

FCC Test Report

FCC ID : UJ9DG009
Equipment : Dongle
Brand Name : i-rocks
Model Name : DG009
Applicant : i-Rocks Technology Co., Ltd.
12F, No. 190, Chung-hsin Rd., Sec. 2, Hsin-tien City,
Taipei, Taiwan R.O.C.
Manufacturer : G. TECH TECHNOLOGY LTD.
No. 8, Jinyuan 1st Road, High-tech Zone, Zhuhai City,
Guangdong, China 519085
Standard : 47 CFR FCC Part 15.247

The product was received on May 31, 2018, and testing was started from Jun. 04, 2018 and completed on Jun. 13, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.


Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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PHOTOGRAPHS OF EUT V01	

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Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	FCC 15.203
3.1	15.207	AC Power-line Conducted Emissions	PASS	FCC 15.207
3.2	15.247(a)	20dB Bandwidth	PASS	15.247(a)
3.2	15.247(a)	Carrier Frequency Separation	PASS	15.247(a)
3.3	15.247(b)	Maximum Conducted Output Power	PASS	15.247(b)
3.4	15.247(a)	Number of Hopping Frequencies and Hopping Bandedge	PASS	15.247(a)
3.5	15.247(a)	Time of Occupancy (Dwell Time)	PASS	15.247(a)
3.6	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	15.247(d)
3.7	15.247(d)	Emissions in Restricted Frequency Bands	PASS	Restricted Bands: FCC 15.209

Reviewed by: Sam Tsai

Report Producer: Amber Chiu

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	Mode	Ch. Frequency (MHz)	Channel Number
2400-2483.5	Wireless devices	2408-2474	0-33 [34]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	FHSS	1.9	1TX

Note:

- ♦ System using FHSS modulation.
- ♦ BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	-	-	PCB	fixed on board	2.15

For Wireless devices mode (1TX/1RX)

Only Ant. 1 (port 1) can be used as transmitting/receiving antenna.

1.1.3 EUT Information

Operational Condition	
EUT Power Type	From Host system
Type of EUT	
☒	Stand-alone
☐	Combined (EUT where the radio part is fully integrated within another device)
☐	Combined Equipment - Brand Name / Model No.: ...
☐	Plug-in radio (EUT intended for a variety of host systems)
☐	Host System - Brand Name / Model No.: ...
☐	Other:

1.1.4 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
FHSS	0.058	12.366	3.797m	300

1.2 Testing Applied Standards

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

- ♦ 47 CFR FCC Part 15
- ♦ Public Notice DA 00-705
- ♦ ANSI C63.10-2013

1.3 Testing Location Information

Testing Location			
☒	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
Test site Designation No. TW1190 with FCC.			
☐	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)	
		TEL : 886-3-656-9065	FAX : 886-3-656-9085
Test site Designation No. TW0006 with FCC.			

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO04-HY	Daniel	24.5°C / 51%	05/Jun/2018
RF Conducted	TH01-HY	Barry	24.3°C / 53%	13/Jun/2018
Radiated	03CH09-HY	Jerry	25.5°C / 54%	04/Jun/2018

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.9 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.3 dB	Confidence levels of 95%
Temperature	0.7 °C	Confidence levels of 95%
Humidity	4 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Condition

RF Conducted	Abbreviation	Remark
RF Conducted-FS	Abbreviation	Remark
TnomVnom	Tnom	20°C
-	Vnom	5V

2.2 Test Channel Mode

Test Software	RF TEST & EMI MODE_AP
---------------	-----------------------

Mode	PowerSetting
FHSS_Nss1_1TX	-
2408MHz	Default
2440MHz	Default
2474MHz	Default

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral
Operating Mode	CTX
1	USB mode ; 2.4G TX

The Worst Case Mode for Following Conformance Tests	
Tests Item	20dB Bandwidth Carrier Frequency Separation Maximum Conducted Output Power Number of Hopping Frequencies Hopping Bandedge Time of Occupancy (Dwell Time) Emissions in Non-restricted Frequency Bands
Test Condition	Conducted measurement at transmit chains

The Worst Case Mode for Following Conformance Tests			
Tests Item	Emissions in Restricted Frequency Bands		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
Operating Mode < 1GHz	CTX		
1	USB mode		
Operating Mode > 1GHz	CTX		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT			V

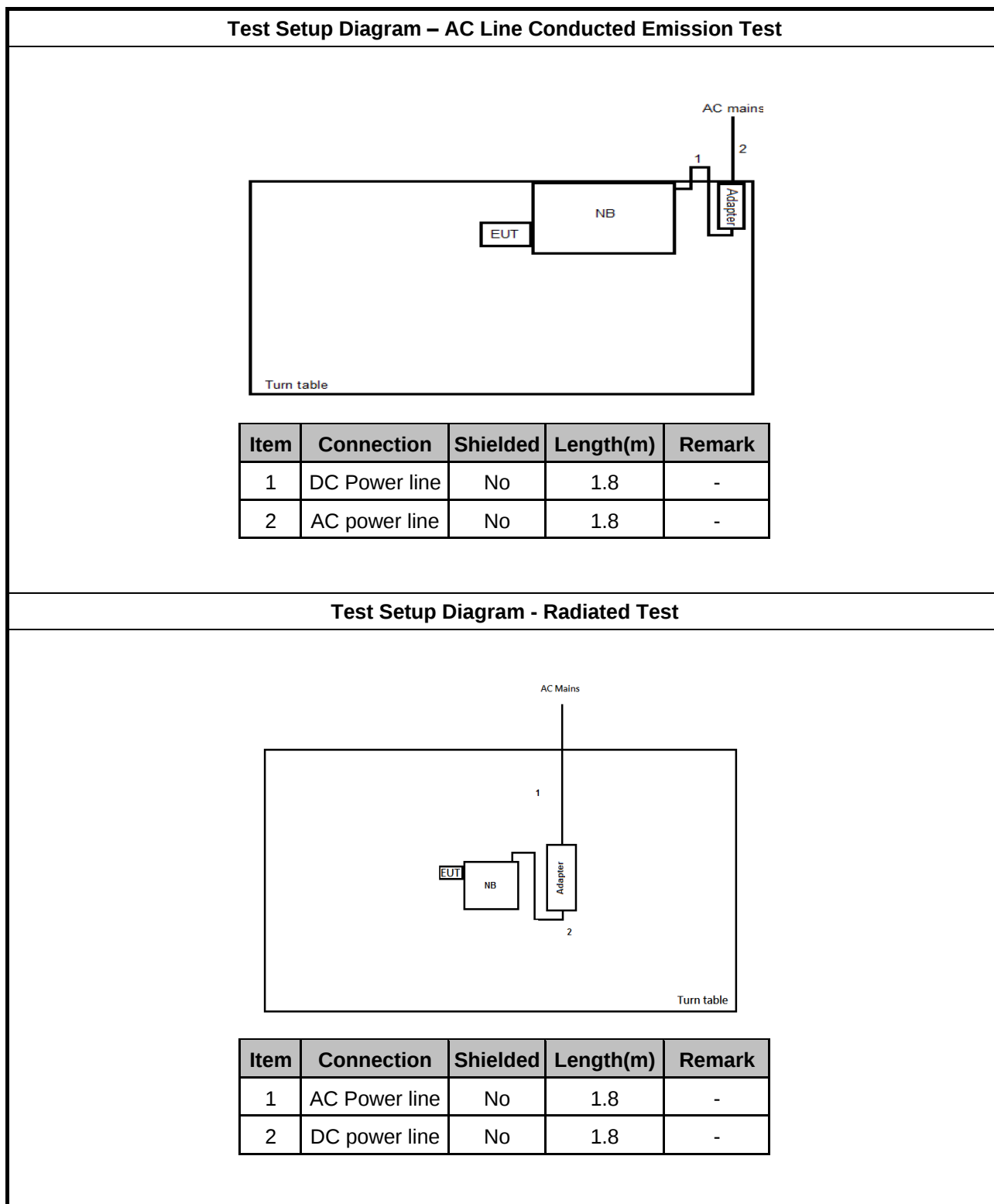
2.4 Support Equipment

Support Equipment – AC Conduction				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	HP	5220m	DOC
2	Adapter for NB	DELL	HA65NM130	DOC

Support Equipment – RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5410	DOC
2	Adapter for NB	DELL	HA65NM130	DOC

Support Equipment – Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5410	DOC
2	Adapter for NB	DELL	HA65NM130	DOC

2.5 Test Setup Diagram



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

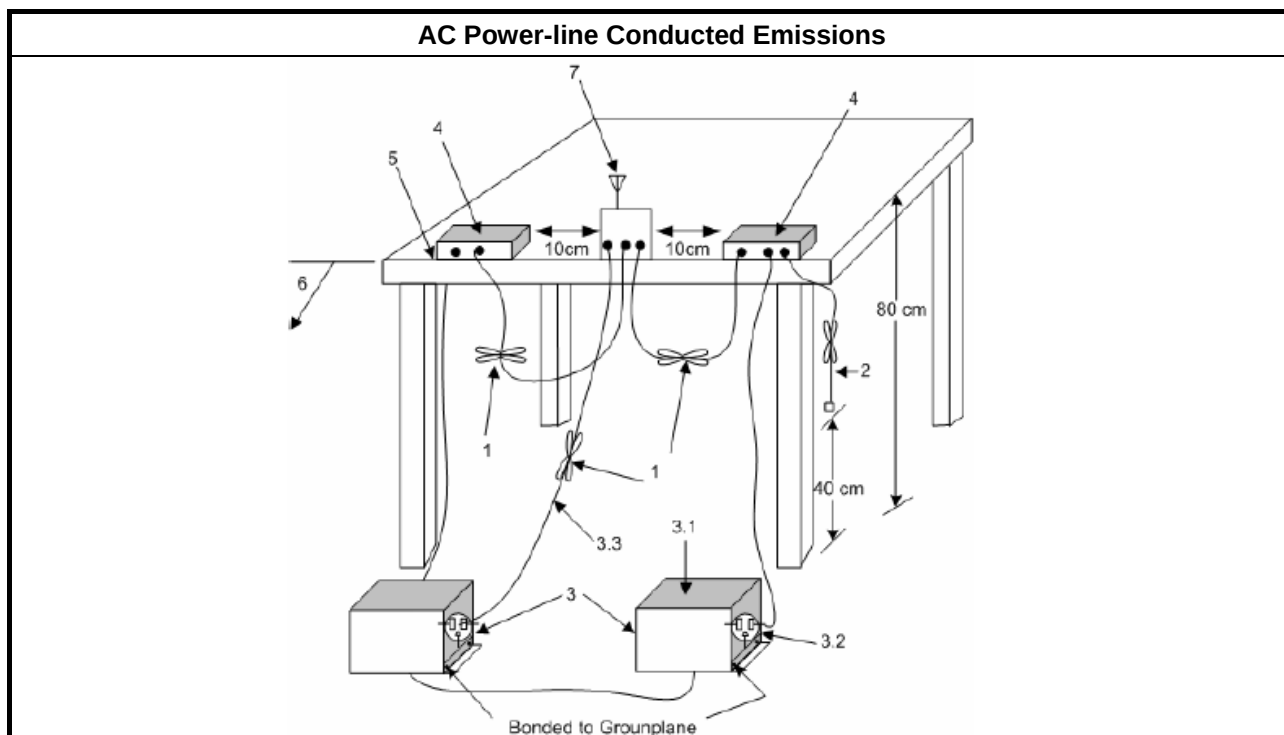
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
Refer as ANSI C63.10-2013, clause 6.2 foray power-line conducted emissions.

3.1.4 Test Setup



3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 20dB Bandwidth and Carrier Frequency Separation

3.2.1 20dB Bandwidth and Carrier Frequency Separation Limit

20dB Bandwidth and Carrier Frequency Separation Limit for Frequency Hopping Systems	
2400-2483.5 MHz Band:	
	$N \geq 75$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz).
	$75 > N \geq 15$ and $ChS \geq MAX$ (20 dB bandwidth 2/3, 25 kHz).
N: Number of Hopping Frequencies; ChS: Hopping Channel Separation	

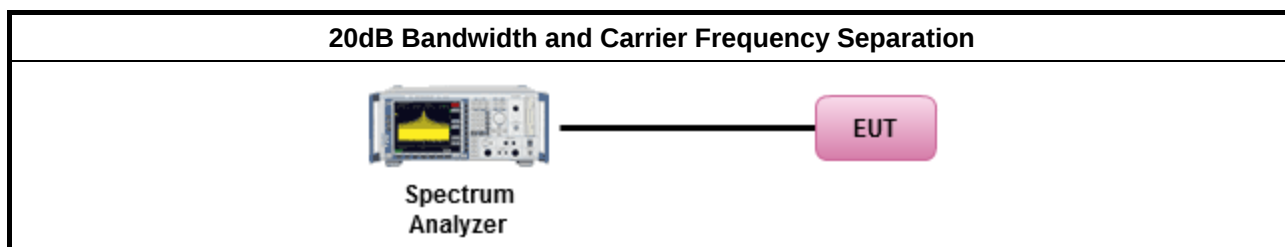
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method
Refer as ANSI C63.10-2013, clause 6.9.2 for 20 dB bandwidth measurement.
Refer as ANSI C63.10-2013, clause 7.8.2 for carrier frequency separation measurement.

3.2.4 Test Setup



3.2.5 Test Result of 20dB Bandwidth

Refer as Appendix B

3.2.6 Test Result of Carrier Frequency Separation

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit	
2400-2483.5 MHz Band:	
	$N \geq 75$; Power 30dBm; EIRP 36dBm
	$75 > N \geq 15$; Power 21dBm; EIRP 27dBm
N: Number of Hopping Frequencies	

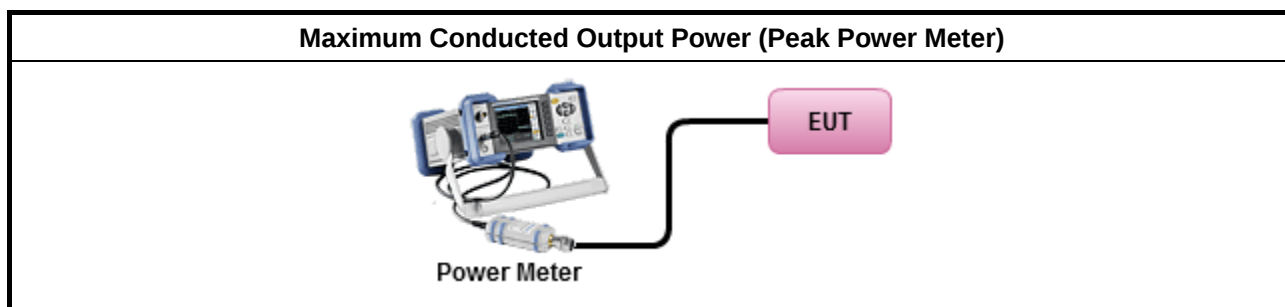
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method
Refer as ANSI C63.10-2013, clause 7.8.5 for output power measurement.

3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

3.4 Number of Hopping Frequencies and Hopping Bandedge

3.4.1 Number of Hopping Frequencies Limit

Number of Hopping Frequencies Limit	
2400-2483.5 MHz Band:	
	$N \geq 75$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz).
	$75 > N \geq 15$ and $ChS \geq MAX$ (20 dB bandwidth 2/3, 25 kHz).
N: Number of Hopping Frequencies; ChS : Hopping Channel Separation	

3.4.2 Hopping Bandedge Limit

Refer clause 3.6.1 and clause 3.7.1

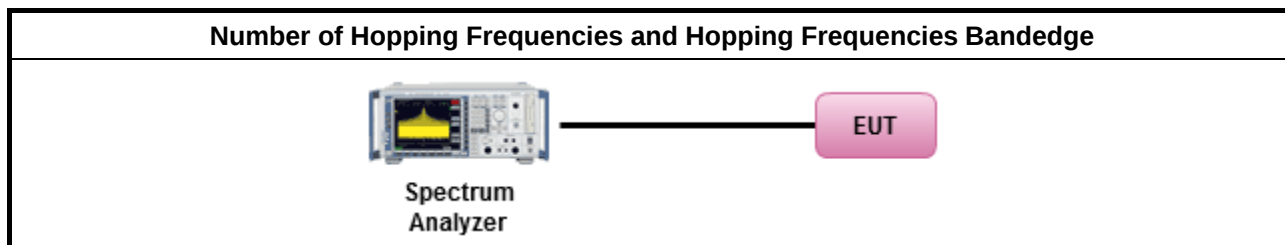
3.4.3 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.4 Test Procedures

Test Method
Refer as ANSI C63.10-2013, clause 7.8.3 for number of hopping frequencies measurement.
Refer as ANSI C63.10-2013, clause 7.8.6 for hopping frequencies Bandedge measurement.

3.4.5 Test Setup



3.4.6 Test Result of Number of Hopping Frequencies

Refer as Appendix D

3.4.7 Test Result of Number of Hopping Frequencies Bandedge

Refer as Appendix D

3.5 Time of Occupancy (Dwell Time)

3.5.1 Time of Occupancy (Dwell Time) Limit

Time of Occupancy (Dwell Time) Limit for Frequency Hopping Systems	
2400-2483.5 MHz Band:	
	$N \geq 75$; 0.4s in $N \times 0.4$ period
	$75 > N \geq 15$; 0.4s in $N \times 0.4$ period
N: Number of Hopping Frequencies	

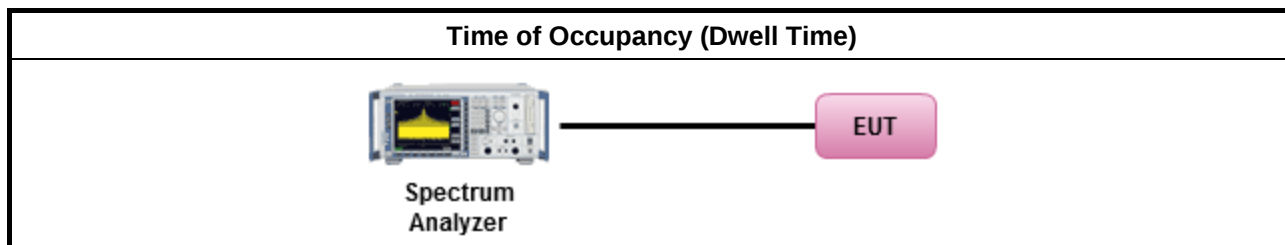
3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method	
Refer as ANSI C63.10-2013, clause 7.8.4 for dwell time measurement.	
Bluetooth ACL packets can be 1, 3, or 5 time slots. Following as dwell time. Operate DH5 at maximum dwell time and maximum duty cycle.	
	The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is $5/1600$ seconds, or 3.125ms. DH5 Packet permit maximum $1600 / 79 / 6 = 3.37$ hops per second in each channel.

3.5.4 Test Setup



3.5.5 Test Result of Time of Occupancy (Dwell Time)

Refer as Appendix E

3.6 Emissions in Non-restricted Frequency Bands

3.6.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	Limit (dB)
Peak output power procedure	20
Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.	

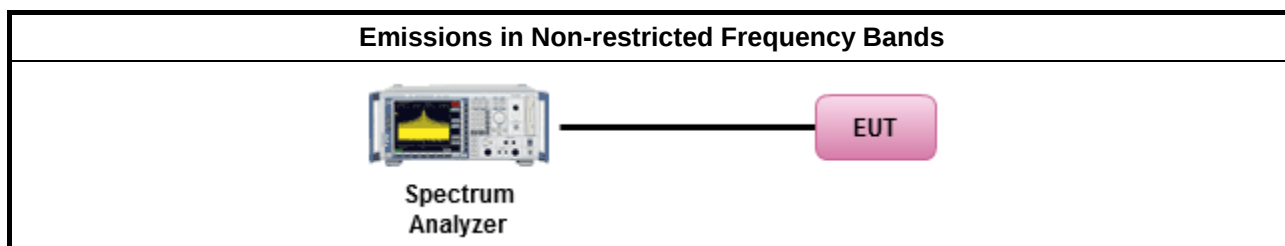
3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

Test Method
Refer as ANSI C63.10-2013, clause 7.8.8 for unwanted emissions into non-restricted bands.

3.6.4 Test Setup



3.6.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix F

3.7 Emissions in Restricted Frequency Bands

3.7.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB / decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

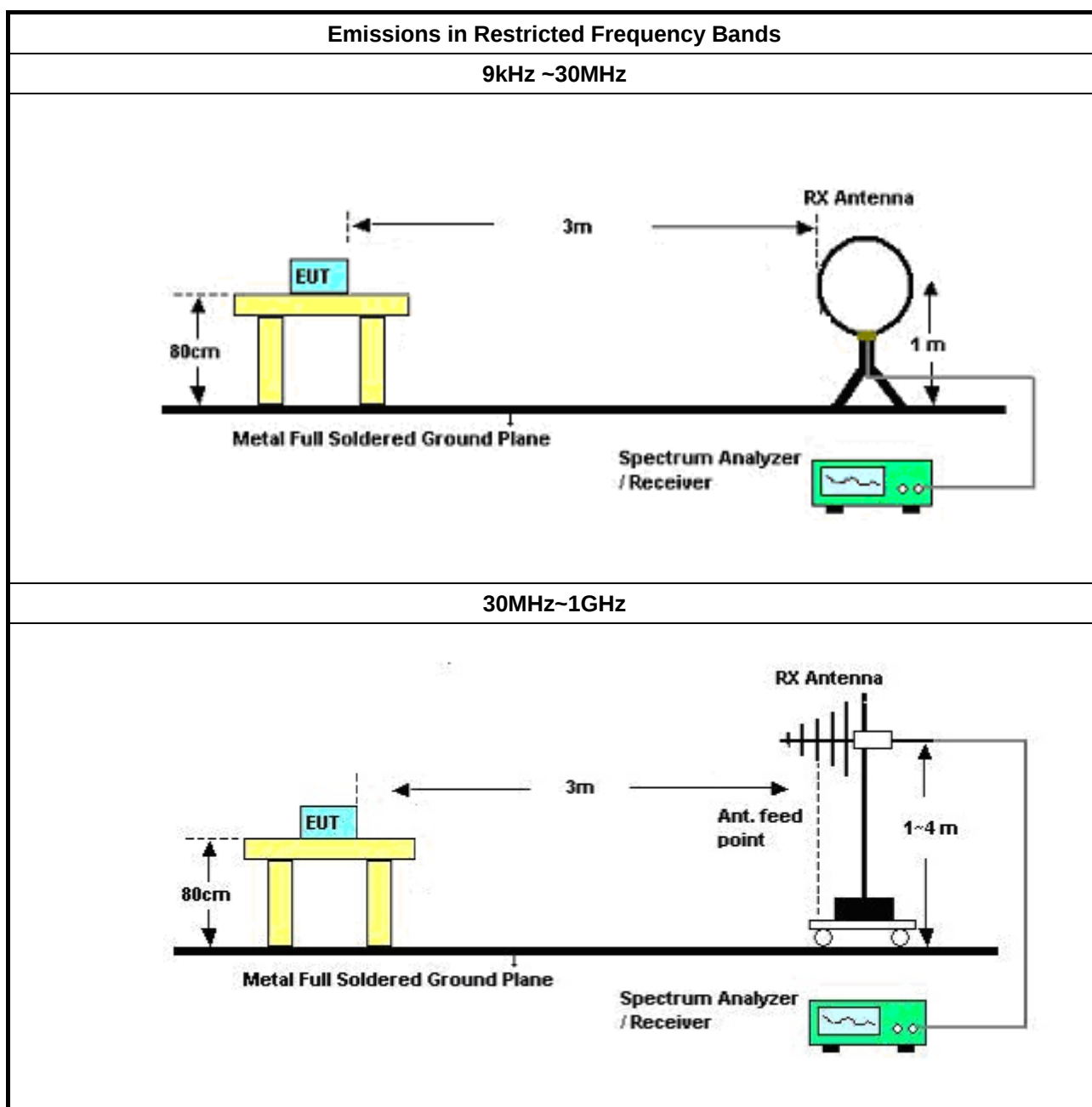
3.7.2 Measuring Instruments

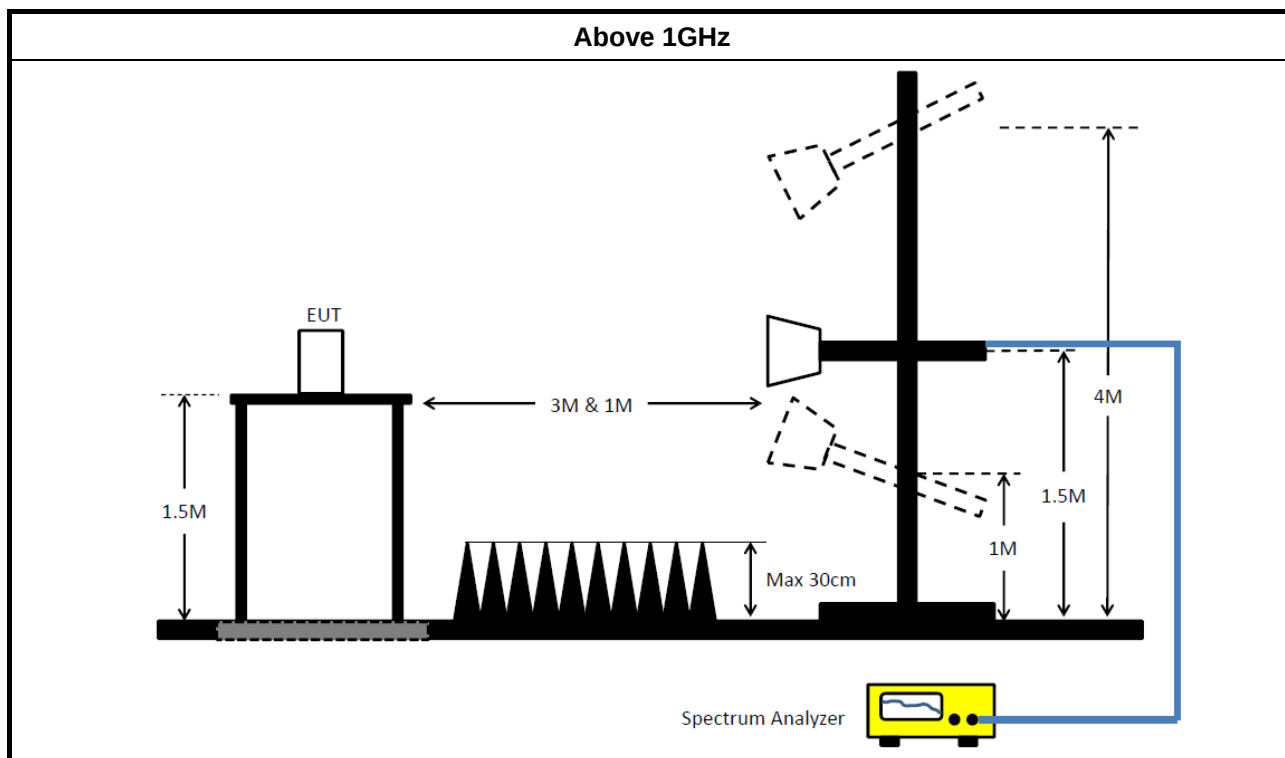
Refer a test equipment and calibration data table in this test report.

3.7.3 Test Procedures

Test Method	
▪ The average emission levels shall be measured in [hopping duty factor].	
▪ Refer as ANSI C63.10; clause 6.9.2.2 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.	
▪ For the transmitter unwanted emissions shall be measured using following options below:	
	▪ Refer as ANSI C63.10, clause 4.1.4.2.1 QP value.
	▪ Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak.
	▪ Refer as ANSI C63.10, clause 4.1.4.2.4 average value of hopping pulsed emissions.

3.7.4 Test Setup





3.7.5 Test Result of Emissions in Restricted Frequency Bands (Below 30MHz)

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

3.7.6 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix G

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESCS30	838251/003	9KHz ~ 2.75GHz	13/Jun/2017	12/Jun/2018
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	17/Nov/2017	16/Nov/2018
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	06/Oct/2017	05/Oct/2018
AC POWER	APC	AFC-11005G	F310050055	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Puls e Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9 kHz ~ 30 MHz	12/Oct/2017	11/Oct/2018

NCR : Non-Calibration Require

Instrument for Conducted Test

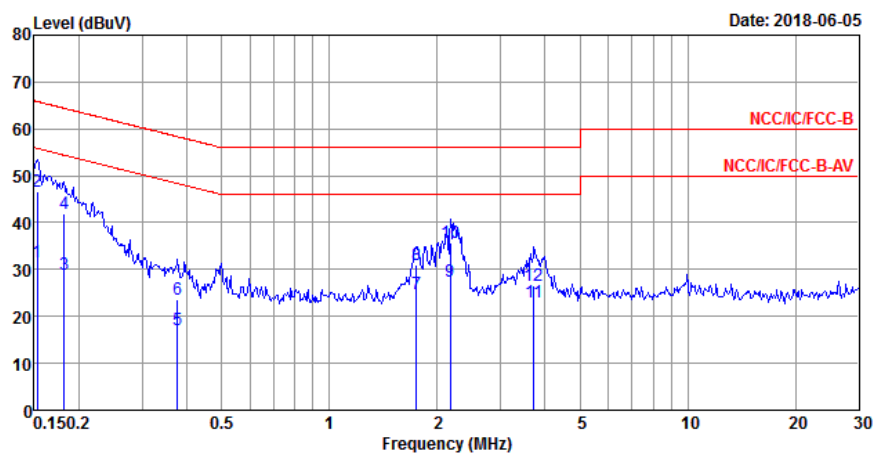
Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	9kHz~40GHz	29/Dec/2017	28/Dec/2018
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	27/Jul/2017	26/Jul/2018
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	05/Feb/2018	04/Feb/2019
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	05/Feb/2018	04/Feb/2019
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10710/4	30MHz ~ 26.5GHz	25/Aug/2017	24/Aug/2018
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10709/4	30MHz ~ 26.5GHz	25/Aug/2017	24/Aug/2018
RF Cable-0.5m	HUBER+SUHNER	SUCOFLEX_104	MY10713/4	30MHz ~ 26.5GHz	25/Aug/2017	24/Aug/2018

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
N.S.A. Measurement	TDK	SAC-3M	03CH09-HY	30MHz ~ 1GHz	23/Apr/2018	22/Apr/2019
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	1GHz ~ 18GHz	20/Jun/2017	19/Jun/2018
Amplifier	Agilent	8449B	3008A02326	1GHz ~ 26.5GHz	17/Jul/2017	16/Jul/2018
Amplifier	EMC	EMC9135	980232	9KHz~1GHz	27/Apr/2018	26/Apr/2019
EXA Signal Analyzer	KEYSIGHT	N9010A	MY54200885	10Hz ~ 44GHz	20/Jul/2017	19/Jul/2018
Bilog Antenna & 5dB Attenuator	TESEQ & MTJ	CBL6111D & MTJ6102-05	35418	30MHz~1GHz	09/Sep/2017	08/Sep/2018
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120D	BBHA9120D 1534	1GHz~18GHz	30/Apr/2018	29/Apr/2019
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170614	18GHz~40GHz	09/Feb/2018	08/Feb/2019
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	29/Mar/2018	28/Mar/2019
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	02/Feb/2018	01/Feb/2019
RF Cable-high	SUHNER	SUCOFLEX104	MY34918/4	1GHz ~ 40GHz	02/Feb/2018	01/Feb/2019

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Neutral
Operating Function	USB mode ; 2.4G TX		

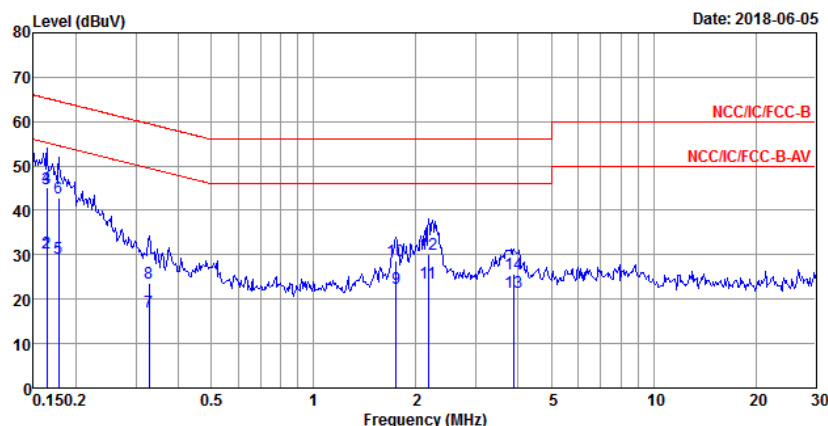


	Freq	Level	Over	Limit	Read	LISM	Cable		
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark	
			dB	dBuV	dBuV	dB	dB		
1	0.15	31.60	-24.22	55.82	21.93	9.63	0.04	Average	
2	0.15	46.71	-19.11	65.82	37.04	9.63	0.04	QP	
3	0.18	28.86	-25.56	54.42	19.23	9.62	0.01	Average	
4	0.18	41.92	-22.50	64.42	32.29	9.62	0.01	QP	
5	0.38	17.03	-31.31	48.34	7.33	9.61	0.09	Average	
6	0.38	23.53	-34.81	58.34	13.83	9.61	0.09	QP	
7	1.75	24.85	-21.15	46.00	15.22	9.63	0.00	Average	
8	1.75	31.12	-24.88	56.00	21.49	9.63	0.00	QP	
9 MAX	2.18	27.32	-18.68	46.00	17.68	9.63	0.01	Average	
10	2.18	35.69	-20.31	56.00	26.05	9.63	0.01	QP	
11	3.72	23.03	-22.97	46.00	13.31	9.64	0.08	Average	
12	3.72	26.69	-29.31	56.00	16.97	9.64	0.08	QP	

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	USB mode ; 2.4G TX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.16	30.51	-24.74	55.25	20.86	9.62	0.03	Average
2	0.16	30.29	-24.96	55.25	20.64	9.62	0.03	Average
3	0.16	44.94	-20.31	65.25	35.29	9.62	0.03	QP
4 MAX	0.16	45.18	-20.07	65.25	35.53	9.62	0.03	QP
5	0.18	29.28	-25.31	54.59	19.64	9.62	0.02	Average
6	0.18	42.93	-21.66	64.59	33.29	9.62	0.02	QP
7	0.33	17.26	-32.23	49.49	7.58	9.61	0.07	Average
8	0.33	23.56	-35.93	59.49	13.88	9.61	0.07	QP
9	1.75	22.57	-23.43	46.00	12.95	9.62	0.00	Average
10	1.75	28.73	-27.27	56.00	19.11	9.62	0.00	QP
11	2.18	23.70	-22.30	46.00	14.07	9.62	0.01	Average
12	2.18	30.25	-25.75	56.00	20.62	9.62	0.01	QP
13	3.88	21.68	-24.32	46.00	11.97	9.63	0.08	Average
14	3.88	25.58	-30.42	56.00	15.87	9.63	0.08	QP

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
FHSS_Nss1_1TX	2.059M	2.056M	2M06D1D	2.052M	2.049M

Max-N dB = Maximum 20dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;

Min-N dB = Minimum 20dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

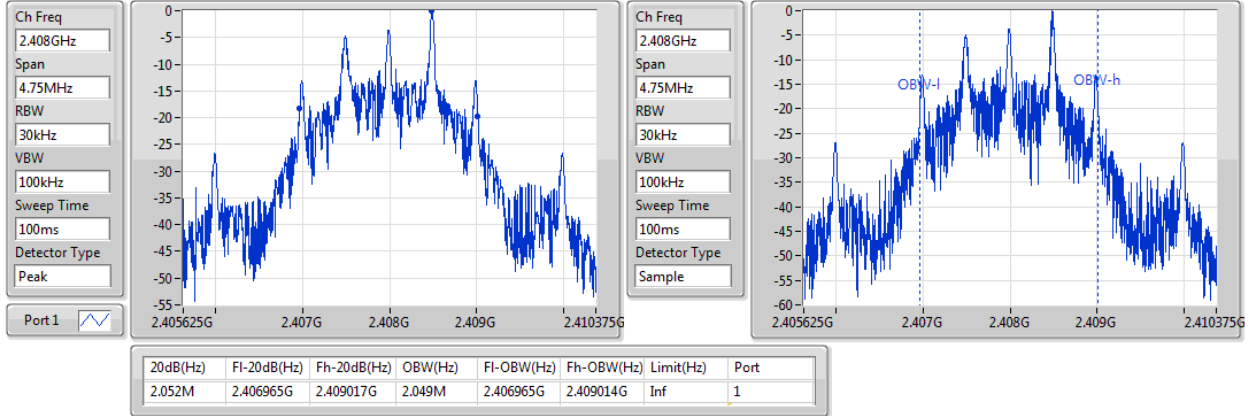
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
FHSS_Nss1_1TX	-	-	-	-
2408MHz_TnomVnom	Pass	Inf	2.052M	2.049M
2440MHz_TnomVnom	Pass	Inf	2.057M	2.049M
2474MHz_TnomVnom	Pass	Inf	2.059M	2.056M

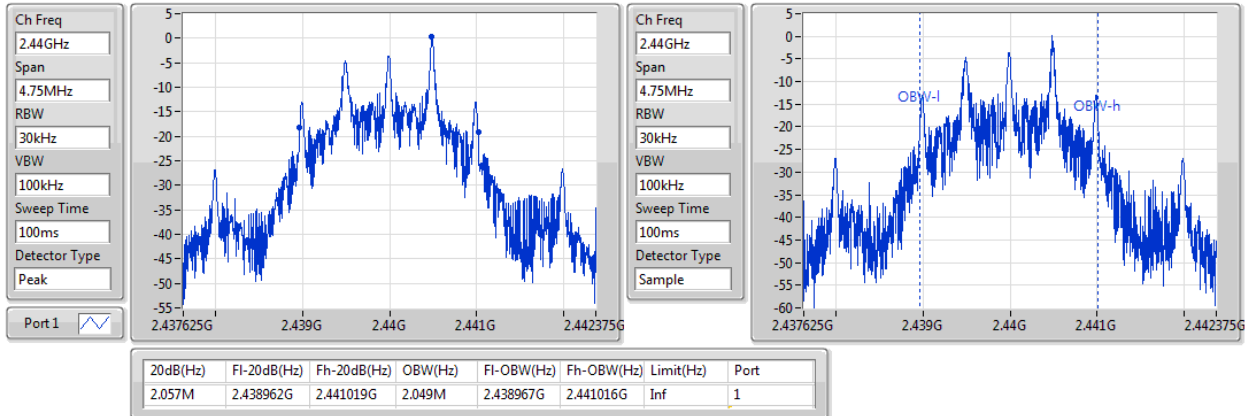
Port X-N dB = Port X 20dB down bandwidth; **Port X-OBW** = Port X 99% occupied bandwidth;

FHSS_Nss1_1TX
EBW
2408MHz

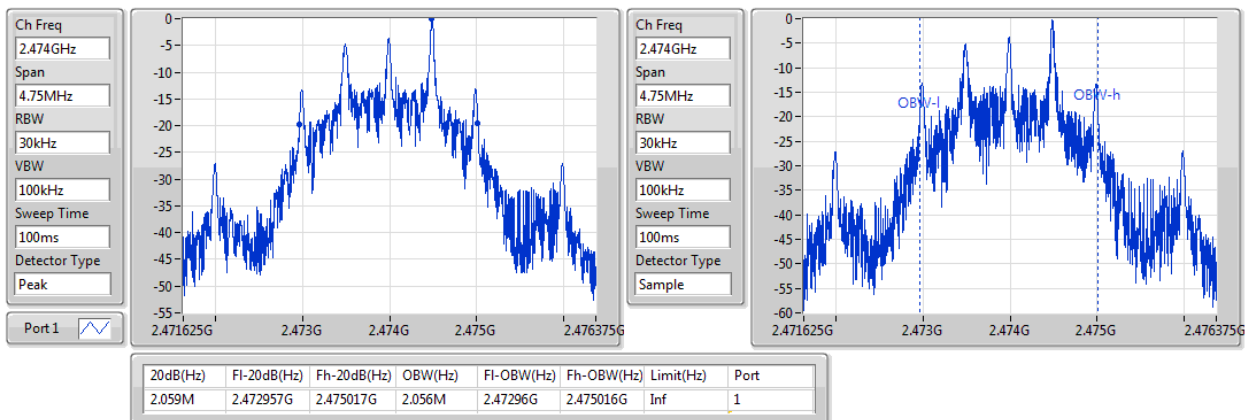
13/06/2018


FHSS_Nss1_1TX
EBW
2440MHz

13/06/2018


FHSS_Nss1_1TX
EBW
2474MHz

13/06/2018



Summary

Mode	Max-Space (Hz)	Min-Space (Hz)
2.4-2.4835GHz	-	-
FHSS_Nss1_1TX	2.002125M	1.99975M

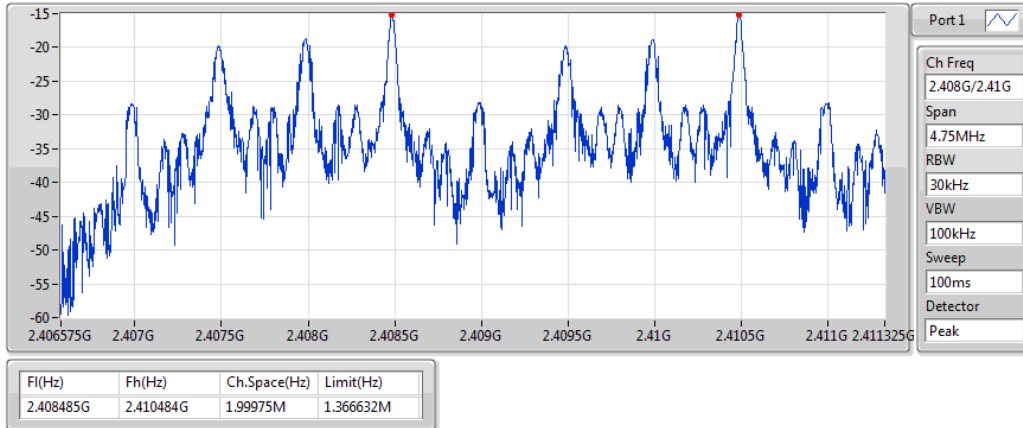
Result

Mode	Result	Fl (Hz)	Fh (Hz)	Ch.Space (Hz)	Limit (Hz)
FHSS_Nss1_1TX	-	-	-	-	-
2408MHz_TnomVnom	Pass	2.408485G	2.410484G	1.99975M	1.366632M
2440MHz_TnomVnom	Pass	2.440482G	2.442484G	2.002125M	1.369962M
2474MHz_TnomVnom	Pass	2.47248G	2.47448G	1.99975M	1.371294M

FHSS_Nss1_1TX

Channel Separation

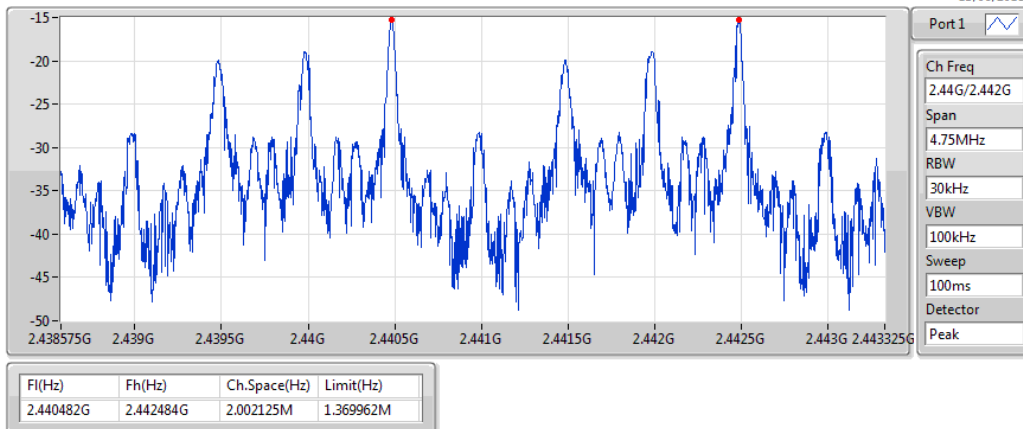
2.408G/2.41GHz



FHSS_Nss1_1TX

Channel Separation

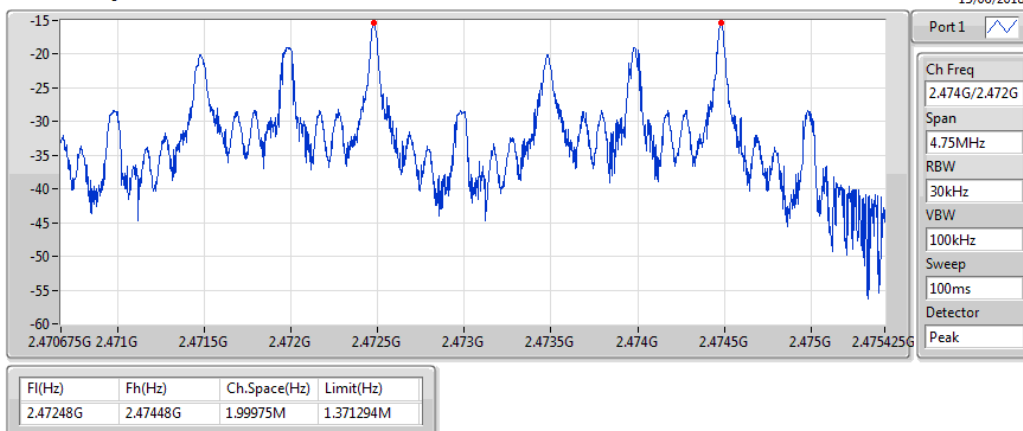
2.44G/2.442GHz



FHSS_Nss1_1TX

Channel Separation

2.474G/2.472GHz



Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
FHSS_Nss1_1TX	0.90	0.00123

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
FHSS_Nss1_1TX	-	-	-	-
2408MHz_TnomVnom	Pass	2.15	0.79	21.00
2440MHz_TnomVnom	Pass	2.15	0.90	21.00
2474MHz_TnomVnom	Pass	2.15	0.87	21.00

**Summary**

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
FHSS	-0.23	0.00095

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
FHSS	-	-	-	-	-
2408MHz	Pass	2.15	-0.44	-0.44	30.00
2440MHz	Pass	2.15	-0.23	-0.23	30.00
2474MHz	Pass	2.15	-0.69	-0.69	30.00

DG = Directional Gain; Port X = Port X output power

Note : Conducted average output power is for reference only



Summary

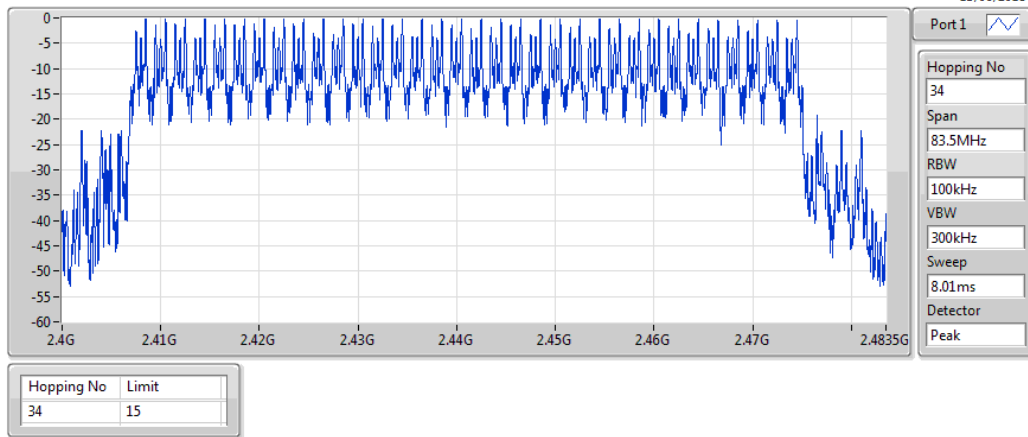
Mode	Max-Hop No
2.4-2.4835GHz	-
FHSS_Nss1_1TX	34

Result

Mode	Result	Hopping No	Limit
FHSS_Nss1_1TX	-	-	-
2440MHz_TnomVnom	Pass	34	15

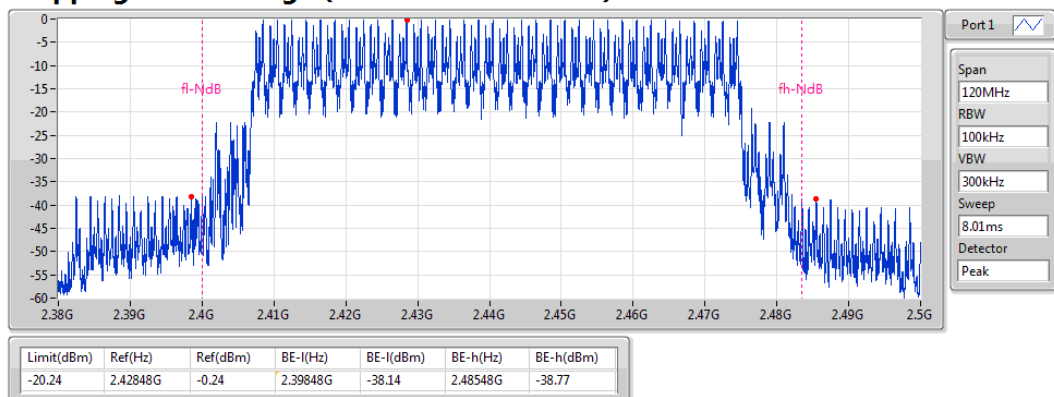
FHSS_Nss1_1TX 2440MHz

Hopping Ch



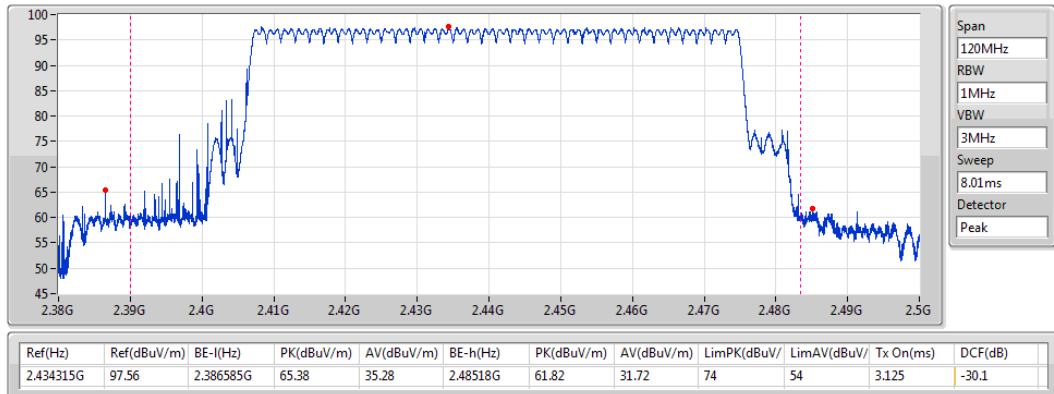
FHSS_Nss1_1TX 2440MHz

Hopping Ch Bandedge (Non-restricted Band)



FHSS_Nss1_1TX 2440MHz

Hopping Ch Bandedge (Restricted Band)



Summary

Mode	Max-Dwell (s)
2.4-2.4835GHz	-
FHSS_Nss1_1TX	12.5664m

Result

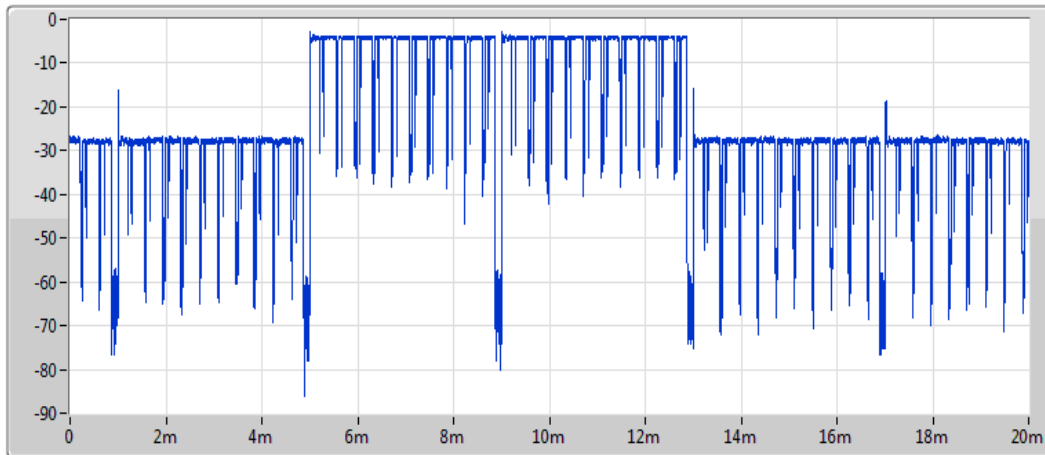
Mode	Result	Period (s)	Dwell (s)	Limit (s)	Tx On (s)
FHSS_Nss1_1TX	-	-	-	-	-
2440MHz_TnomVnom	Pass	13.6	12.5664m	400m	264u

FHSS_Nss1_1TX

Dwell

2440MHz

13/06/2018



Port 1 

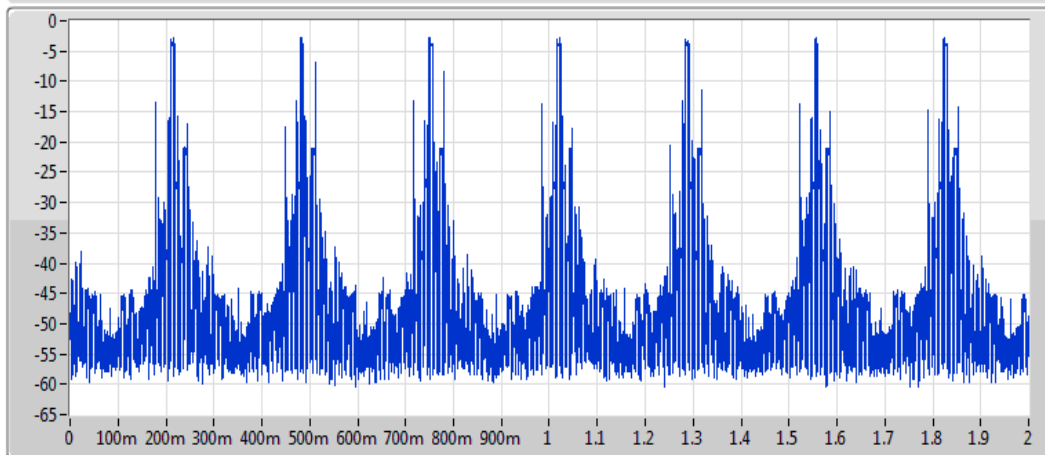
Ch Freq
2.44GHz

RBW
300kHz

VBW
1MHz

Sweep Time
20ms

TX Time
264us



Port 1 

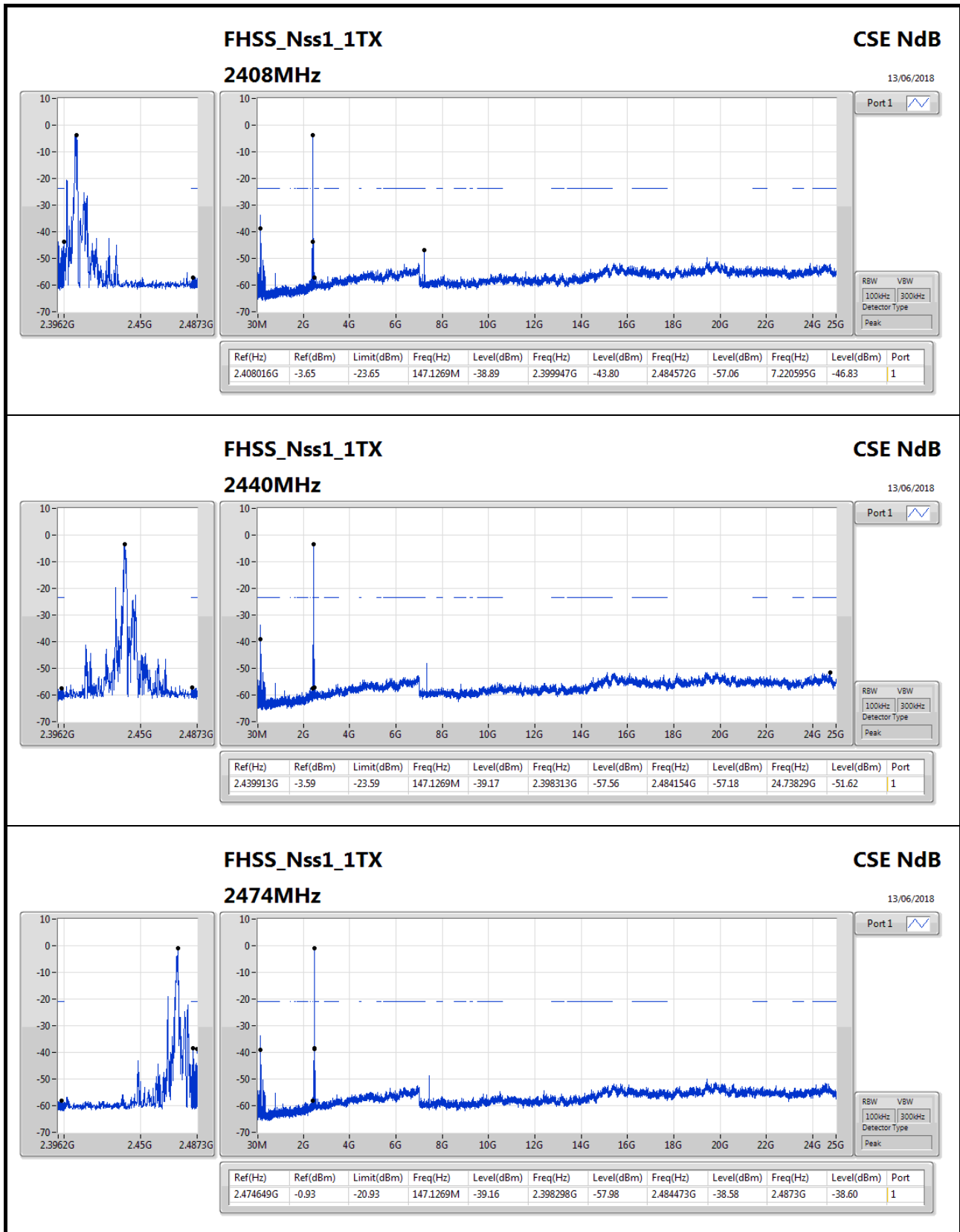
Period(s)	Dwell(s)	Limit(s)	Tx On(s)
13.6	12.5664m	400m	264u

Summary

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
FHSS_Nss1_1TX	Pass	2.408016G	-3.65	-23.65	147.1269M	-38.89	2.399947G	-43.80	2.484572G	-57.06	7.220595G	-46.83	1

Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
FHSS_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2408MHz_TnomVnom	Pass	2.408016G	-3.65	-23.65	147.1269M	-38.89	2.399947G	-43.80	2.484572G	-57.06	7.220595G	-46.83	1
2440MHz_TnomVnom	Pass	2.439913G	-3.59	-23.59	147.1269M	-39.17	2.398313G	-57.56	2.484154G	-57.18	24.73829G	-51.62	1
2474MHz_TnomVnom	Pass	2.474649G	-0.93	-20.93	147.1269M	-39.16	2.398298G	-57.98	2.484473G	-38.58	2.4873G	-38.60	1





RSE TX below 1GHz Result

Appendix G.1

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
FHSS_Nss1_1TX	Pass	QP	64.92M	36.58	40.00	-3.42	-25.54	3	Vertical	150	1.10	-

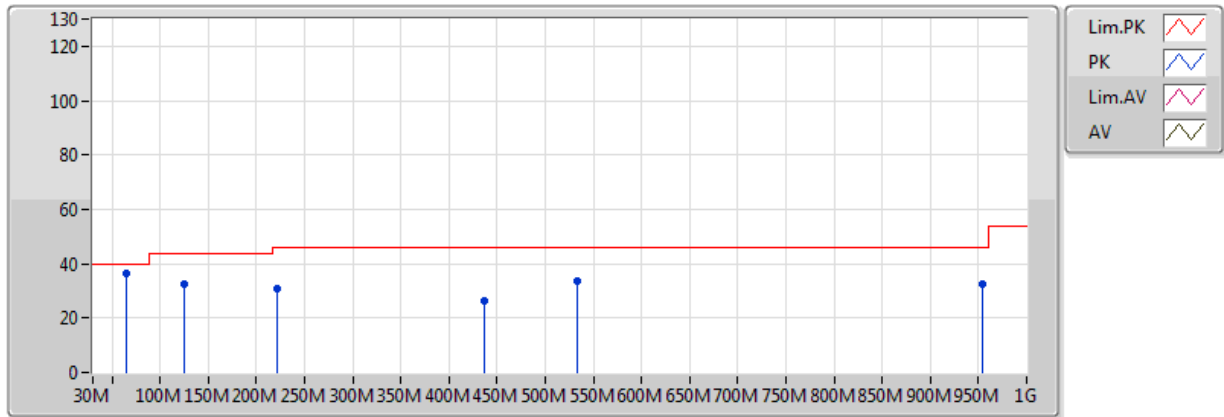
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
FHSS_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	125.06M	32.62	43.50	-10.88	-19.22	3	Vertical	360	1.00	-
2440MHz	Pass	PK	222.06M	30.61	46.00	-15.39	-20.68	3	Vertical	360	1.00	-
2440MHz	Pass	PK	437.4M	26.07	46.00	-19.93	-13.06	3	Vertical	360	1.00	-
2440MHz	Pass	PK	532.46M	33.38	46.00	-12.62	-12.08	3	Vertical	360	1.00	-
2440MHz	Pass	PK	953.44M	32.22	46.00	-13.78	-4.71	3	Vertical	360	1.00	-
2440MHz	Pass	QP	64.92M	36.58	40.00	-3.42	-25.54	3	Vertical	150	1.10	-
2440MHz	Pass	PK	64.92M	36.30	40.00	-3.70	-25.54	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	177.44M	33.63	43.50	-9.87	-21.16	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	251.16M	39.56	46.00	-6.44	-16.97	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	431.58M	31.39	46.00	-14.61	-13.11	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	530.52M	31.01	46.00	-14.99	-12.09	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	953.44M	34.35	46.00	-11.65	-4.71	3	Horizontal	0	1.00	-

FHSS_Nss1_1TX

2440MHz_USB

04/06/2018

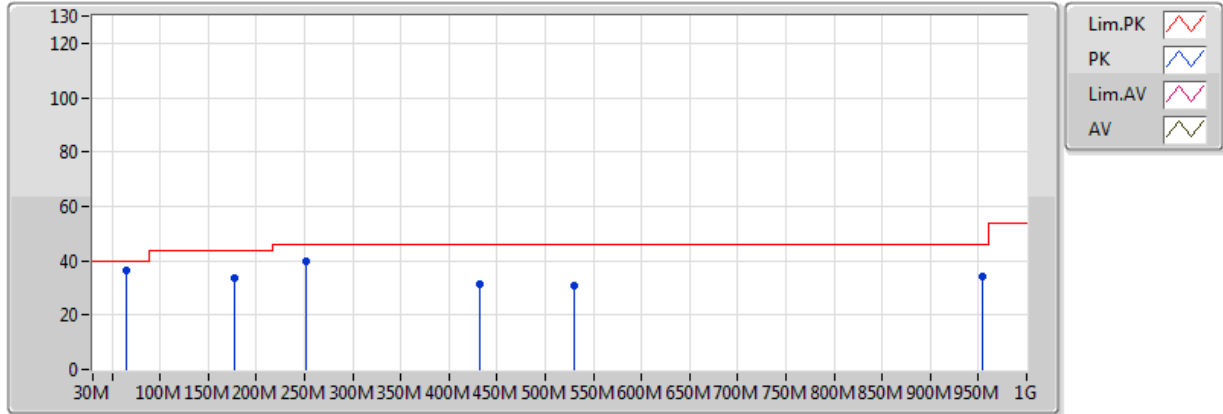


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	125.06M	32.62	43.50	-10.88	-19.22	3	Vertical	360	1.00	-
PK	222.06M	30.61	46.00	-15.39	-20.68	3	Vertical	360	1.00	-
PK	437.4M	26.07	46.00	-19.93	-13.06	3	Vertical	360	1.00	-
PK	532.46M	33.38	46.00	-12.62	-12.08	3	Vertical	360	1.00	-
PK	953.44M	32.22	46.00	-13.78	-4.71	3	Vertical	360	1.00	-
QP	64.92M	36.58	40.00	-3.42	-25.54	3	Vertical	150	1.10	-

FHSS_Nss1_1TX

2440MHz_USB

04/06/2018



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	64.92M	36.30	40.00	-3.70	-25.54	3	Horizontal	0	1.00	-
PK	177.44M	33.63	43.50	-9.87	-21.16	3	Horizontal	0	1.00	-
PK	251.16M	39.56	46.00	-6.44	-16.97	3	Horizontal	0	1.00	-
PK	431.58M	31.39	46.00	-14.61	-13.11	3	Horizontal	0	1.00	-
PK	530.52M	31.01	46.00	-14.99	-12.09	3	Horizontal	0	1.00	-
PK	953.44M	34.35	46.00	-11.65	-4.71	3	Horizontal	0	1.00	-



RSE TX above 1GHz Result

Appendix G.2

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
FHSS_Nss1_1TX	Pass	AV	7.423517G	53.72	54.00	-0.28	11.44	3	Horizontal	317	1.02	-

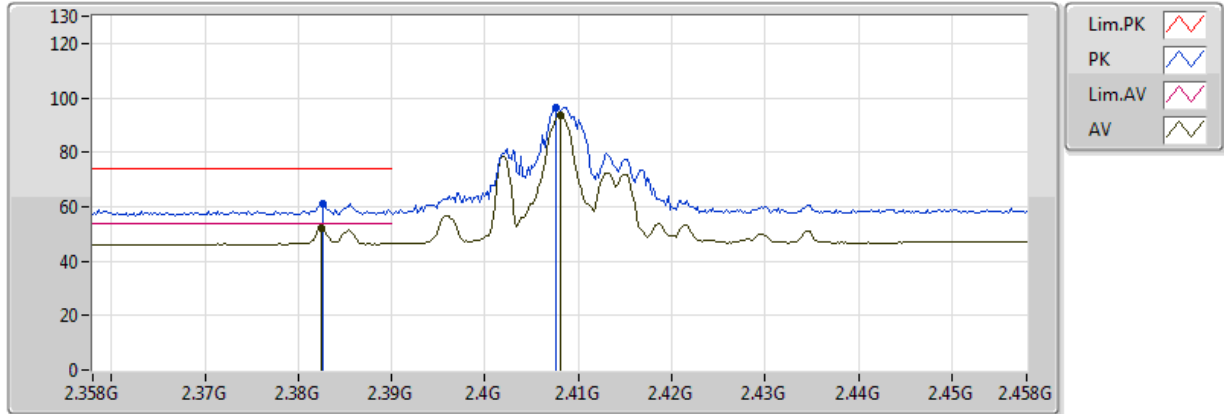
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
FHSS_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-
2408MHz	Pass	AV	2.3824G	51.85	54.00	-2.15	30.35	3	Vertical	190	1.21	-
2408MHz	Pass	AV	2.408G	93.43	Inf	-Inf	30.44	3	Vertical	190	1.21	-
2408MHz	Pass	PK	2.3826G	61.12	74.00	-12.88	30.35	3	Vertical	190	1.21	-
2408MHz	Pass	PK	2.4076G	96.62	Inf	-Inf	30.44	3	Vertical	190	1.21	-
2408MHz	Pass	AV	2.3824G	53.42	54.00	-0.58	30.35	3	Horizontal	219	1.39	-
2408MHz	Pass	AV	2.408G	96.50	Inf	-Inf	30.44	3	Horizontal	219	1.39	-
2408MHz	Pass	PK	2.3824G	63.59	74.00	-10.41	30.35	3	Horizontal	219	1.39	-
2408MHz	Pass	PK	2.4086G	100.17	Inf	-Inf	30.44	3	Horizontal	219	1.39	-
2408MHz	Pass	AV	4.817058G	35.95	54.00	-18.05	5.82	3	Vertical	174	1.41	-
2408MHz	Pass	PK	4.816918G	46.63	74.00	-27.37	5.82	3	Vertical	174	1.41	-
2408MHz	Pass	AV	4.816978G	38.69	54.00	-15.31	5.82	3	Horizontal	238	1.02	-
2408MHz	Pass	PK	4.817078G	48.28	74.00	-25.72	5.82	3	Horizontal	238	1.02	-
2440MHz	Pass	AV	2.3784G	44.72	54.00	-9.28	30.34	3	Vertical	238	2.66	-
2440MHz	Pass	AV	2.44G	93.80	Inf	-Inf	30.55	3	Vertical	238	2.66	-
2440MHz	Pass	AV	2.486G	45.79	54.00	-8.21	30.71	3	Vertical	238	2.66	-
2440MHz	Pass	PK	2.3868G	58.29	74.00	-15.71	30.37	3	Vertical	238	2.66	-
2440MHz	Pass	PK	2.4396G	97.33	Inf	-Inf	30.54	3	Vertical	238	2.66	-
2440MHz	Pass	PK	2.4876G	59.93	74.00	-14.07	30.71	3	Vertical	238	2.66	-
2440MHz	Pass	AV	2.368G	44.53	54.00	-9.47	30.30	3	Horizontal	219	1.36	-
2440MHz	Pass	AV	2.44G	96.54	Inf	-Inf	30.55	3	Horizontal	219	1.36	-
2440MHz	Pass	AV	2.4964G	45.26	54.00	-8.74	30.74	3	Horizontal	219	1.36	-
2440MHz	Pass	PK	2.3764G	58.36	74.00	-15.64	30.33	3	Horizontal	219	1.36	-
2440MHz	Pass	PK	2.4396G	100.39	Inf	-Inf	30.54	3	Horizontal	219	1.36	-
2440MHz	Pass	PK	2.4884G	59.03	74.00	-14.97	30.71	3	Horizontal	219	1.36	-
2440MHz	Pass	AV	7.321417G	44.28	54.00	-9.72	11.15	3	Vertical	198	1.50	-
2440MHz	Pass	PK	7.321457G	55.04	74.00	-18.96	11.15	3	Vertical	198	1.50	-
2440MHz	Pass	AV	7.321477G	52.12	54.00	-1.88	11.15	3	Horizontal	317	1.03	-
2440MHz	Pass	PK	7.321557G	60.88	74.00	-13.12	11.15	3	Horizontal	317	1.03	-
2474MHz	Pass	AV	2.474G	93.36	Inf	-Inf	30.66	3	Vertical	238	2.57	-
2474MHz	Pass	AV	2.4844G	51.25	54.00	-2.75	30.69	3	Vertical	238	2.57	-
2474MHz	Pass	PK	2.4736G	97.20	Inf	-Inf	30.66	3	Vertical	238	2.57	-
2474MHz	Pass	PK	2.4838G	67.52	74.00	-6.48	30.69	3	Vertical	238	2.57	-
2474MHz	Pass	AV	2.474G	95.50	Inf	-Inf	30.66	3	Horizontal	218	1.88	-
2474MHz	Pass	AV	2.4844G	53.06	54.00	-0.94	30.69	3	Horizontal	218	1.88	-
2474MHz	Pass	PK	2.4736G	99.38	Inf	-Inf	30.66	3	Horizontal	218	1.88	-
2474MHz	Pass	PK	2.483502G	72.19	74.00	-1.81	30.69	3	Horizontal	218	1.88	-
2474MHz	Pass	AV	7.423497G	46.85	54.00	-7.15	11.44	3	Vertical	205	1.94	-
2474MHz	Pass	PK	7.420244G	56.36	74.00	-17.64	11.43	3	Vertical	205	1.94	-
2474MHz	Pass	AV	7.423517G	53.72	54.00	-0.28	11.44	3	Horizontal	317	1.02	-
2474MHz	Pass	PK	7.423477G	62.55	74.00	-11.45	11.44	3	Horizontal	317	1.02	-

FHSS_Nss1_1TX

2408MHz_TX

02/06/2018

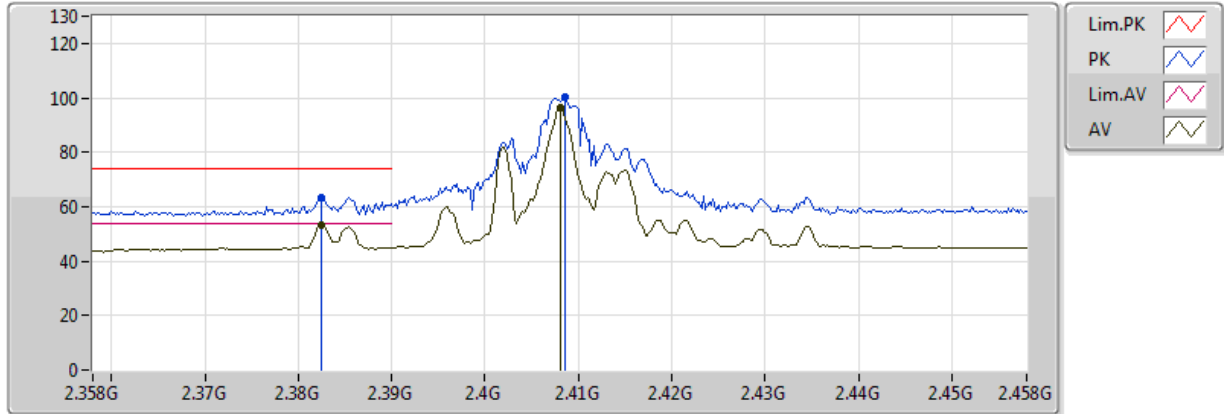


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3824G	51.85	54.00	-2.15	30.35	3	Vertical	190	1.21	-
AV	2.408G	93.43	Inf	-Inf	30.44	3	Vertical	190	1.21	-
PK	2.3826G	61.12	74.00	-12.88	30.35	3	Vertical	190	1.21	-
PK	2.4076G	96.62	Inf	-Inf	30.44	3	Vertical	190	1.21	-

FHSS_Nss1_1TX

2408MHz_TX

02/06/2018

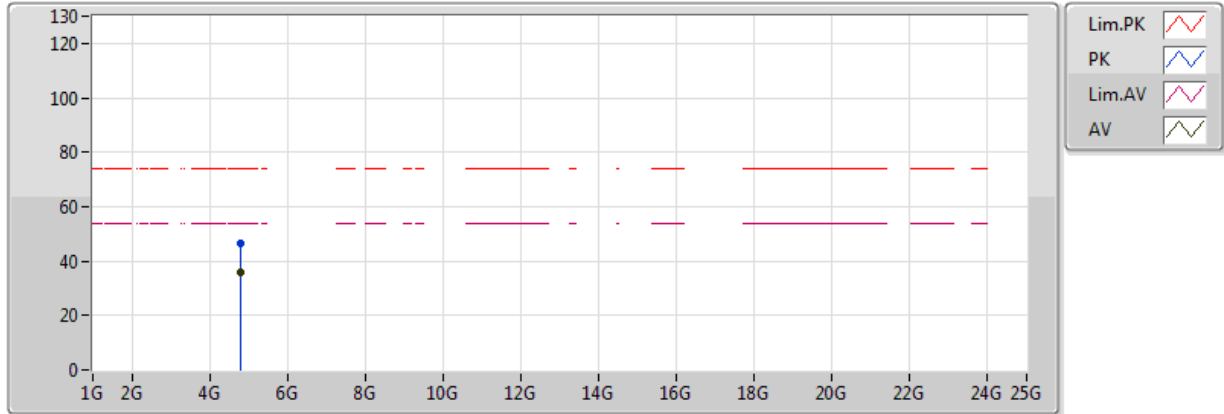


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3824G	53.42	54.00	-0.58	30.35	3	Horizontal	219	1.39	-
AV	2.408G	96.50	Inf	-Inf	30.44	3	Horizontal	219	1.39	-
PK	2.3824G	63.59	74.00	-10.41	30.35	3	Horizontal	219	1.39	-
PK	2.4086G	100.17	Inf	-Inf	30.44	3	Horizontal	219	1.39	-

FHSS_Nss1_1TX

2408MHz_TX

02/06/2018

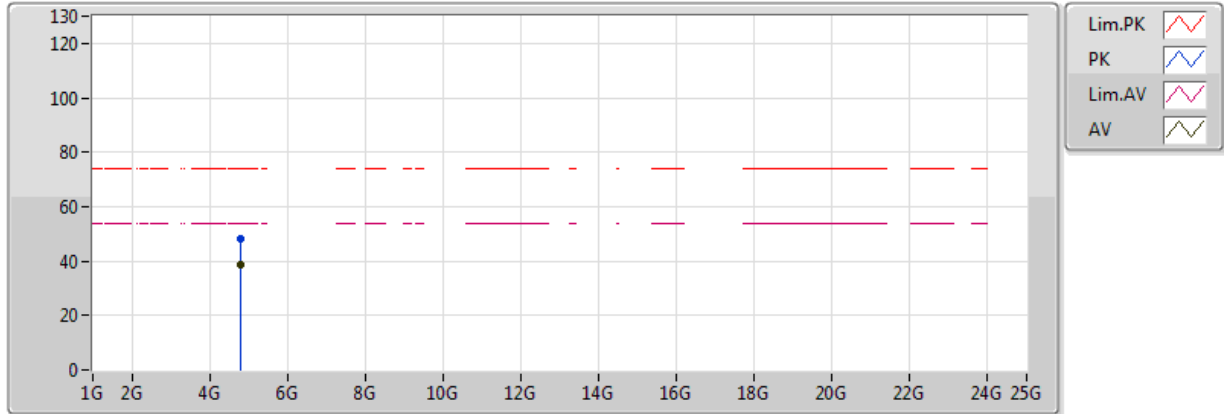


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.817058G	35.95	54.00	-18.05	5.82	3	Vertical	174	1.41	-
PK	4.816918G	46.63	74.00	-27.37	5.82	3	Vertical	174	1.41	-

FHSS_Nss1_1TX

2408MHz_TX

02/06/2018

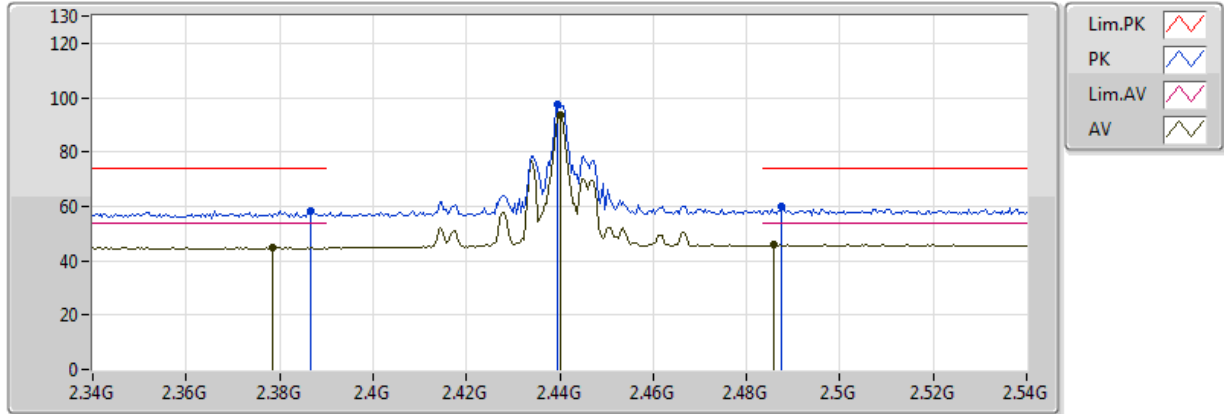


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.816978G	38.69	54.00	-15.31	5.82	3	Horizontal	238	1.02	-
PK	4.817078G	48.28	74.00	-25.72	5.82	3	Horizontal	238	1.02	-

FHSS_Nss1_1TX

2440MHz_TX

02/06/2018

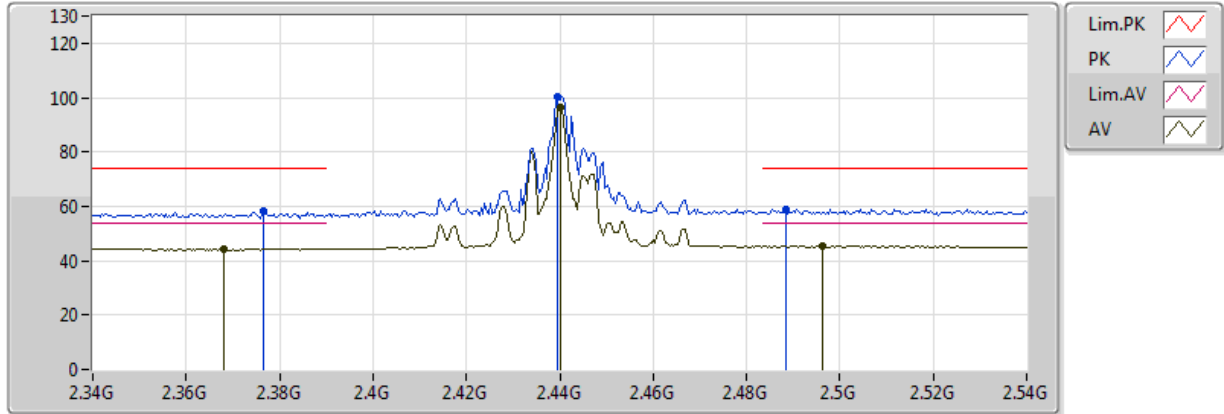


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3784G	44.72	54.00	-9.28	30.34	3	Vertical	238	2.66	-
AV	2.44G	93.80	Inf	-Inf	30.55	3	Vertical	238	2.66	-
AV	2.486G	45.79	54.00	-8.21	30.71	3	Vertical	238	2.66	-
PK	2.3868G	58.29	74.00	-15.71	30.37	3	Vertical	238	2.66	-
PK	2.4396G	97.33	Inf	-Inf	30.54	3	Vertical	238	2.66	-
PK	2.4876G	59.93	74.00	-14.07	30.71	3	Vertical	238	2.66	-

FHSS_Nss1_1TX

2440MHz_TX

02/06/2018

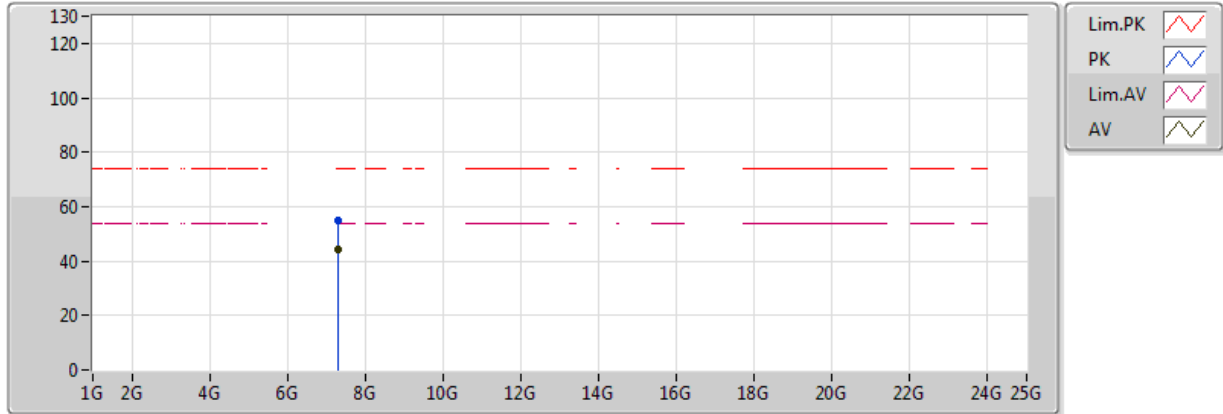


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.368G	44.53	54.00	-9.47	30.30	3	Horizontal	219	1.36	-
AV	2.44G	96.54	Inf	-Inf	30.55	3	Horizontal	219	1.36	-
AV	2.4964G	45.26	54.00	-8.74	30.74	3	Horizontal	219	1.36	-
PK	2.3764G	58.36	74.00	-15.64	30.33	3	Horizontal	219	1.36	-
PK	2.4396G	100.39	Inf	-Inf	30.54	3	Horizontal	219	1.36	-
PK	2.4884G	59.03	74.00	-14.97	30.71	3	Horizontal	219	1.36	-

FHSS_Nss1_1TX

2440MHz_TX

02/06/2018

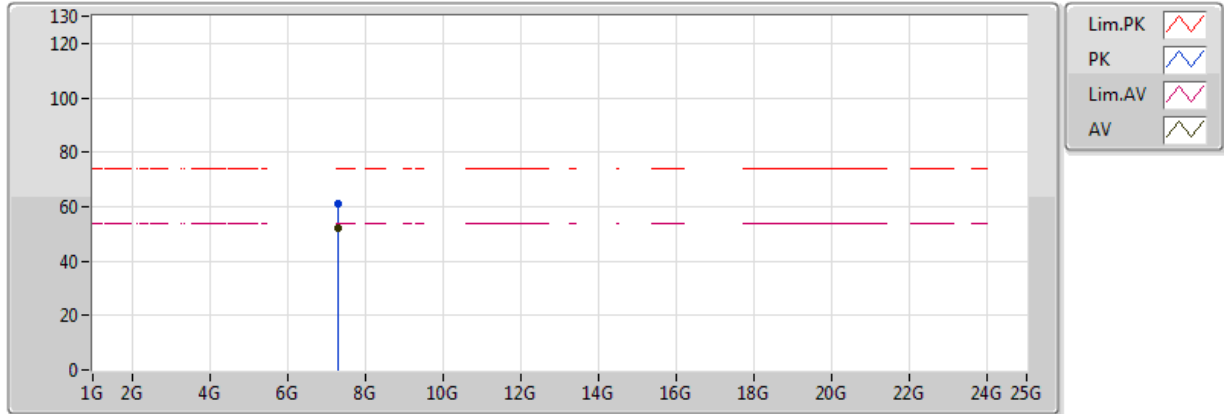


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	7.321417G	44.28	54.00	-9.72	11.15	3	Vertical	198	1.50	-
PK	7.321457G	55.04	74.00	-18.96	11.15	3	Vertical	198	1.50	-

FHSS_Nss1_1TX

2440MHz_TX

02/06/2018

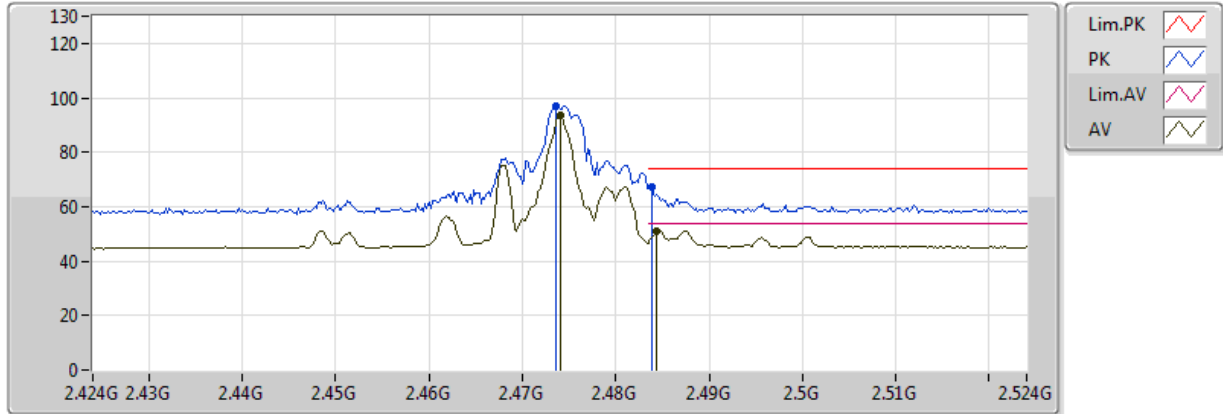


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	7.321477G	52.12	54.00	-1.88	11.15	3	Horizontal	317	1.03	-
PK	7.321557G	60.88	74.00	-13.12	11.15	3	Horizontal	317	1.03	-

FHSS_Nss1_1TX

2474MHz_TX

02/06/2018

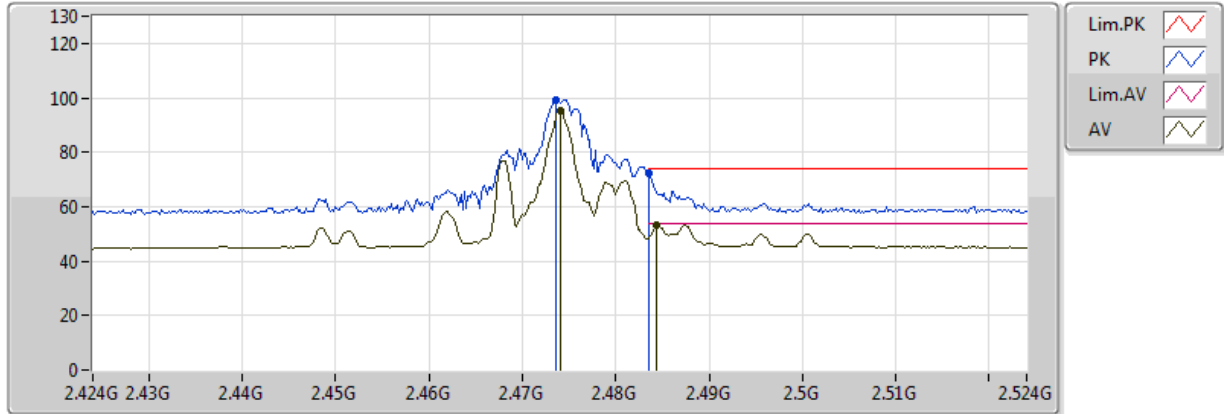


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.474G	93.36	Inf	-Inf	30.66	3	Vertical	238	2.57	-
AV	2.4844G	51.25	54.00	-2.75	30.69	3	Vertical	238	2.57	-
PK	2.4736G	97.20	Inf	-Inf	30.66	3	Vertical	238	2.57	-
PK	2.4838G	67.52	74.00	-6.48	30.69	3	Vertical	238	2.57	-

FHSS_Nss1_1TX

2474MHz_TX

02/06/2018

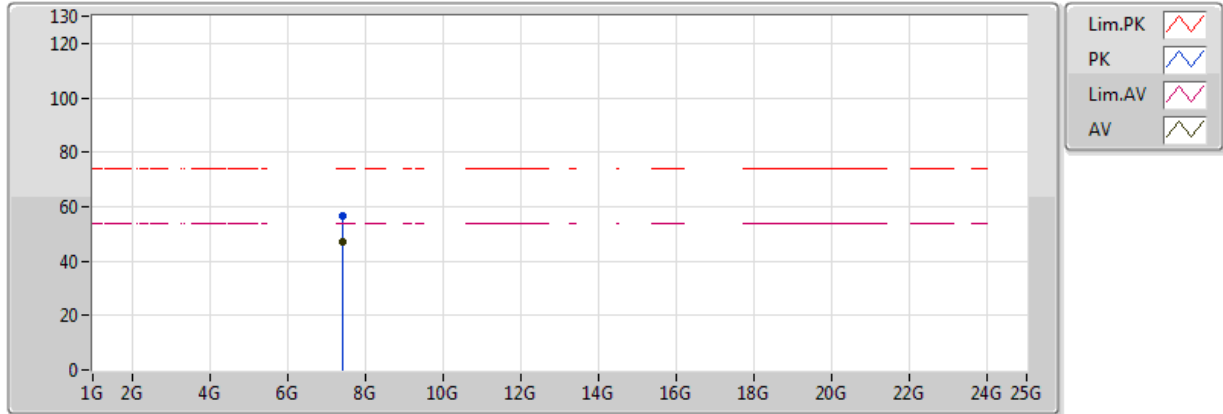


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.474G	95.50	Inf	-Inf	30.66	3	Horizontal	218	1.88	-
AV	2.4844G	53.06	54.00	-0.94	30.69	3	Horizontal	218	1.88	-
PK	2.4736G	99.38	Inf	-Inf	30.66	3	Horizontal	218	1.88	-
PK	2.483502G	72.19	74.00	-1.81	30.69	3	Horizontal	218	1.88	-

FHSS_Nss1_1TX

2474MHz_TX

02/06/2018

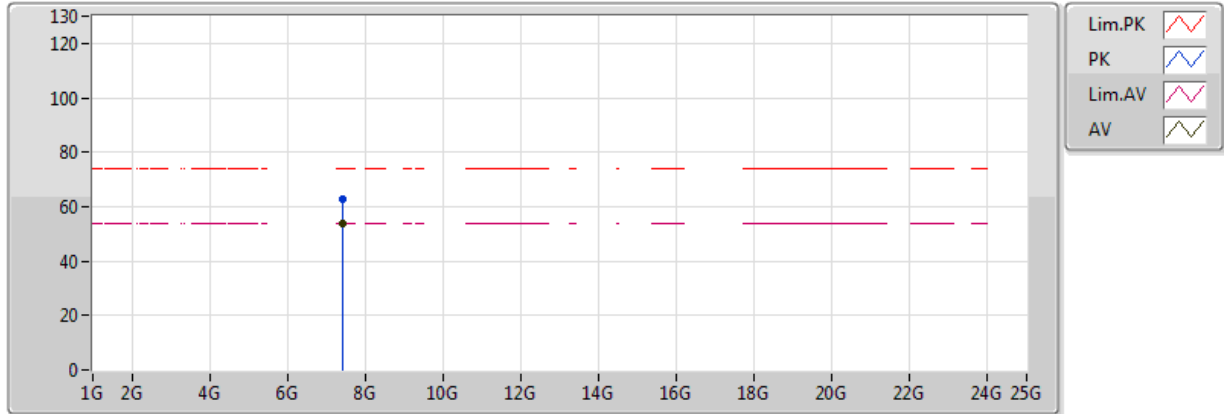


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	7.423497G	46.85	54.00	-7.15	11.44	3	Vertical	205	1.94	-
PK	7.420244G	56.36	74.00	-17.64	11.43	3	Vertical	205	1.94	-

FHSS_Nss1_1TX

2474MHz_TX

02/06/2018



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	7.423517G	53.72	54.00	-0.28	11.44	3	Horizontal	317	1.02	-
PK	7.423477G	62.55	74.00	-11.45	11.44	3	Horizontal	317	1.02	-