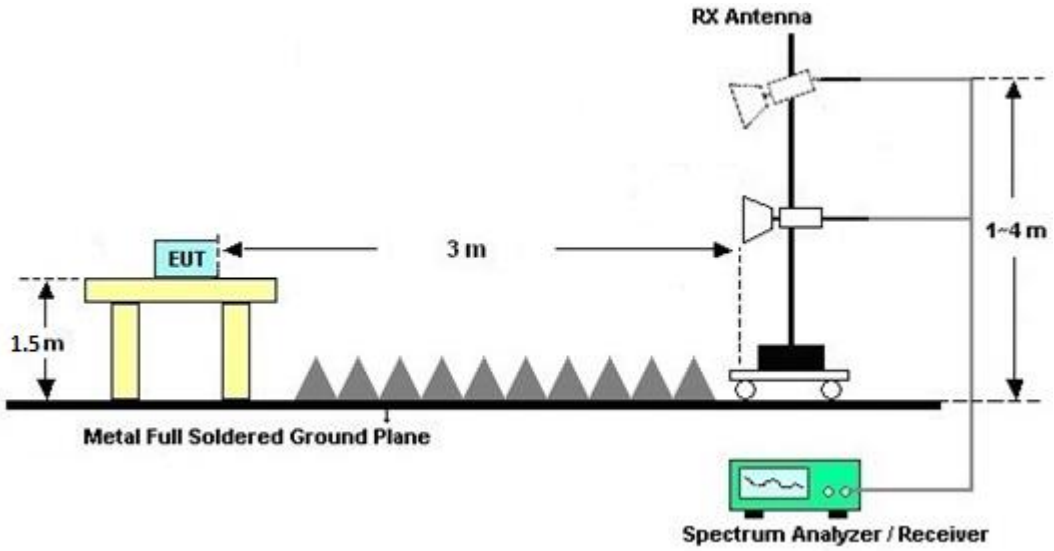
For radiated test below 30MHz



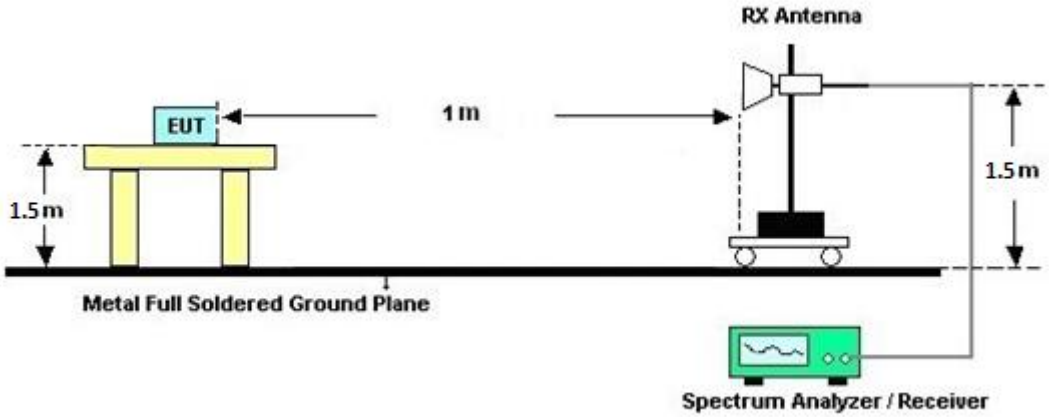
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



3.8.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.8.7 Duty Cycle

Please refer to Appendix E.

3.8.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C and D.

3.9 AC Conducted Emission Measurement

3.9.1 Limit of AC Conducted Emission

For equipment 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.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

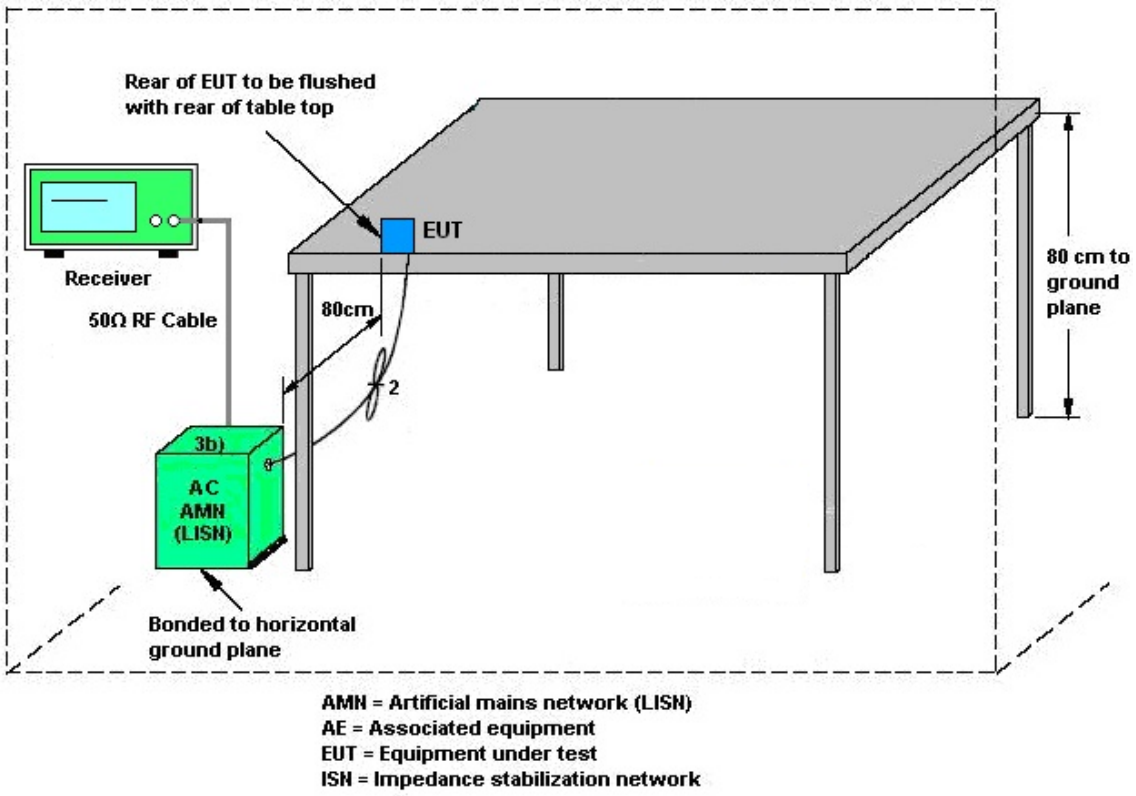
3.9.2 Measuring Instruments

See list of measuring equipment of this test report.

3.9.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN shall be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.9.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.9.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.10 Antenna Requirements

3.10.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. 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 rule.

3.10.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.10.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Bilog Antenna	TESEQ	6111D	50391	30MHz~1GHz	Jul. 06, 2020	Jun. 28, 2021~ Jun. 30, 2021	Jul. 05, 2021	Radiation (03CH02-CA)
Bilog Antenna	TESEQ	6111D	50392	30MHz~1GHz	Jul. 29, 2020	Jun. 30, 2021~ Jul. 14, 2021	Jul. 28, 2021	Radiation (03CH02-CA)
Horn Antenna	SCHWARZBECK	BBHA 9120D	01895	1GHz~18GHz	Aug. 28, 2020	Jun. 28, 2021~ Jul. 14, 2021	Aug. 27, 2021	Radiation (03CH02-CA)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00842	18GHz~40GHz	Jul. 27, 2020	Jun. 28, 2021~ Jul. 14, 2021	Jul. 26, 2021	Radiation (03CH02-CA)
Preamplifier	SONOMA	310N	372240	N/A	Aug. 12, 2020	Jun. 28, 2021~ Jul. 14, 2021	Aug. 11, 2021	Radiation (03CH02-CA)
Preamplifier	Keysight	83017A	MY53270323	1GHz~26.5GHz	Jul. 28, 2020	Jun. 28, 2021~ Jul. 14, 2021	Jul. 27, 2021	Radiation (03CH02-CA)
Preamplifier	E-instrument	ERA-100M-18G-56-01-A70	EC1900251	N/A	Mar. 30, 2021	Jun. 28, 2021~ Jul. 14, 2021	Mar. 29, 2022	Radiation (03CH02-CA)
Preamplifier	EMEC	EMC18G40G	060725	18G-40G	Aug. 07, 2020	Jun. 28, 2021~ Jul. 14, 2021	Aug. 06, 2021	Radiation (03CH02-CA)
Spectrum Analyzer	Keysight	N9010A	MY57420221	10Hz~44GHz	Sep. 11, 2020	Jun. 28, 2021~ Jul. 14, 2021	Sep. 10, 2021	Radiation (03CH02-CA)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN10	3G High Pass	Jul. 24, 2020	Jun. 28, 2021~ Jul. 14, 2021	Jul. 23, 2021	Radiation (03CH02-CA)
Filter	Wainwright	WLK12-1200-1272-11000-40SS	SN2	1.2G Low Pass	Jul. 24, 2020	Jun. 28, 2021~ Jul. 14, 2021	Jul. 23, 2021	Radiation (03CH02-CA)
Hygrometer	TESEO	608-H1	45142602	N/A	Aug. 05, 2020	Jun. 28, 2021~ Jul. 14, 2021	Aug. 04, 2021	Radiation (03CH02-CA)
Controller	ChainTek	3000-1	N/A	Control Turn table & Ant Mast	N/A	Jun. 28, 2021~ Jul. 14, 2021	N/A	Radiation (03CH02-CA)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Jun. 28, 2021~ Jul. 14, 2021	N/A	Radiation (03CH02-CA)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Jun. 28, 2021~ Jul. 14, 2021	N/A	Radiation (03CH02-CA)
Software	Audix	E3	N/A	N/A	N/A	Jun. 28, 2021~ Jul. 14, 2021	N/A	Radiation (03CH02-CA)
LISN	TESEQ	NNB51	47407	N/A	Jul. 06, 2020	Jun. 30, 2021~ Jul. 04, 2021	Jul. 05, 2021	Conduction (CO01-CA)
LISN	TESEQ	NNB51	47415	N/A	Jun. 30, 2021	Jul. 05, 2021~ Jul. 09, 2021	Jun. 29, 2022	Conduction (CO01-CA)
EMI Test Receiver	R&S	ESR7	102177	9KHz~7GHz	Jul. 16, 2020	Jun. 30, 2021~ Jul. 09, 2021	Jul. 15, 2021	Conduction (CO01-CA)
Pulse limiter with 10dB attenuation	R&S	VTSD 9561-F N	9561-F-N00412	N/A	Jul. 08, 2020	Jun. 30, 2021~ Jul. 06, 2021	Jul. 07, 2021	Conduction (CO01-CA)
Pulse limiter with 10dB attenuation	R&S	VTSD 9561-F N	9561-F-N00412	N/A	Jul. 06, 2021	Jul. 07, 2021~ Jul. 09, 2021	Jul. 05, 2022	Conduction (CO01-CA)
Test Software	R&S	EMC32 V10.30.0	N/A	N/A	N/A	Jun. 30, 2021~ Jul. 09, 2021	N/A	Conduction (CO01-CA)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H1	45142595	N/A	Aug. 05, 2020	May 25, 2021~ Jul. 02, 2021	Aug. 04, 2021	Conducted (TH01-CA)
Power meter	Anritsu	ML2495A	1804004	N/A	Aug. 10, 2020	May 25, 2021~ Jul. 02, 2021	Aug. 09, 2021	Conducted (TH01-CA)
Power Sensor	Anritsu	MA2411B	1726149	300MHz-40GHz	Aug. 10, 2020	May 25, 2021~ Jul. 02, 2021	Aug. 09, 2021	Conducted (TH01-CA)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101089	10Hz-40GHz	Sep. 14, 2020	May 25, 2021~ Jul. 02, 2021	Sep. 13, 2021	Conducted (TH01-CA)
Switch Box & RF Cable	EM Electronics	EMSW26	1090304	N/A	Dec. 30, 2020	May 25, 2021~ Jul. 02, 2021	Dec. 29, 2021	Conducted (TH01-CA)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.2 dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.5 dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**6.1 dB**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**6.5 dB**

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Andy Kao	Temperature:	18.1~25.1	°C
Test Date:	2021/5/25-2021/7/2	Relative Humidity:	31.3~52.9	%

TEST RESULTS DATA
20dB and 99% Occupied Bandwidth and Hopping Channel Separation

Data Rate	NTX	CH.	Freq. (MHz)	20db BW (MHz)	99% Bandwidth (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
2Mbps	1	1	2412	1.874	1.816	2.663	1.2494	Pass
2Mbps	1	14	2438	1.918	1.823	2.663	1.2783	Pass
2Mbps	1	27	2464	1.903	1.823	2.009	1.2687	Pass

TEST RESULTS DATA
Dwell Time

Mod.	Hopping Channel Number Rate	Hops Over Occupancy Time(hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Nomal	27	32	0.65	0.02080	0.4	Pass

TEST RESULTS DATA
Peak Power Table

CH.	NTX	Peak Power (dBm)	Power Limit (dBm)	Test Result
1	1	17.33	20.97	Pass
14	1	**18.01**	20.97	Pass
27	1	17.60	20.97	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

CH.	NTX	Average Power (dBm)	Duty Factor (dB)
1	1	17.17	0.00
14	1	**17.85**	0.00
27	1	17.43	0.00

TEST RESULTS DATA
Number of Hopping Frequency

Number of Hopping (Channel)	Limits (Channel)	Pass/Fail
27	> 15	Pass

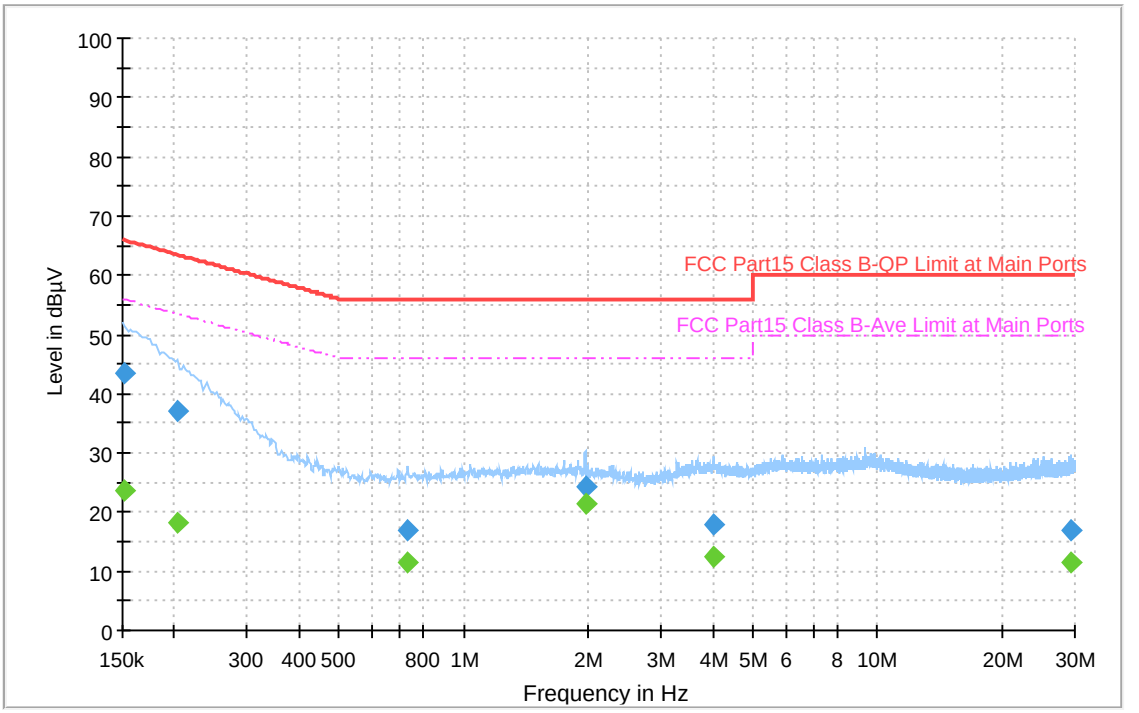
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Jordan Huang	**Temperature :**	24℃
		Relative Humidity :	45%

EUT Information

Site:	CO01-CA
Power:	120Vac/60Hz
Mode:	1
	Earbud Link + Repeater Link + 6-earbud charge with AC adapter

Full Spectrum



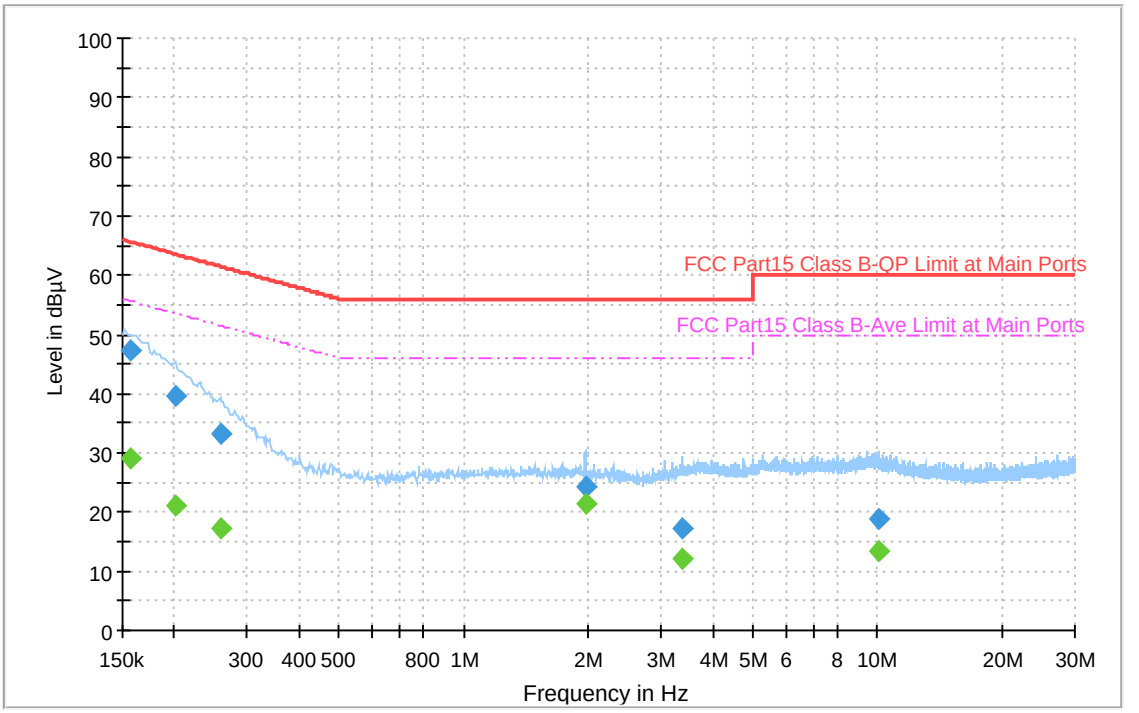
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	23.76	55.88	32.12	L1	OFF	20.3
0.152250	43.47	---	65.88	22.41	L1	OFF	20.3
0.204000	---	18.21	53.45	35.24	L1	OFF	20.3
0.204000	36.92	---	63.45	26.53	L1	OFF	20.3
0.732750	---	11.55	46.00	34.45	L1	OFF	20.3
0.732750	16.80	---	56.00	39.20	L1	OFF	20.3
1.965750	---	21.41	46.00	24.59	L1	OFF	20.3
1.965750	24.32	---	56.00	31.68	L1	OFF	20.3
4.020000	---	12.51	46.00	33.49	L1	OFF	20.4
4.020000	17.85	---	56.00	38.15	L1	OFF	20.4
29.222250	---	11.62	50.00	38.38	L1	OFF	20.7
29.222250	16.80	---	60.00	43.20	L1	OFF	20.7

EUT Information

Site:	CO01-CA
Power:	120Vac/60Hz
Mode:	1
	Earbud Link + Repeater Link + 6-earbud charge with AC adapter

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	---	29.11	55.63	26.52	N	OFF	20.3
0.156750	47.23	---	65.63	18.40	N	OFF	20.3
0.201750	---	20.99	53.54	32.55	N	OFF	20.3
0.201750	39.60	---	63.54	23.94	N	OFF	20.3
0.258000	---	17.18	51.50	34.32	N	OFF	20.3
0.258000	33.34	---	61.50	28.16	N	OFF	20.3
1.965750	---	21.50	46.00	24.50	N	OFF	20.3
1.965750	24.21	---	56.00	31.79	N	OFF	20.3
3.378750	---	11.99	46.00	34.01	N	OFF	20.4
3.378750	17.39	---	56.00	38.61	N	OFF	20.4
10.011750	---	13.37	50.00	36.63	N	OFF	20.5
10.011750	18.80	---	60.00	41.20	N	OFF	20.5

Appendix C. Radiated Spurious Emission

Test Engineer :	Michael Bui	Temperature :	17~23C
		Relative Humidity :	42~48%

2.4GHz 2400~2483.5MHz

Proprietary 2.4G (2M) (Band Edge @ 3m)

2.4GHz	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Proprietary 2.4G (2M) 2412MHz		2364.18	57.31	-16.69	74	43.52	27.68	17.51	31.4	100	1	P	H
		2364.18	30.81	-23.19	54	-	-	-	-	-	-	A	H
	*	2412	105.08	-	-	91.25	27.6	17.59	31.36	100	1	P	H
	*	2412	78.58	-	-	-	-	-	-	-	-	A	H
												P	H
												A	H
		2380.035	58.25	-15.75	74	44.42	27.67	17.54	31.38	101	243	P	V
		2380.035	31.75	-22.25	54	-	-	-	-	-	-	A	V
	*	2412	109.2	-	-	95.43	27.54	17.59	31.36	101	243	P	V
	*	2412	82.70	-	-	-	-	-	-	-	-	A	V
												P	V
												A	V
Proprietary 2.4G (2M) 2438MHz		2389.95	60.48	-13.52	74	46.67	27.63	17.55	31.37	114	8	P	H
		2389.95	33.98	-20.02	54	-	-	-	-	-	-	A	H
	*	2438	107.78	-	-	93.9	27.59	17.65	31.36	114	8	P	H
	*	2438	81.28	-	-	-	-	-	-	-	-	A	H
		2486	63.82	-10.18	74	49.86	27.56	17.75	31.35	114	8	P	H
		2486	37.32	-16.68	54	-	-	-	-	-	-	A	H
		2389.65	62.91	-11.09	74	49.1	27.63	17.55	31.37	100	166	P	V
		2389.65	36.41	-17.59	54	-	-	-	-	-	-	A	V
	*	2438	112.38	-	-	98.64	27.45	17.65	31.36	100	166	P	V
	*	2438	85.88	-	-	-	-	-	-	-	-	A	V
		2486.16	67.98	-6.02	74	54.19	27.39	17.75	31.35	100	166	P	V
		2486.16	41.48	-12.52	54	-	-	-	-	-	-	A	V

Proprietary 2.4G (2M) 2464MHz	*	2464	108.55	-	-	94.61	27.58	17.71	31.35	110	0	P	H
	*	2464	82.05	-	-	-	-	-	-	-	-	A	H
		2495.6	61.67	-12.33	74	47.68	27.56	17.77	31.34	110	0	P	H
		2495.6	35.17	-18.83	54	-	-	-	-	-	-	A	H
												P	H
												A	H
	*	2464	112.32	-	-	98.55	27.41	17.71	31.35	127	239	P	V
	*	2464	85.82	-	-	-	-	-	-	-	-	A	V
		2495.84	63.71	-10.29	74	49.89	27.39	17.77	31.34	127	239	P	V
		2495.84	37.21	-16.79	54	-	-	-	-	-	-	A	V
												P	V
												A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

Proprietary 2.4G (2M) (Harmonic @ 3m)

2.4GHz	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
Proprietary 2.4G (2M) 2412MHz		4824	52.57	-21.43	74	77.82	31.39	11.55	68.19	100	0	P	H
		4824	26.07	-27.93	54	-	-	-	-	-	-	A	H
		7236	45.36	-28.64	74	62.15	36.25	13.77	66.81	100	0	P	H
													H
													H
													H
													H
													H
		4824	49.00	-25.00	74	74.24	31.4	11.55	68.19	100	0	P	V
													V
		7236	44.87	-29.13	74	61.75	36.16	13.77	66.81	100	0	P	V
													V
													V
													V
													V
													V
Proprietary 2.4G (2M) 2438MHz		4876	52.44	-21.56	74	77.56	31.36	11.68	68.16	100	0	P	H
		4876	25.94	-28.06	54	-	-	-	-	-	-	A	H
		7314	45.4	-28.6	74	62	36.35	13.87	66.82	100	0	P	H
													H
													H
													H
													H
		4876	49.25	-24.75	74	74.43	31.3	11.68	68.16	100	0	P	V
													V
		7314	45.58	-28.42	74	62.13	36.4	13.87	66.82	100	0	P	V
													V
													V
													V

Proprietary 2.4G (2M) 2464MHz		4928	49.21	-24.79	74	74.27	31.38	11.68	68.12	100	0	P	H
													H
		7392	47.28	-26.72	74	63.7	36.48	13.93	66.83	100	0	P	H
													H
		9856	49.86	-24.14	74	63.71	39.12	15.94	68.91	100	0	P	H
													H
													H
		4928	47.42	-26.58	74	72.58	31.28	11.68	68.12	100	0	P	V
													V
		7392	46.69	-27.31	74	63.03	36.56	13.93	66.83	100	0	P	V
													V
		9856	51.00	-23.00	74	64.84	39.13	15.94	68.91	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission above 18GHz

Proprietary 2.4G (2M) (SHF)

2.4GHz	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Proprietary 2.4G (2M) SHF		19504	42.69	-31.31	74	45.24	37.57	23.02	53.6	100	0	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		19504	50.33	-23.67	74	52.78	37.67	23.02	53.6	100	0	P	V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Emission below 1GHz

Proprietary 2.4G (2M) (LF)

2.4GHz	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Proprietary 2.4G (2M) LF		43.58	27.6	-12.4	40	41.24	17.65	1.15	32.44	-	-	P	H
		50.37	20.71	-19.29	40	37.81	14.11	1.23	32.44	-	-	P	H
		105.66	18.88	-24.62	43.5	32.9	16.67	1.73	32.42	-	-	P	H
		955.38	33.34	-12.66	46	28.2	31.1	5.25	31.21	-	-	P	H
		965.08	33.44	-20.56	54	28.26	31	5.29	31.11	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
		36.79	25.86	-14.14	40	35.84	21.43	1.03	32.44	-	-	P	V
		43.58	32.61	-7.39	40	46.25	17.65	1.15	32.44	-	-	P	V
		51.34	28.38	-11.62	40	45.92	13.66	1.24	32.44	-	-	P	V
		69.77	21.93	-18.07	40	40.6	12.28	1.48	32.43	-	-	P	V
		105.66	17.21	-26.29	43.5	31.23	16.67	1.73	32.42	-	-	P	V
		946.65	34.15	-11.85	46	29.5	30.73	5.21	31.29	-	-	P	V
		993.21	33.71	-20.29	54	28.62	30.57	5.38	30.86	-	-	P	V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

2.4GHz	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.

Appendix D. Radiated Spurious Emission Plots

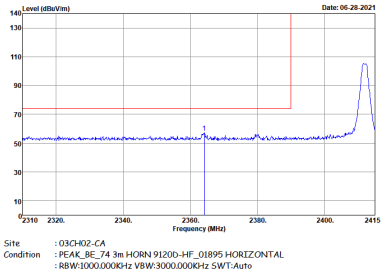
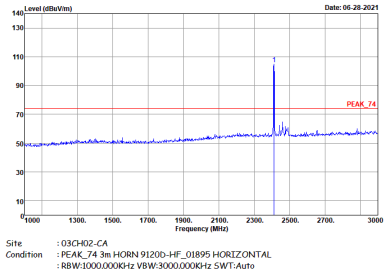
Test Engineer :	Michael Bui	**Temperature :**	17~23C
		Relative Humidity :	42~48%

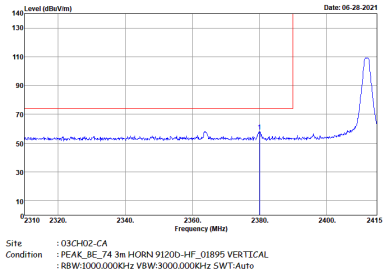
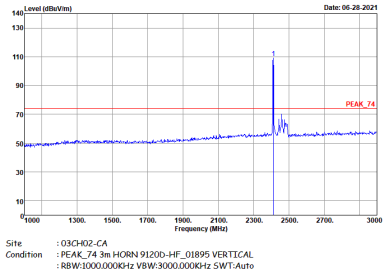
Note symbol

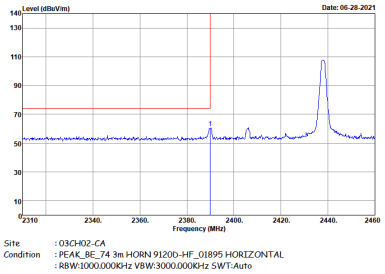
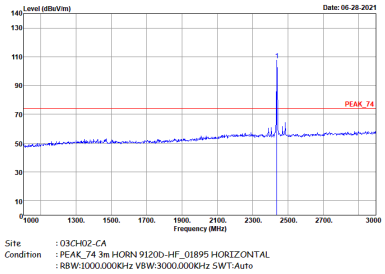
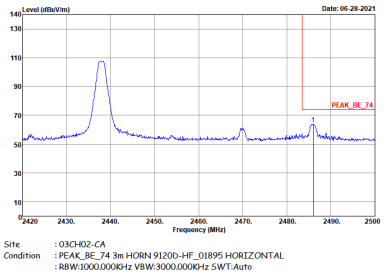
-L	**Low channel location**
-R	**High channel location**

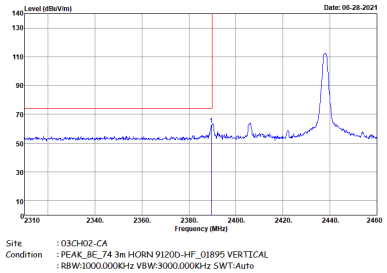
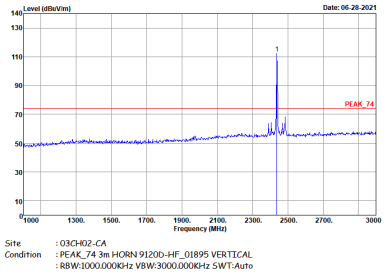
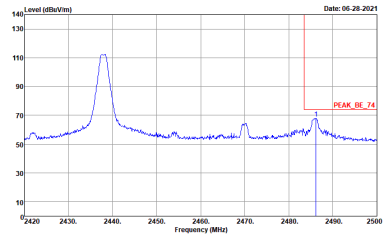
2.4GHz 2400~2483.5MHz

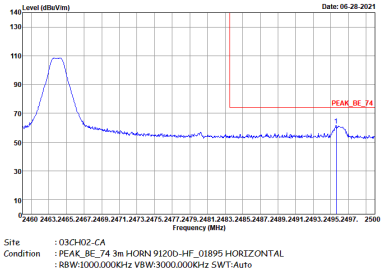
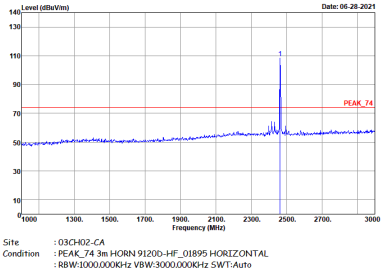
Proprietary 2.4G (2M) (Band Edge @ 3m)

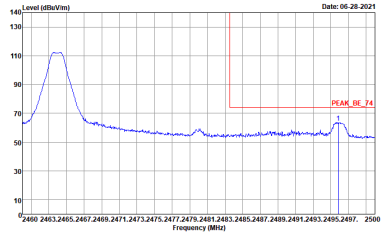
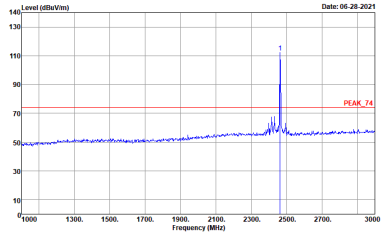
2.4GHz	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	Proprietary 2.4G (2M) 2412MHz	
	Horizontal	Fundamental
Peak		

2.4GHz	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	Proprietary 2.4G (2M) 2412MHz	
	Vertical	Fundamental
Peak	 Site : 03CH02-CA Condition : PEAK_BE_74 3m HORN 9120D-HF_01895 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH02-CA Condition : PEAK_74 3m HORN 9120D-HF_01895 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

2.4GHz	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	Proprietary 2.4G (2M) 2438MHz	
	Horizontal	Fundamental
Peak		
Peak		Left blank

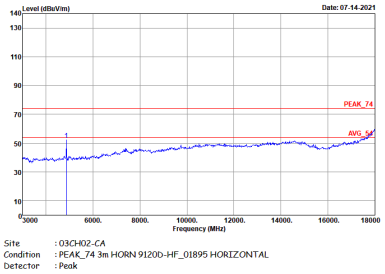
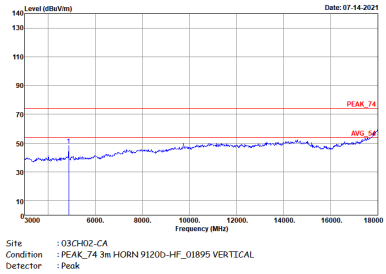
2.4GHz	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	Proprietary 2.4G (2M) 2438MHz	
	Vertical	Fundamental
Peak	 Site : 03CH02-CA Condition : PEAK_BE_74 3m HORN 9120D-HF_01895 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH02-CA Condition : PEAK_74 3m HORN 9120D-HF_01895 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site : 03CH02-CA Condition : PEAK_BE_74 3m HORN 9120D-HF_01895 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

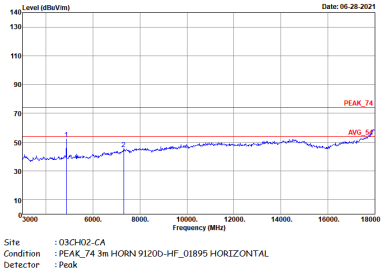
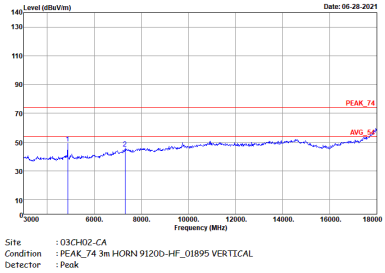
2.4GHz	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	Proprietary 2.4G (2M) 2464MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH02-CA Condition : PEAK_BE_74 3m HORN 9120D-HF_01895 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH02-CA Condition : PEAK_74 3m HORN 9120D-HF_01895 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

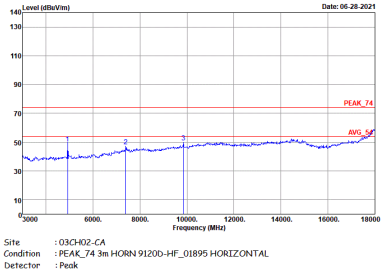
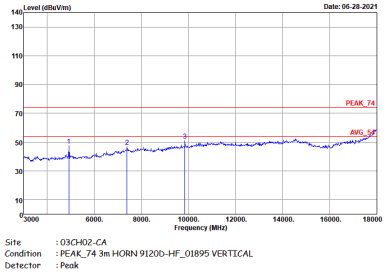
2.4GHz	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	Proprietary 2.4G (2M) 2464MHz	
	Vertical	Fundamental
Peak	 Site : 03CH02-CA Condition : PEAK_BE_74 3m HORN 9120D-HF_01895 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH02-CA Condition : PEAK_74 3m HORN 9120D-HF_01895 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

2.4GHz 2400~2483.5MHz

Proprietary 2.4G (2M) (Harmonic @ 3m)

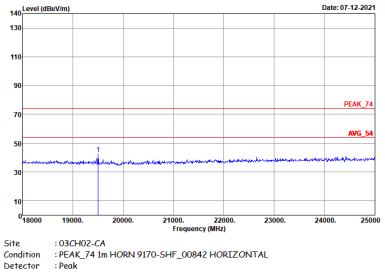
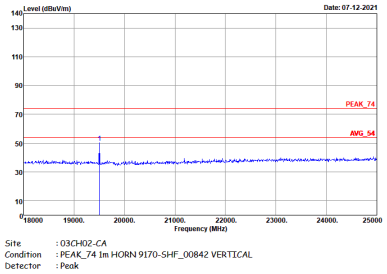
2.4GHz	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	Proprietary 2.4G (2M) 2412MHz	
	Horizontal	Vertical
Peak Avg.		

2.4GHz	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	Proprietary 2.4G (2M) 2438MHz	
	Horizontal	Vertical
Peak Avg.		

2.4GHz	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	Proprietary 2.4G (2M) 2464MHz	
	Horizontal	Vertical
Peak		

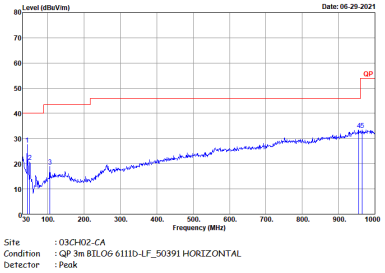
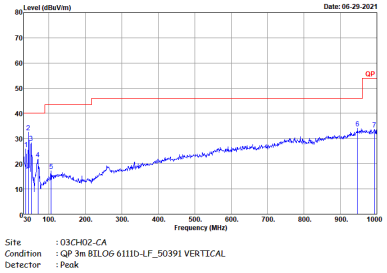
Emission above 18GHz

2.4GHz Proprietary 2.4G (2M) (SHF)

2.4GHz	2.4GHz 2400~2483.5MHz	
	Proprietary 2.4G (2M) SHF	
	Horizontal	Vertical
Peak		

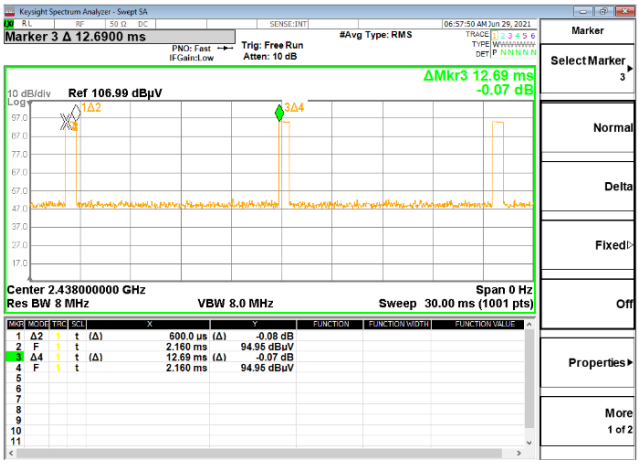
Emission below 1GHz

2.4GHz Proprietary 2.4G (2M) (LF)

2.4GHz	2.4GHz 2400~2483.5MHz	
	Proprietary 2.4G (2M) LF	
	Horizontal	Vertical
QP / Peak		

Appendix E. Duty Cycle Plots

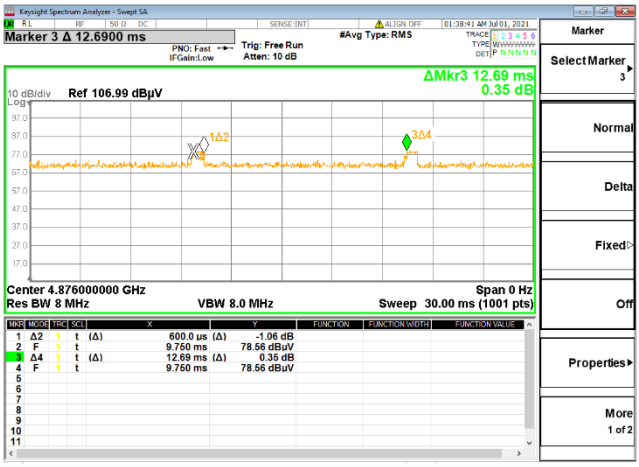
Radio 1 : The duty cycle of fundamental signal (2438MHz) is 4.73 %



Note:

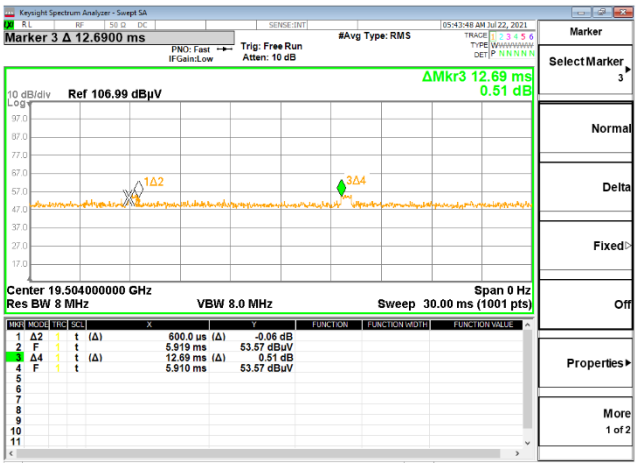
1. The Radio is 2.4GHz proprietary design as detailed in the Operating Discerption.
2. The pulse train (period) of fundamental signal is less than 100 milliseconds
3. The worst case duty cycle = on time/ pulse train = 0.6 ms / 12.69 ms = 4.73 %
4. The worst case duty cycle correction factor = 20*log (Duty cycle) = -26.5 dB and this correction is applied to all emissions that demonstrate the same pulse timing characteristics as the fundamental emission (Clause 7.5 of ANSI C63.10 2013).

Radio 1 : The duty cycle of 2nd harmonics is 4.73%



Note: The duty cycle of 2nd harmonics is (= on time/ pulse chain = 0.6 ms / 12.69 ms) 4.73 %

Radio 1 : The duty cycle of 8th harmonics (19504MHz) is 4.73%



Note: The duty cycle of 8th harmonics is (on time/ pulse chain = 0.6 ms / 12.69 ms) 4.73 %