

FCC Test Report

FCC ID : TVE-3111BB056

Equipment : Secured Wireless Access Point

Brand Name : FORTINET

Model Name : FortiAP U431Fxxxxxx, FAP-U431Fxxxxxx,
FORTIAP-U431Fxxxxxx
FortiAP U433Fxxxxxx, FAP-U433Fxxxxxx,
FORTIAP-U433Fxxxxxx
(where "x" can be used as "A-Z", or "0-9", or "-", or
blank for software changes or marketing purposes only)

Applicant : Fortinet, Inc.
899 Kifer Road, Sunnyvale, CA 94086, USA

Manufacturer : Universal Global Scientific Industrial Co., Ltd
141, Lane 351, Sec. 1, Taiping Road, Tsautuen, Nantou
54261, Taiwan

Standard : 47 CFR FCC Part 15.247

The product was received on Mar. 11, 2019, and testing was started from Apr. 20, 2019 and completed on May 17, 2019. 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



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

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:
None

Reviewed by: Jackson Tsai

Report Producer: Debby Hung

1 General Description

1.1 Information

The EUT has three radio chip.

Function	Radio 1	Radio 2	Radio 3
WiFi 2.4G	X	V	V
WiFi 5G	V	V	V (Only RX)
Bluetooth	X	X	V

1.1.1 RF General Information

Frequency Range (MHz)	Bluetooth Version	Ch. Frequency (MHz)	Channel Number
2400-2483.5	BR / EDR	2402-2480	0-78 [79]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	BT-BR(1Mbps)	1	1TX
2.4-2.4835GHz	BT-EDR(2Mbps)	1	1TX
2.4-2.4835GHz	BT-EDR(3Mbps)	1	1TX

Note:

- ◆ Bluetooth BR uses a GFSK (1Mbps).
- ◆ Bluetooth EDR uses a combination of $\pi/4$ -DQPSK (2Mbps) and 8DPSK (3Mbps).
- ◆ Bluetooth BR/EDR uses as a system using FHSS modulation.
- ◆ BWch is the nominal channel bandwidth.



1.1.2 Antenna Information

Model: FAP-U433F

Ant.	Radio	Brand	Model Name	Antenna Type	Connector
1-4	1	ARISTOTLE	RFA-05-C53-U-B32C255	Dipole Antenna	Reversed-SMA
5-8	2	ARISTOTLE	RFA-25-C53-U-B32C255	Dipole Antenna	Reversed-SMA
9-10	3	ARISTOTLE	RFA-25-C53-U-B32C255	Dipole Antenna	Reversed-SMA
11	3	ARISTOTLE	RFA-BT-G402-79-200	PIFA Antenna	IPEX

Ant.	Gain (dBi)			
	Radio 1	Radio 2 & Radio 3		Radio 3
	5G	2.4G	5G	BT
1-4	4.3	-	-	-
5-8	-	3.5	5.0	-
9-10	-	3.5	5.0	-
11	-	-	-	3.0

Model: FAP-U431F

Ant.	Radio	Brand	Model Name	Antenna Type	Connector
1-4	1	ARISTOTLE	RFA-9953	PIFA Antenna	IPEX
5-8	2	ARISTOTLE	RFA-9953	PIFA Antenna	IPEX
9-10	3	ARISTOTLE	RFA-9953	PIFA Antenna	IPEX
11	3	ARISTOTLE	RFA-BT-G402-79-200	PIFA Antenna	IPEX

Ant.	Gain (dBi)			
	Radio 1	Radio 2 & Radio 3		Radio 3
	5G	2.4G	5G	BT
1-4	6.0	-	-	-
5-8	-	4.0	6.0	-
9-10	-	4.0	6.0	-
11	-	-	-	3.0



Ant.	BF Gain (dBi)
	Radio 1 & 2
-	6.02

Directional gain = $G_{ANT\ MAX} + 10 \log(N_{ANT}/N_{SS})$ dBi, where N_{SS} = the number of independent spatial streams of data and $G_{ANT\ MAX}$ is the gain of the antenna having the highest gain (in dBi).

For 2.4GHz function:

For IEEE 802.11 b/g/n/ac/ax mode

Radio 2 : Ant. 5 to Ant. 8 could transmit/receive simultaneously. (4TX/4RX)

Radio 3 : Ant. 9 and Ant. 10 could transmit/receive simultaneously.(2TX/2RX)

For 5GHz function:

For IEEE 802.11 a/n/ac/ax mode

Radio 1 : Ant. 1 to Ant. 4 could transmit/receive simultaneously. (4TX/4RX)

Radio 2 : Ant. 5 to Ant. 8 could transmit/receive simultaneously. (4TX/4RX)

Radio 3 : Ant. 9 and Ant. 10 could transmit/receive simultaneously. (2RX)

For Bluetooth function:

For IEEE 802.15.1 Bluetooth mode

Radio 3 : Ant. 11 could transmit/receive simultaneously. (1TX/1RX)

1.1.3 EUT Information

Operational Condition	
EUT Power Type	From AC Adapter
EUT Function	<input checked="" type="checkbox"/> Point-to-multipoint <input type="checkbox"/> Point-to-point
Type of EUT	
<input checked="" type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device)
	Combined Equipment - Brand Name / Model No.: ...
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems)
	Host System - Brand Name / Model No.: ...
<input type="checkbox"/>	Other:

1.1.4 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) $\geq 1/T$
BT-BR(1Mbps)	0.741	1.3	2.888m	1k
BT-EDR(2Mbps)	0.785	1.05	2.891m	1k

Note. If DC < 0.98, the DCF was added while measuring Output power and PSD.

1.1.5 Table for Multiple Listing

Brand Name	Model Name	Description
FORTINET	FortiAP U431Fxxxxxx	Internal Antenna
	FAP-U431Fxxxxxx	
	FORTIAP-U431Fxxxxxx	
	FortiAP U433Fxxxxxx	External Antenna
	FAP-U433Fxxxxxx	
	FORTIAP-U433Fxxxxxx	

Notes: All the models are electrically identical, difference model names for marketing purpose.

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
- ◆ KDB 558074 D01 v05r02
- ◆ ANSI C63.10-2013

1.3 Testing Location Information

Testing Location			
<input checked="" type="checkbox"/>	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.			
<input type="checkbox"/>	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
RF Conducted	TH06-HY	Gary	23.1~26.6°C / 61~69%	07/May/2019~10/May/2019
Radiated	03CH02-HY	Daniel	21.6~23.5°C / 51.7~55.3%	20/Apr/2019~11/May/2019
AC Conduction	CO01-HY	Jeff	23.5~24.1°C / 53.6~57.5%	11/May/2019~17/May/2019

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)	3.54 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	1.6 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
TnomVnom	Tnom	20°C
-	Vnom	120V

2.2 Test Channel Mode



Test Software	Cmd
---------------	-----

Mode	PowerSetting
BT-BR(1Mbps)	-
2402MHz	10
2441MHz	10
2480MHz	10
BT-EDR(2Mbps)	-
2402MHz	10
2441MHz	10
2480MHz	10

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	Adapter mode ; Radio3 ; BT EDR 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	Adapter mode ; Radio3 ; BT EDR TX	
Operating Mode > 1GHz	CTX	
Orthogonal Planes of EUT	Y Plane	Z Plane
		
Worst Planes of EUT		V

2.4 Accessories and Support Equipment

Accessories				
AC Adapter	Brand Name	APD	Model Name	WA-30J12R
	Power Rating	I/P: 100 - 240Vac, 0.9 A, O/P: 12 Vdc, 2.5 A		
	Power Cord	1.50 meter, non-shielded cable, w/o ferrite core		

Reminder: Regarding to more detail and other information, please refer to user manual.

Support Equipment – RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5410	R33002 / DOC
2	Adapter for NB	DELL	HA65NM130	R35737 / DOC

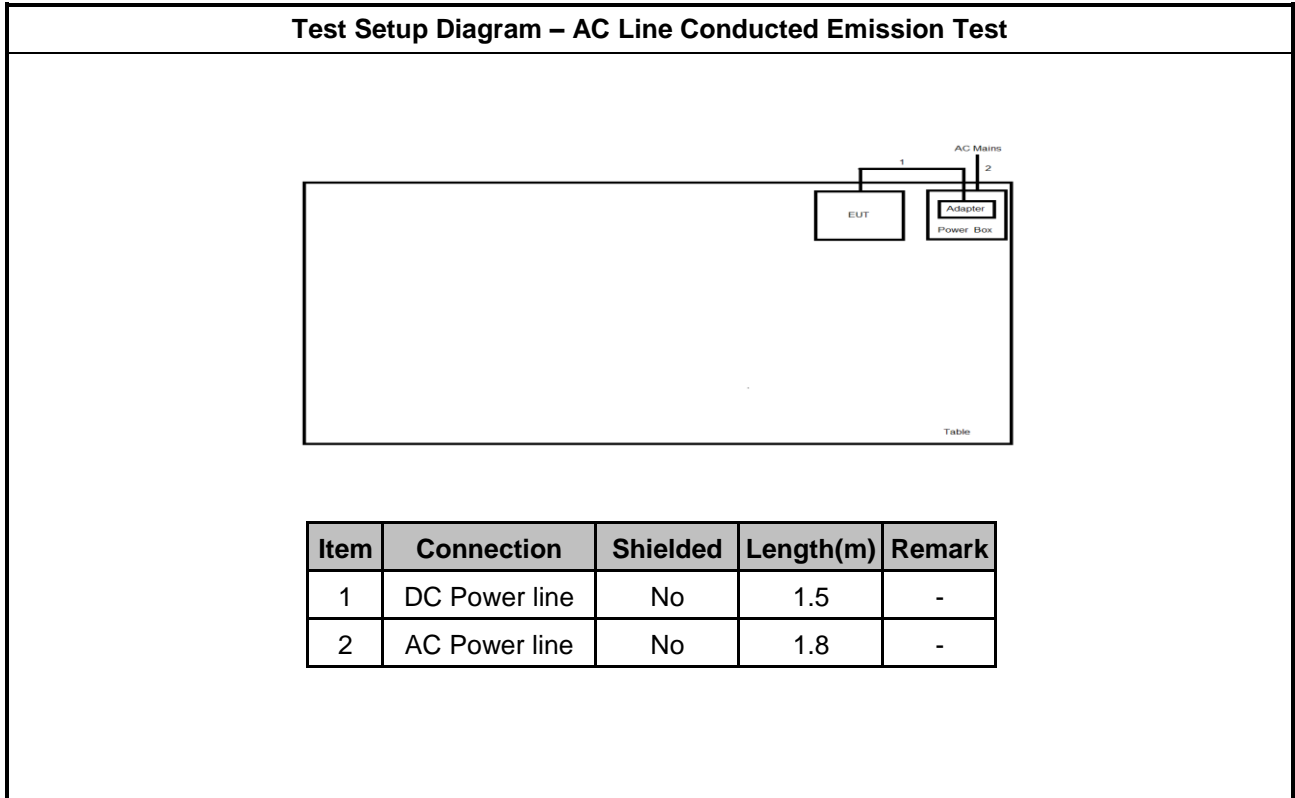
Support Equipment – Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5530	DOC
2	Client AP	FORTINET	FAP-U433F	DOC
3	Client AP	FORTINET	FAP-U431F	DOC

Note.Support equipment No.2,3 was provided by customer.

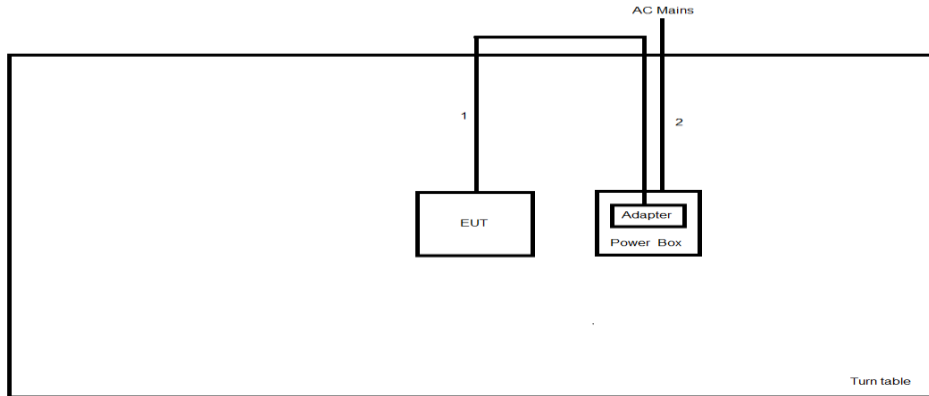
Support Equipment – AC Conduction				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5530	DOC
2	Client AP	FORTINET	FAP-U433F	DOC
3	Client AP	FORTINET	FAP-U431F	DOC

Note.Support equipment No.2,3 was provided by customer.

2.5 Test Setup Diagram



Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length(m)	Remark
1	DC Power line	No	1.5	-
2	AC Power line	No	1.8	-

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.

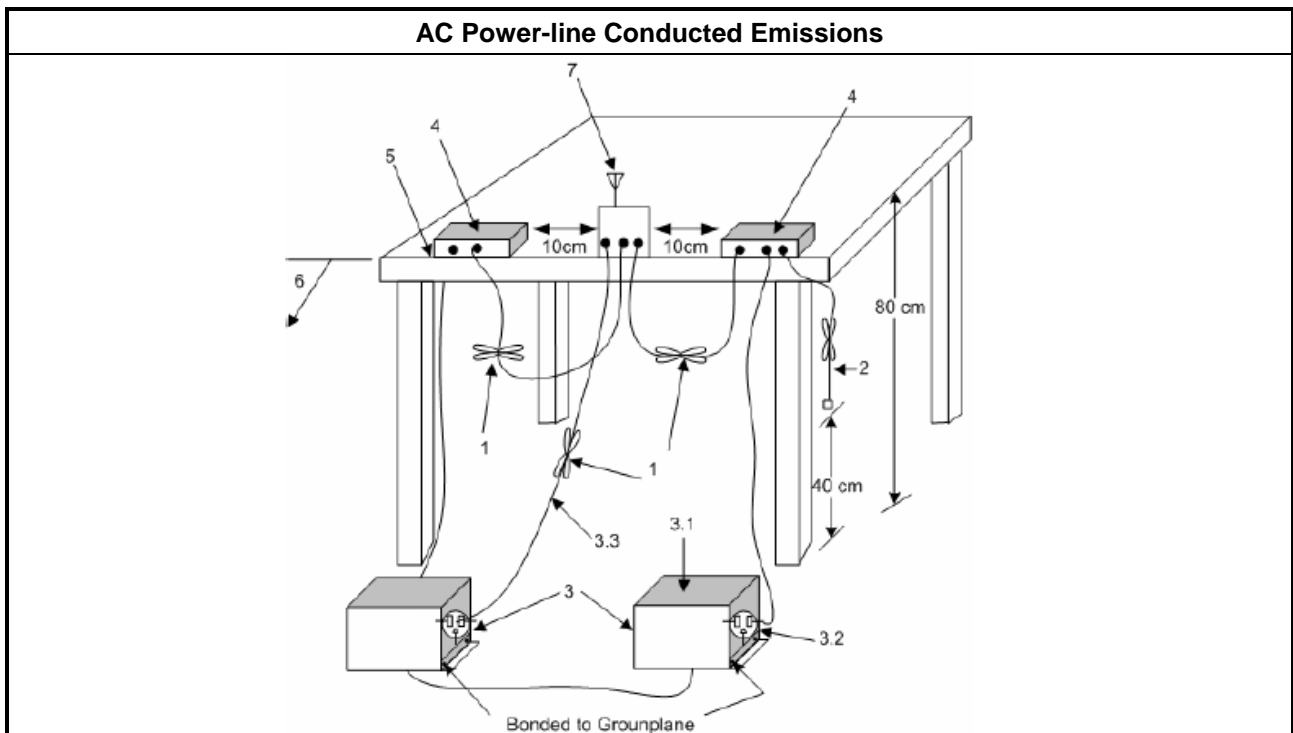
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

Test Method
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 2400-2483.5 MHz Band: 	
	<ul style="list-style-type: none"> $N \geq 75$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz).
	<ul style="list-style-type: none"> $75 > N \geq 15$ and $ChS \geq MAX$ (20 dB bandwidth 2/3,25 kHz).
N: Number of Hopping Frequencies; ChS: Hopping Channel Separation	

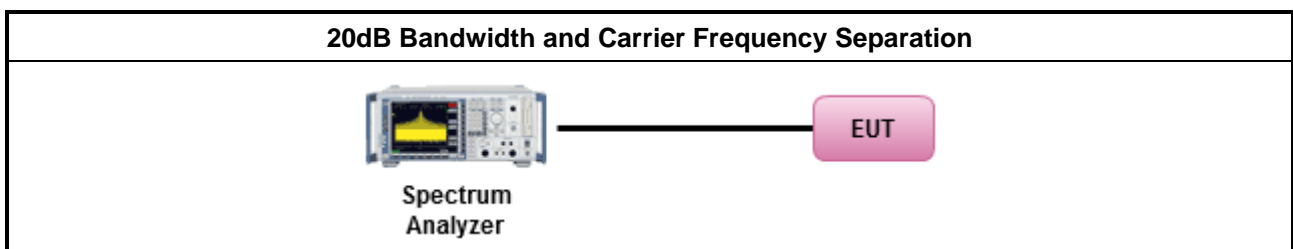
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method
<ul style="list-style-type: none"> Refer as ANSI C63.10-2013, clause 6.9.2 for 20 dB bandwidth measurement.
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 2400-2483.5 MHz Band: 	
	<ul style="list-style-type: none"> $N \geq 75$; Power 30dBm; EIRP 36dBm
	<ul style="list-style-type: none"> $75 > N \geq 15$; Power 21dBm; EIRP 27dBm
N: Number of Hopping Frequencies	

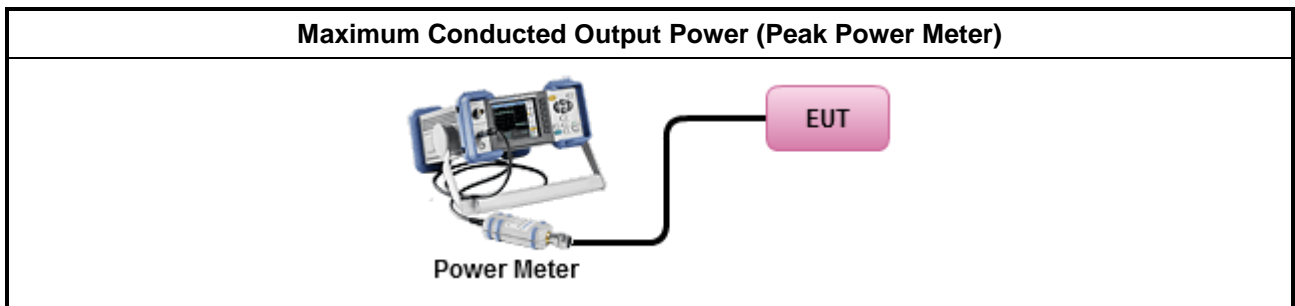
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> ▪ 2400-2483.5 MHz Band: 	
	<ul style="list-style-type: none"> ▪ $N \geq 75$ and $ChS \geq MAX$ (20 dB bandwidth, 25 kHz).
	<ul style="list-style-type: none"> ▪ $75 > N \geq 15$ 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

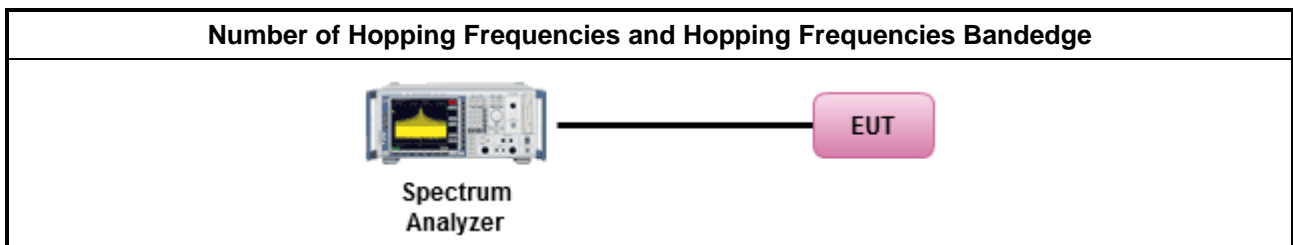
3.4.3 Measuring Instruments

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

3.4.4 Test Procedures

Test Method
<ul style="list-style-type: none"> ▪ Refer as ANSI C63.10-2013, clause 7.8.3 for number of hopping frequencies measurement.
<ul style="list-style-type: none"> ▪ 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	
<ul style="list-style-type: none"> 2400-2483.5 MHz Band: 	
	<ul style="list-style-type: none"> $N \geq 75$; 0.4s in $N \times 0.4$ period
	<ul style="list-style-type: none"> $75 > N \geq 15$; 0.4s in $N \times 0.4$ period
N: Number of Hopping Frequencies	

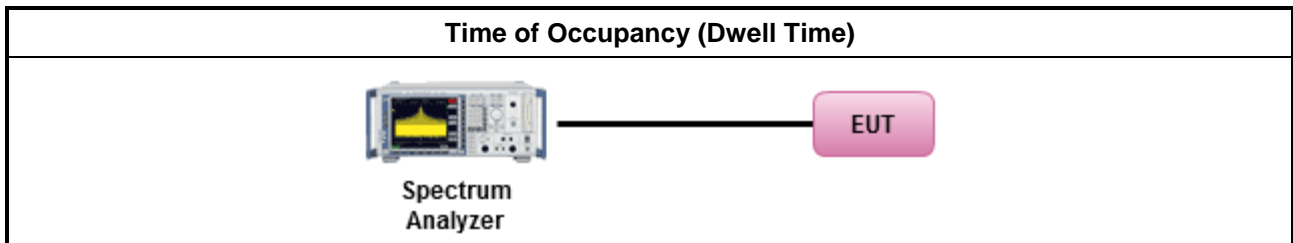
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> Refer as ANSI C63.10-2013, clause 7.8.4 for dwell time measurement. 	
<ul style="list-style-type: none"> 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. 	
	<ul style="list-style-type: none"> 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.	

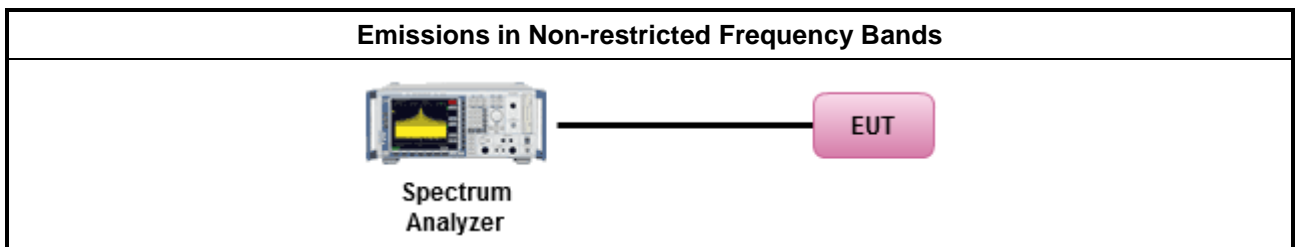
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

Test Method
<ul style="list-style-type: none"> 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.

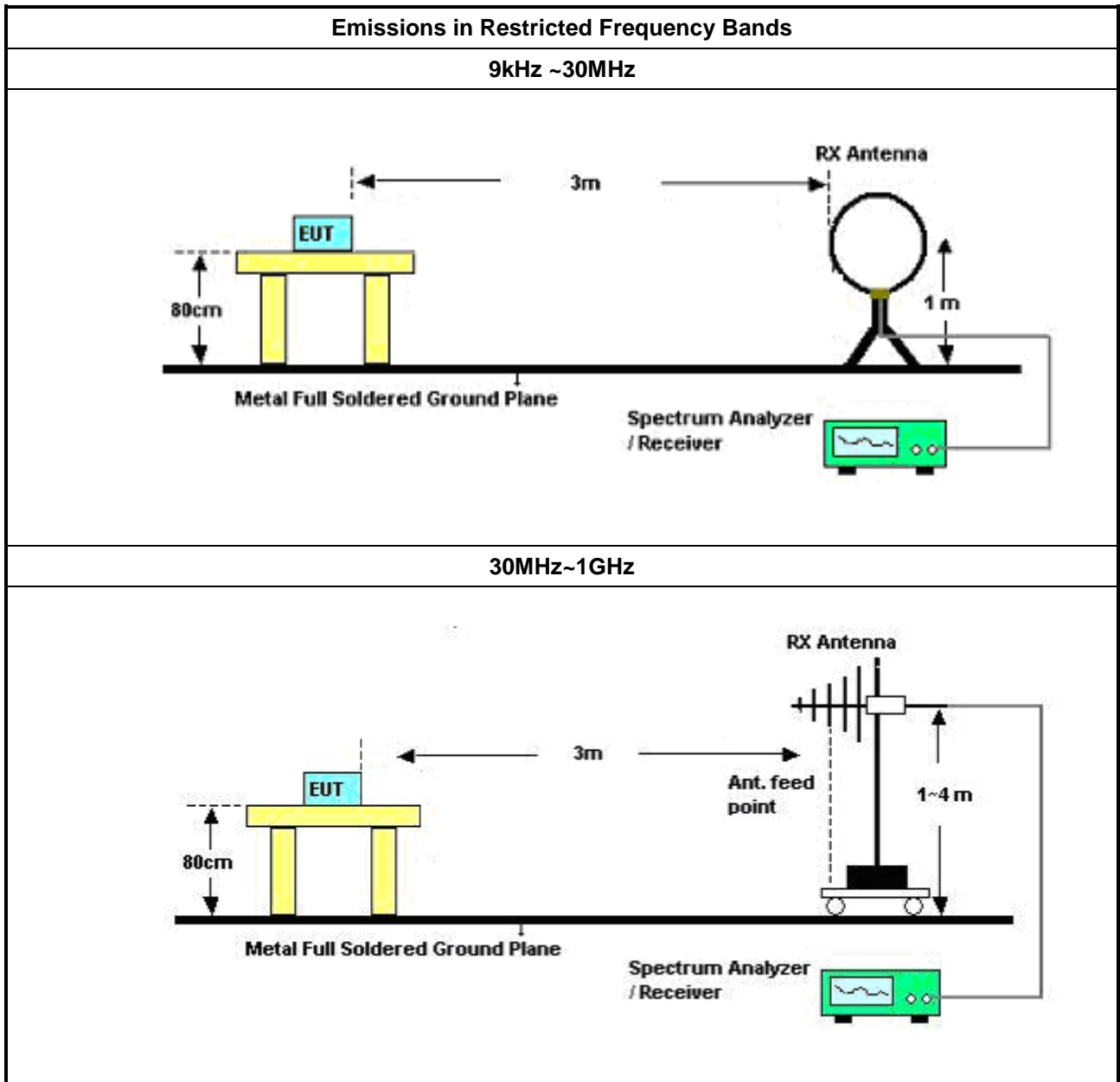
3.7.2 Measuring Instruments

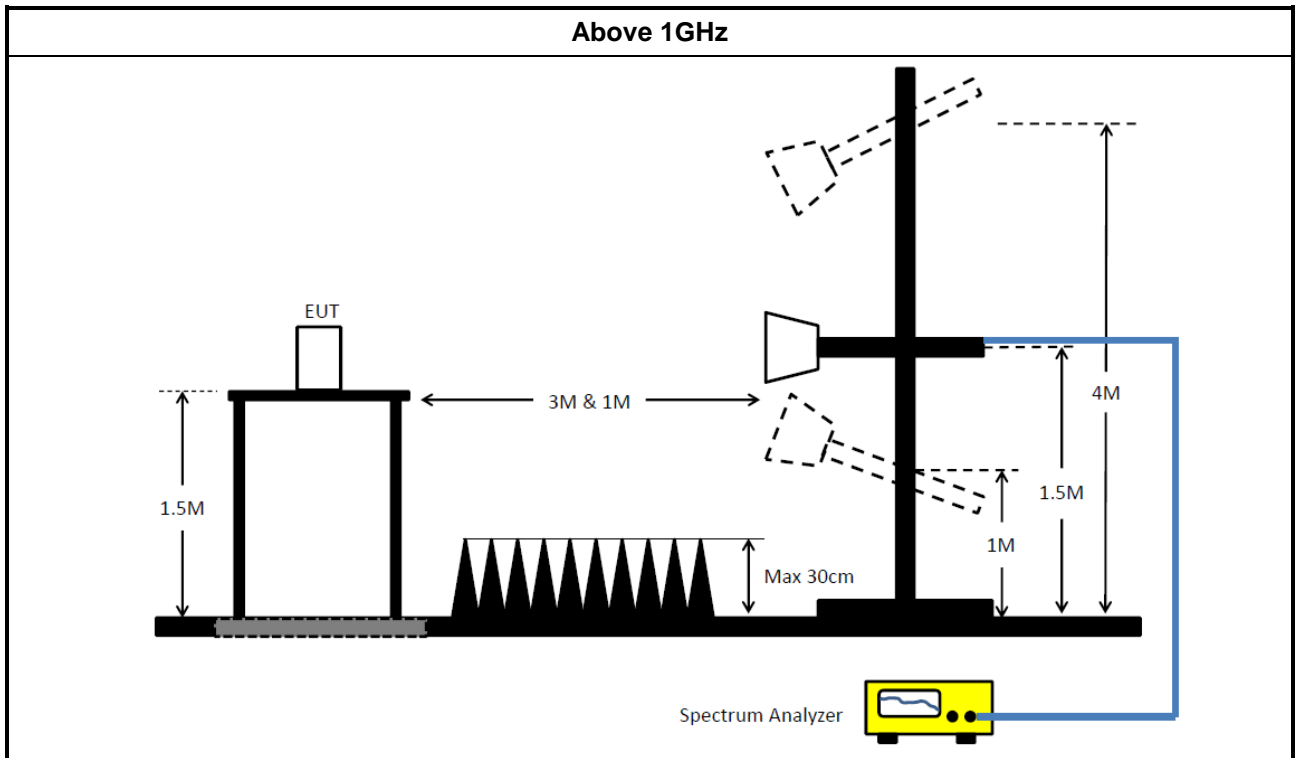
Refer a test equipment and calibration data table in this test report.

3.7.3 Test Procedures

Test Method	
	<ul style="list-style-type: none"> ▪ The average emission levels shall be measured in [hopping duty factor].
	<ul style="list-style-type: none"> ▪ Refer as ANSI C63.10; clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
	<ul style="list-style-type: none"> ▪ For the transmitter unwanted emissions shall be measured using following options below: <ul style="list-style-type: none"> ▪ 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	ESR3	102052	9kHz ~ 3.6GHz	09/Apr/2019	08/Apr/2020
LISN	R&S	ENV 216	101274	9kHz ~ 30MHz	12/Jun/2018	11/Jun/2019
RF Cable-CON	MTJ	RG142	CB001-CO	9kHz ~ 30MHz	17/Sep/2018	16/Sep/2019
AC POWER	APC	AFC-11003G	F308010045	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Puls e Limiter	SCHWARZBEC K	VTSD 9561F	9495	9kHz ~ 30MHz	11/Oct/2018	10/Oct/2019

NCR : Non-Calibration Require



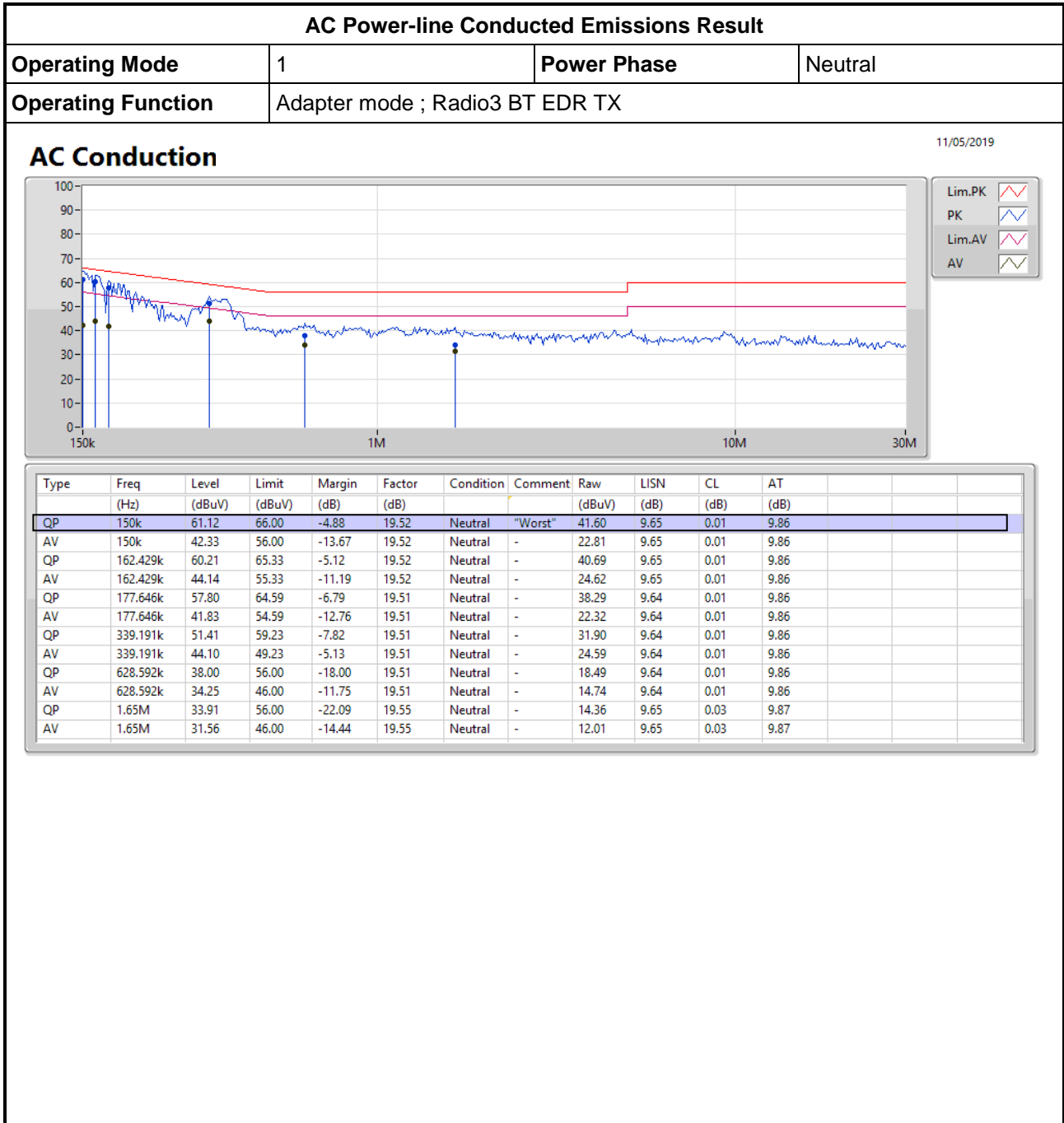
Instrument for Radiated Test

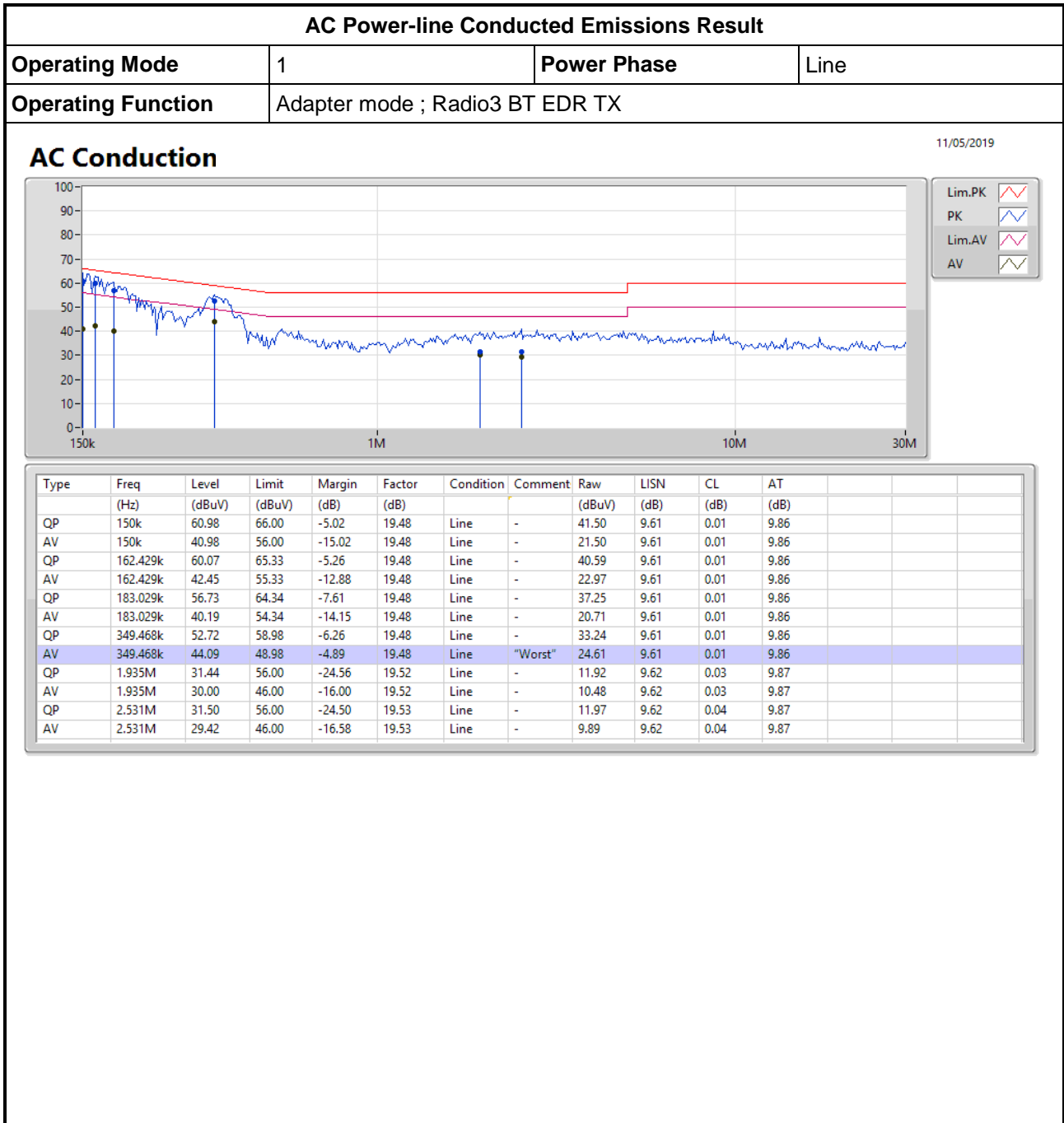
Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	19/Oct/2018	18/Oct/2019
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz 3m	17/Oct/2018	16/Oct/2019
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	27Jul/2018	02/Jul/2019
Microwave Preamplifier	Agilent	8449B	3008A02373	1GHz ~ 26.5GHz	23/Oct/2018	22/Oct/2019
Signal Analyzer	R&S	FSV40	101500	10Hz ~ 40GHz	18/Jul/2018	17/Jul/2019
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	26/Mar/2019	25/Mar/2020
RF Cable-high 6m	SUHNER	SUCOFLEX104	10567868 / SN805193/4	1GHz~40GHz	09/Apr/2019	08/Apr/2020
RF Cable-high 7m	SUHNER	SUCOFLEX104	10567868 / SN805192/4	1GHz~40GHz	09/Apr/2019	08/Apr/2020
Bilog Antenna & 5dB Attenuator	SCHAFFNER / MTJ	CBL 6112B / MTJ6102-05	2723 / 2	30MHz ~ 1GHz	08/Sep/2018	07/Sep/2019
Preamplifier	MITEQ	TTA1840-35-HG	1864481	18GHz ~ 40GHz	24/Aug/2018	23/Aug/2019
EMI Test Receiver	R&S	ESR	102052	9kHz ~ 3.6GHz	09/Apr/2019	08/Apr/2020
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	15/Mar/2019	14/Mar/2020
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170221	15GHz ~ 40GHz	22/Mar/2019	21/Mar/2020
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBH 9120 D	BBHA 9120 D 1531	1GHz ~ 18GHz	09/Mar/2019	08/Mar/2020

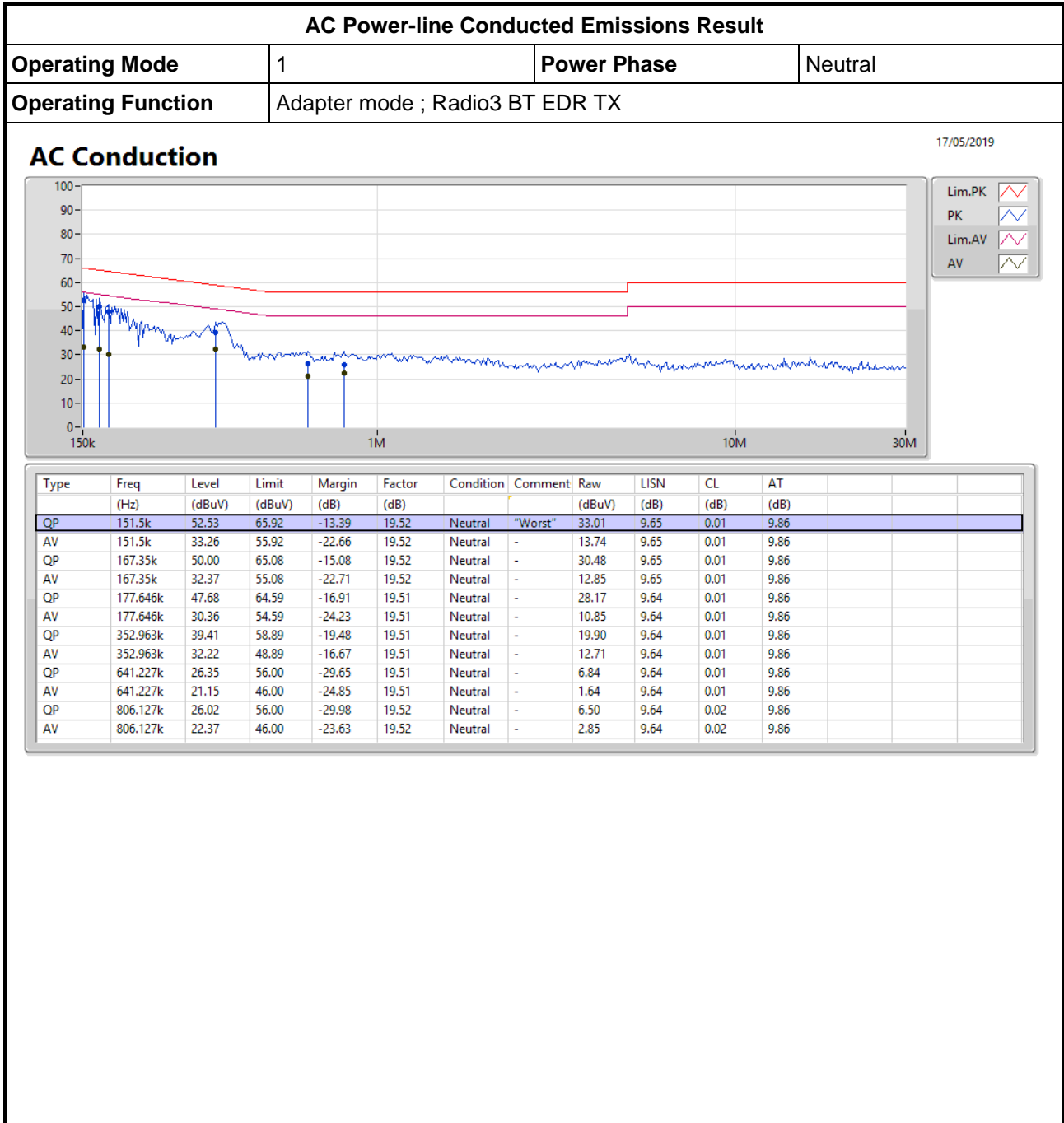


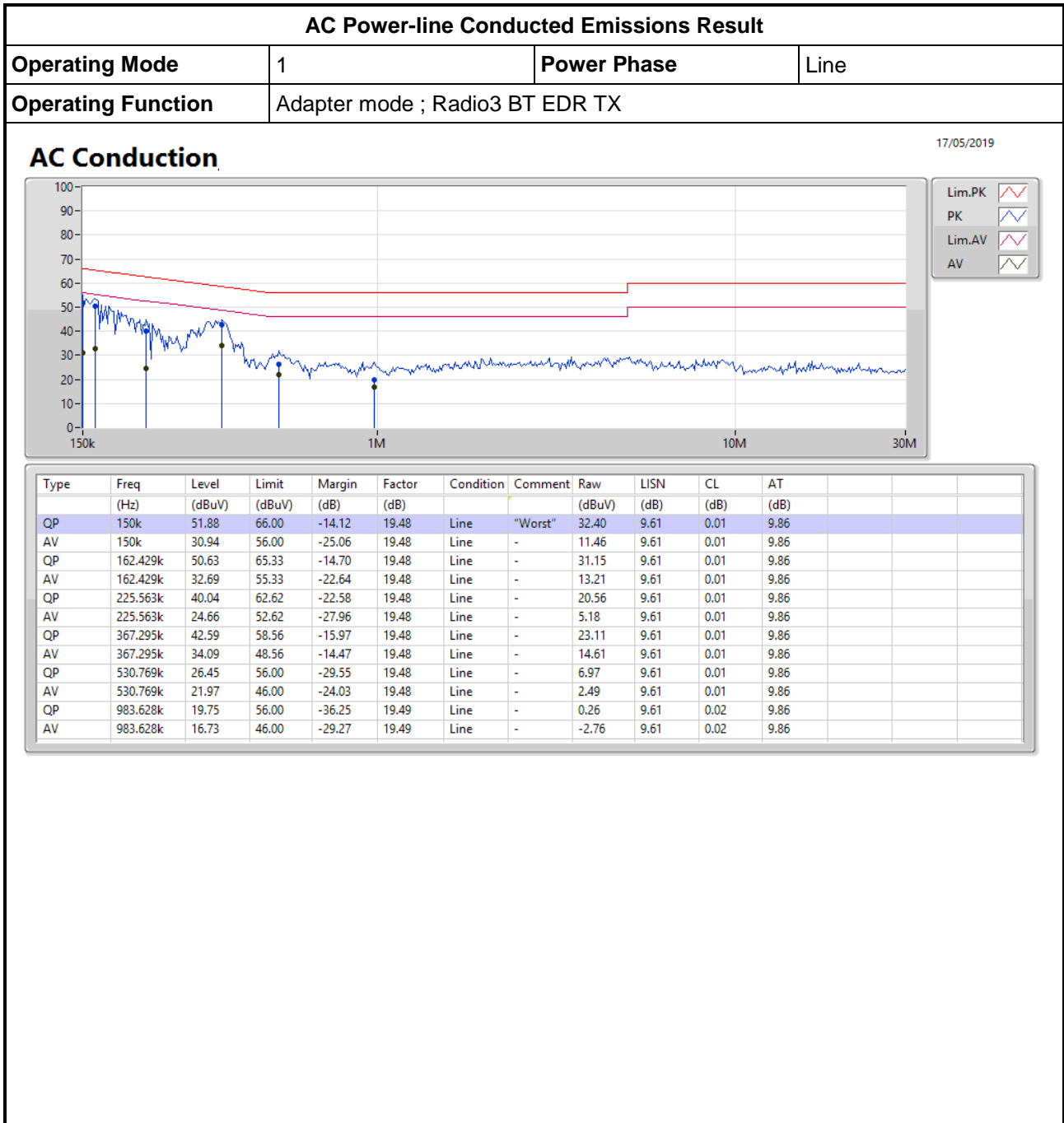
Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101500	10Hz~40GHz	18/Jul/2018	17/Jul/2019
Power Sensor	Anritsu	MA2411B	1339407	300MHz ~ 40GHz	17/Nov/2018	16/Nov/2019
Power Meter	Anritsu	ML2495A	1517010	300MHz ~ 40GHz	17/Nov/2018	16/Nov/2019
Cable 0.2m	HUBER	MY10710/4	RF Cable - 01	30MHz ~18G	10/Jan/2019	09/Jan/2020
Cable 0.2m	HUBER	MY10711/4	RF Cable - 02	30MHz ~18G	10/Jan/2019	09/Jan/2020
Cable 0.5m	HUBER	MY39470/4	RF Cable - 29	30MHz ~18G	10/Jan/2019	09/Jan/2020
SMB100A Signal Generator	R&S	SMB100A03	181147	100kHz~40GHz	12/Nov/2018	10/Nov/2020











Summary

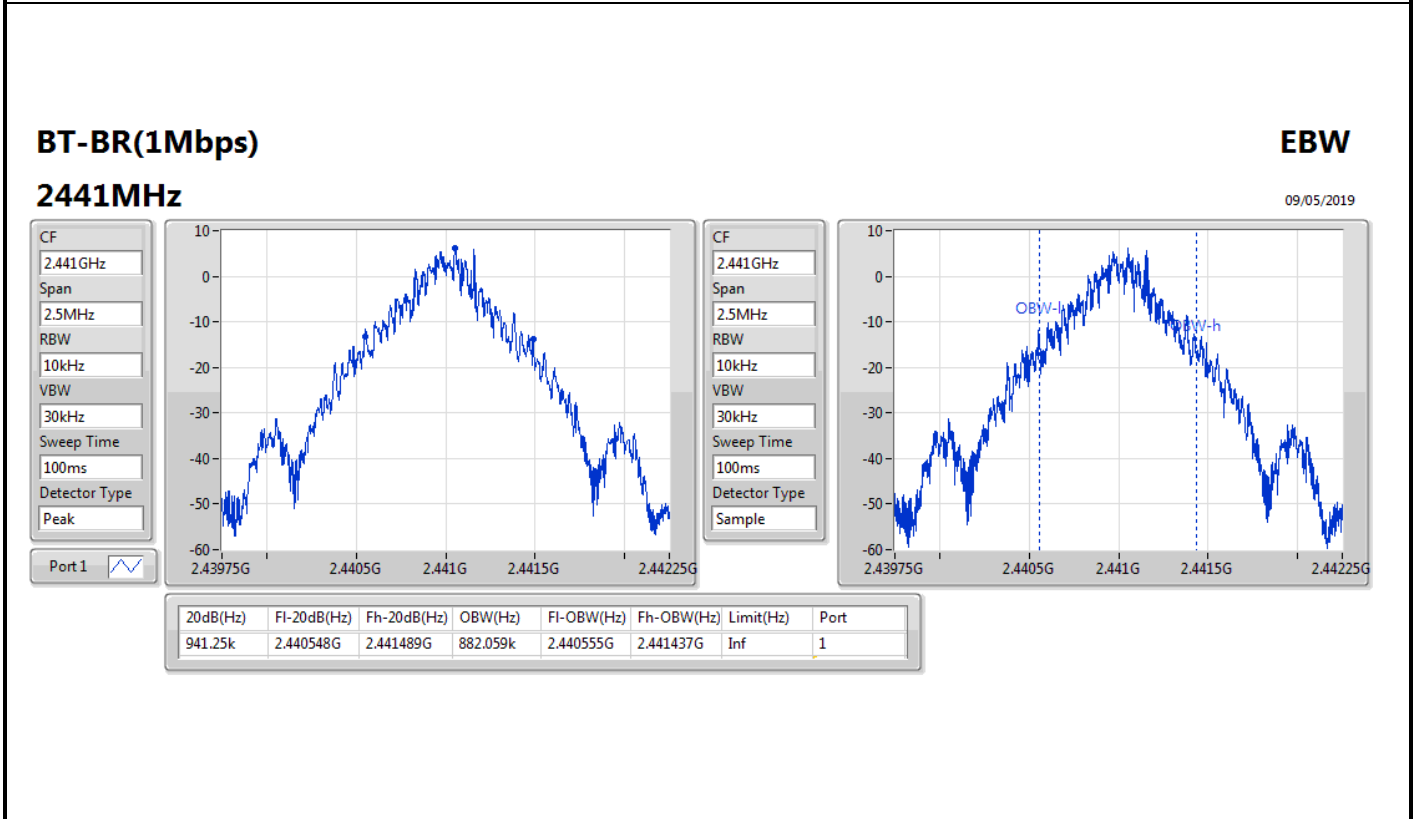
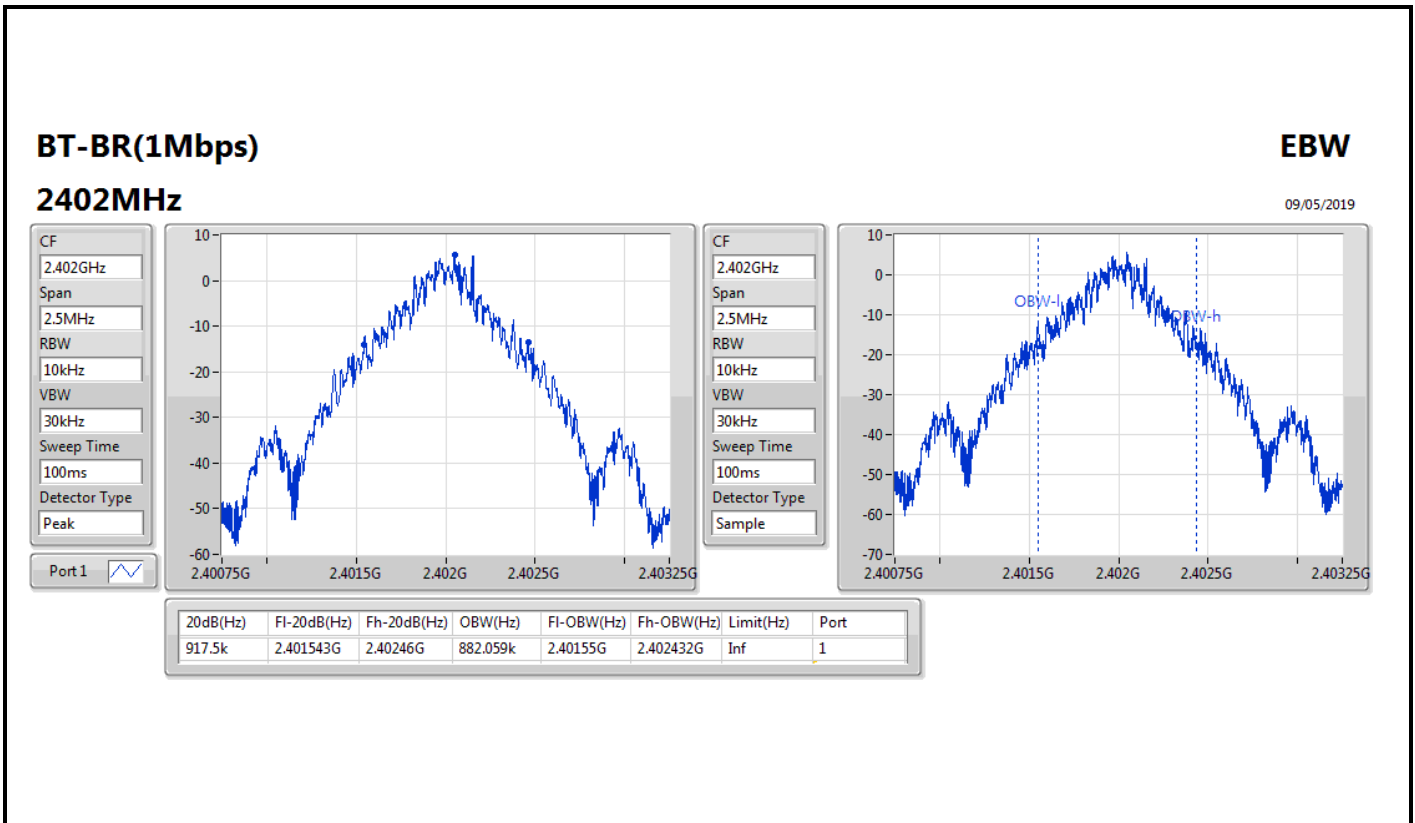
Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-BR(1Mbps)	941.25k	887.056k	887KF1D	916.25k	882.059k
BT-EDR(2Mbps)	1.334M	1.226M	1M23G1D	1.331M	1.223M

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)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	Inf	917.5k	882.059k
2441MHz	Pass	Inf	941.25k	882.059k
2480MHz	Pass	Inf	916.25k	887.056k
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.334M	1.223M
2441MHz	Pass	Inf	1.331M	1.223M
2480MHz	Pass	Inf	1.333M	1.226M

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

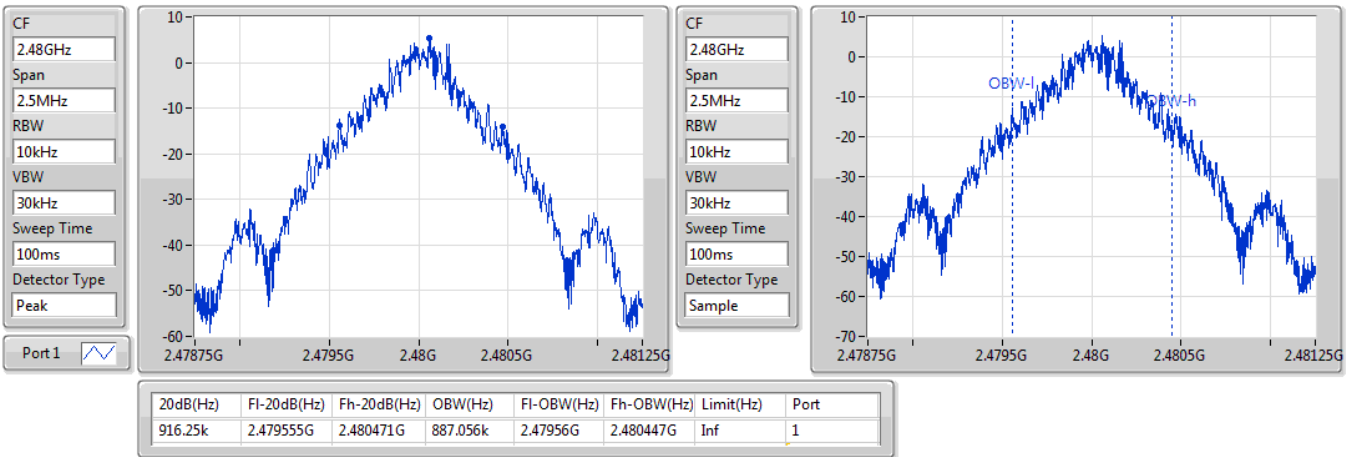


BT-BR(1Mbps)

EBW

2480MHz

09/05/2019

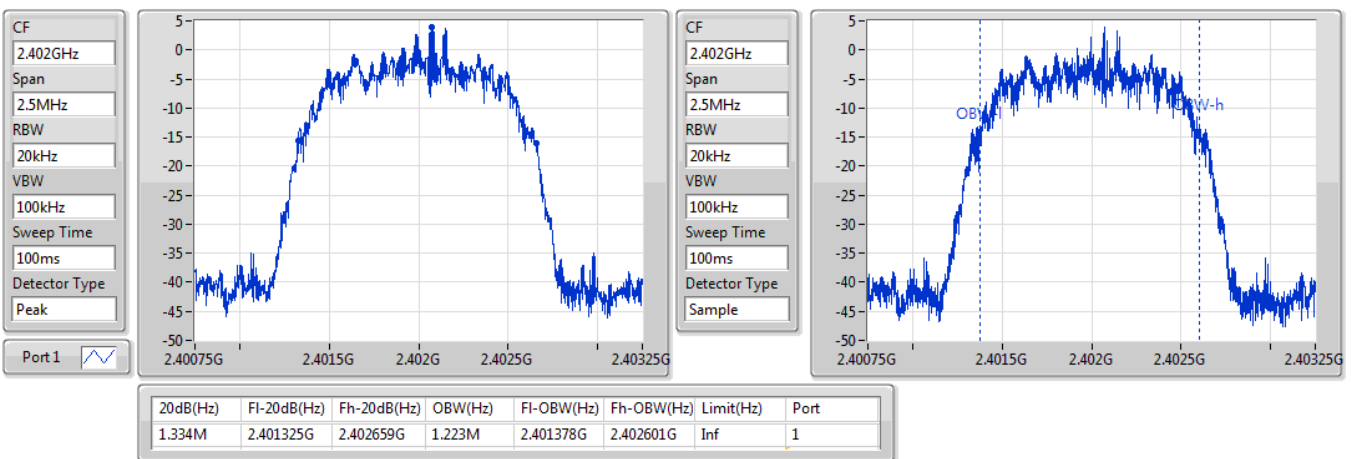


BT-EDR(2Mbps)

EBW

2402MHz

09/05/2019

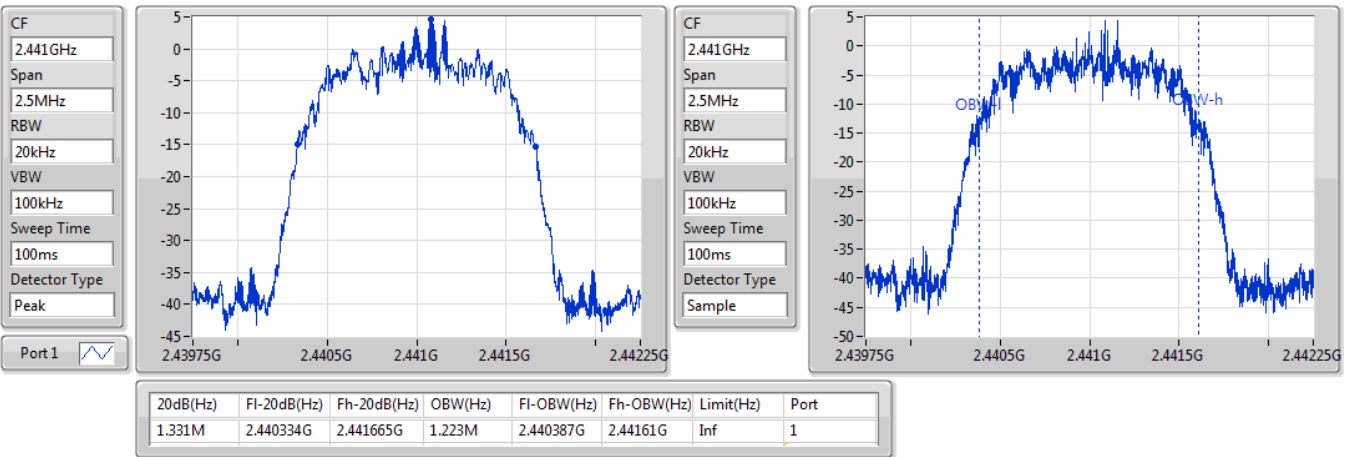


BT-EDR(2Mbps)

EBW

2441MHz

09/05/2019

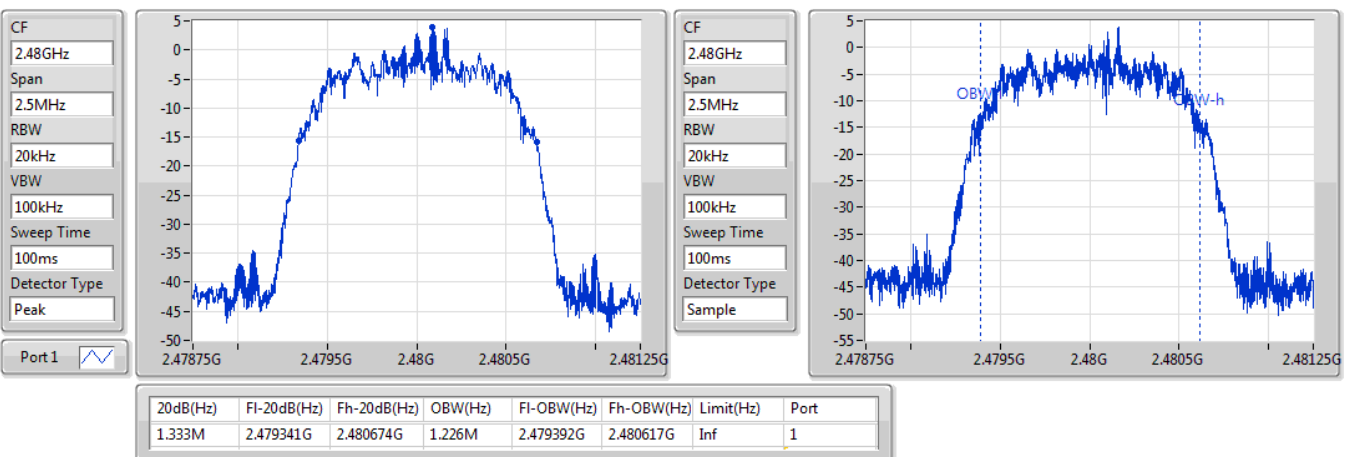


BT-EDR(2Mbps)

EBW

2480MHz

09/05/2019





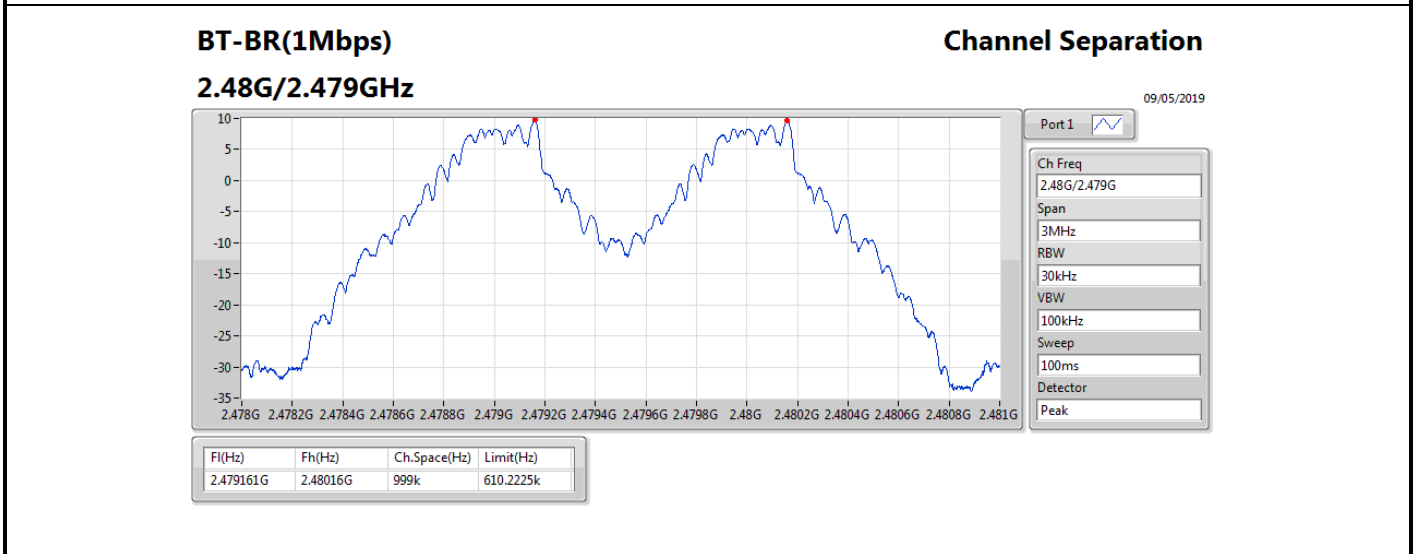
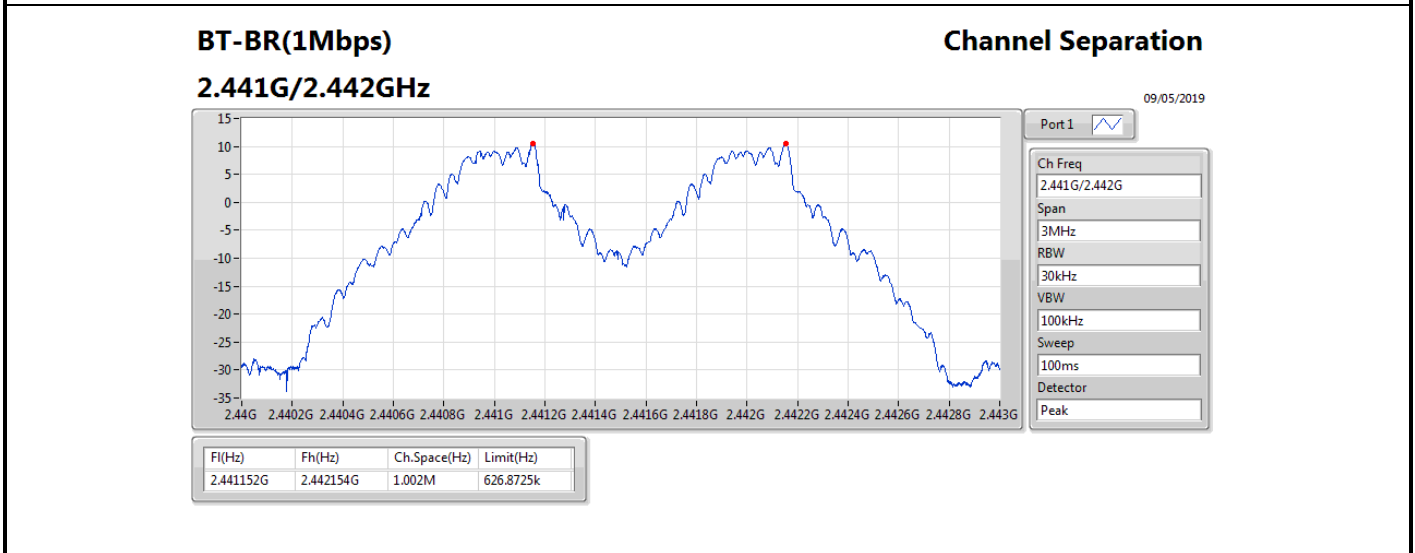
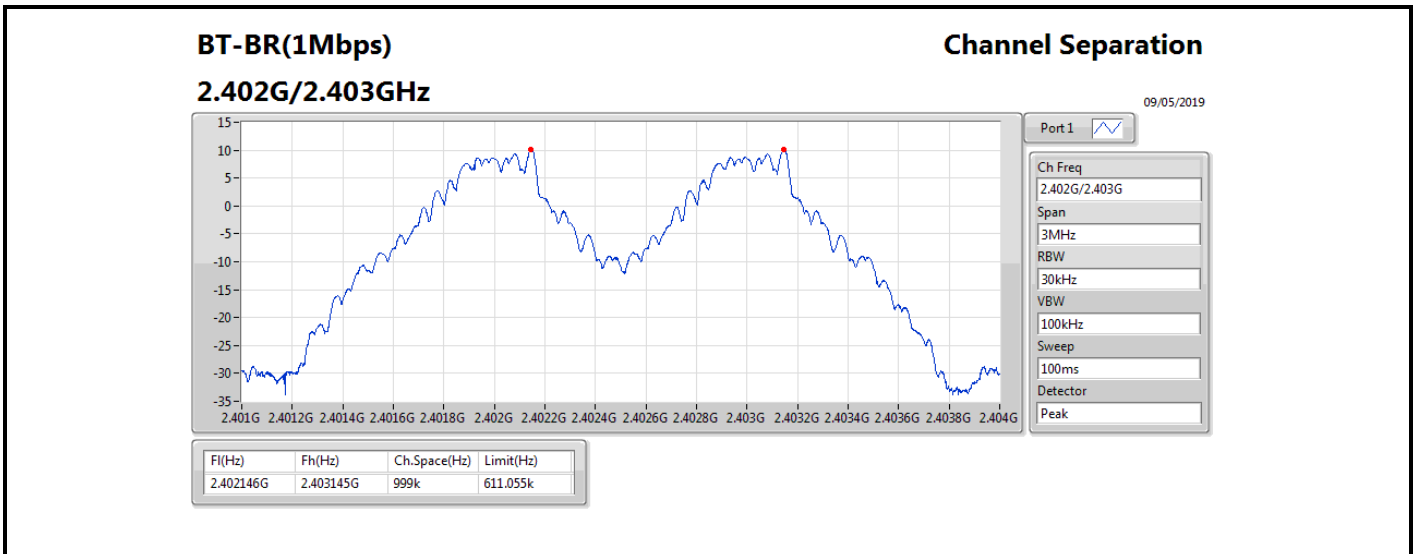
Summary

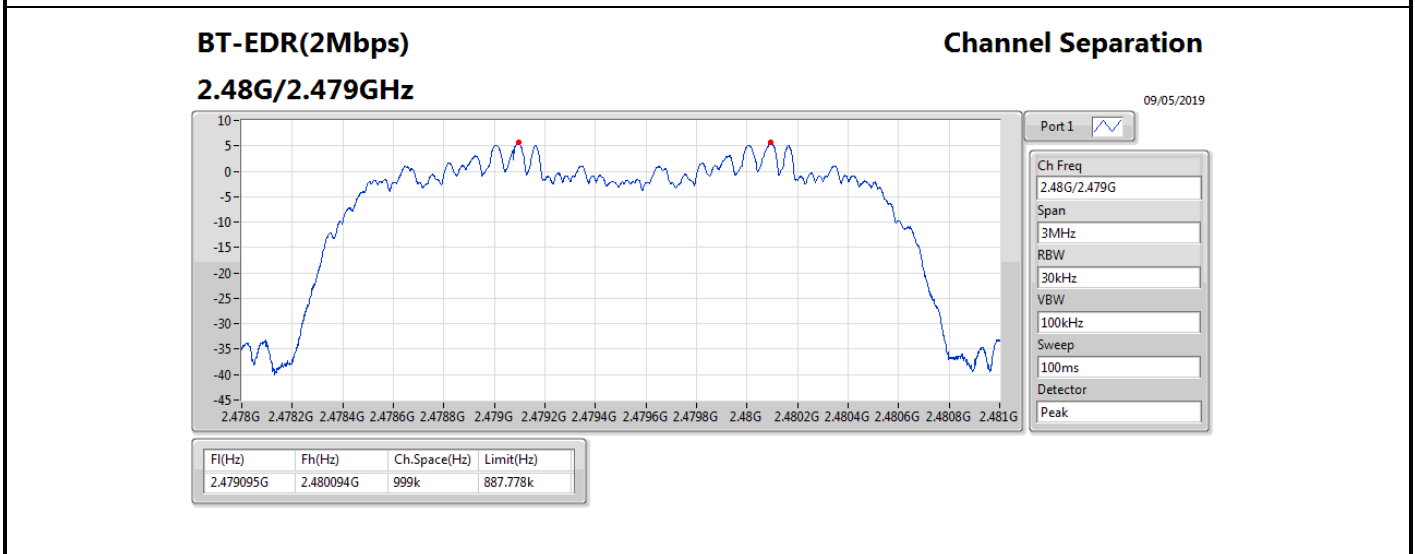
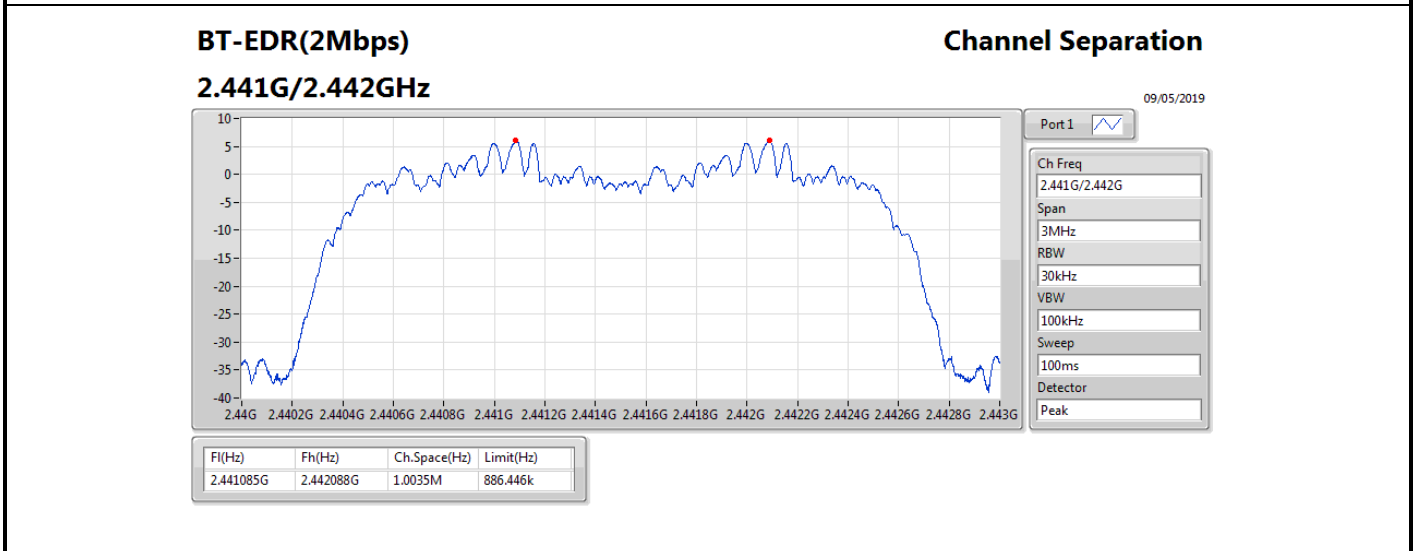
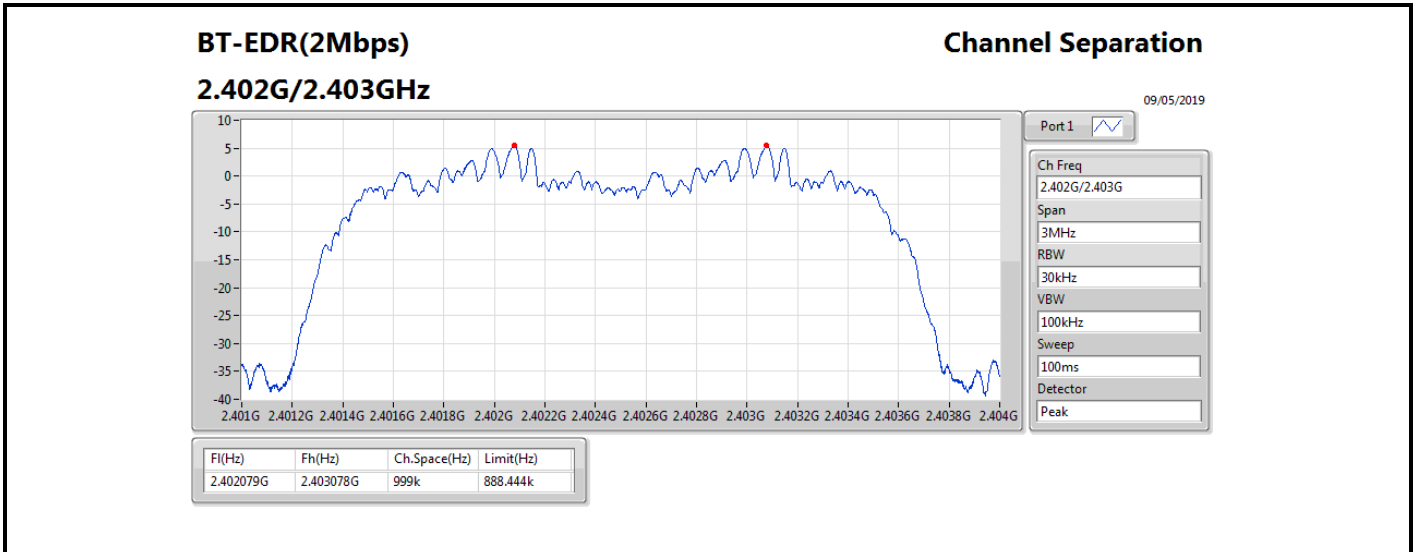
Mode	Max-Space (Hz)	Min-Space (Hz)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	1.002M	999k
BT-EDR(2Mbps)	1.0035M	999k



Result

Mode	Result	Fl (Hz)	Fh (Hz)	Ch.Space (Hz)	Limit (Hz)
BT-BR(1Mbps)	-	-	-	-	-
2402MHz	Pass	2.402146G	2.403145G	999k	611.055k
2441MHz	Pass	2.441152G	2.442154G	1.002M	626.8725k
2480MHz	Pass	2.479161G	2.48016G	999k	610.2225k
BT-EDR(2Mbps)	-	-	-	-	-
2402MHz	Pass	2.402079G	2.403078G	999k	888.444k
2441MHz	Pass	2.441085G	2.442088G	1.0035M	886.446k
2480MHz	Pass	2.479095G	2.480094G	999k	887.778k







Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	12.17	0.01648
BT-EDR(2Mbps)	10.83	0.01211



Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	3.00	11.79	21.00
2441MHz	Pass	3.00	12.17	21.00
2480MHz	Pass	3.00	11.32	21.00
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	3.00	10.31	21.00
2441MHz	Pass	3.00	10.83	21.00
2480MHz	Pass	3.00	10.45	21.00

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



Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	11.96	0.01570
BT-EDR(2Mbps)	8.38	0.00689



Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	3.00	11.55	21.00
2441MHz	Pass	3.00	11.96	21.00
2480MHz	Pass	3.00	11.06	21.00
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	3.00	7.83	21.00
2441MHz	Pass	3.00	8.38	21.00
2480MHz	Pass	3.00	7.88	21.00

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



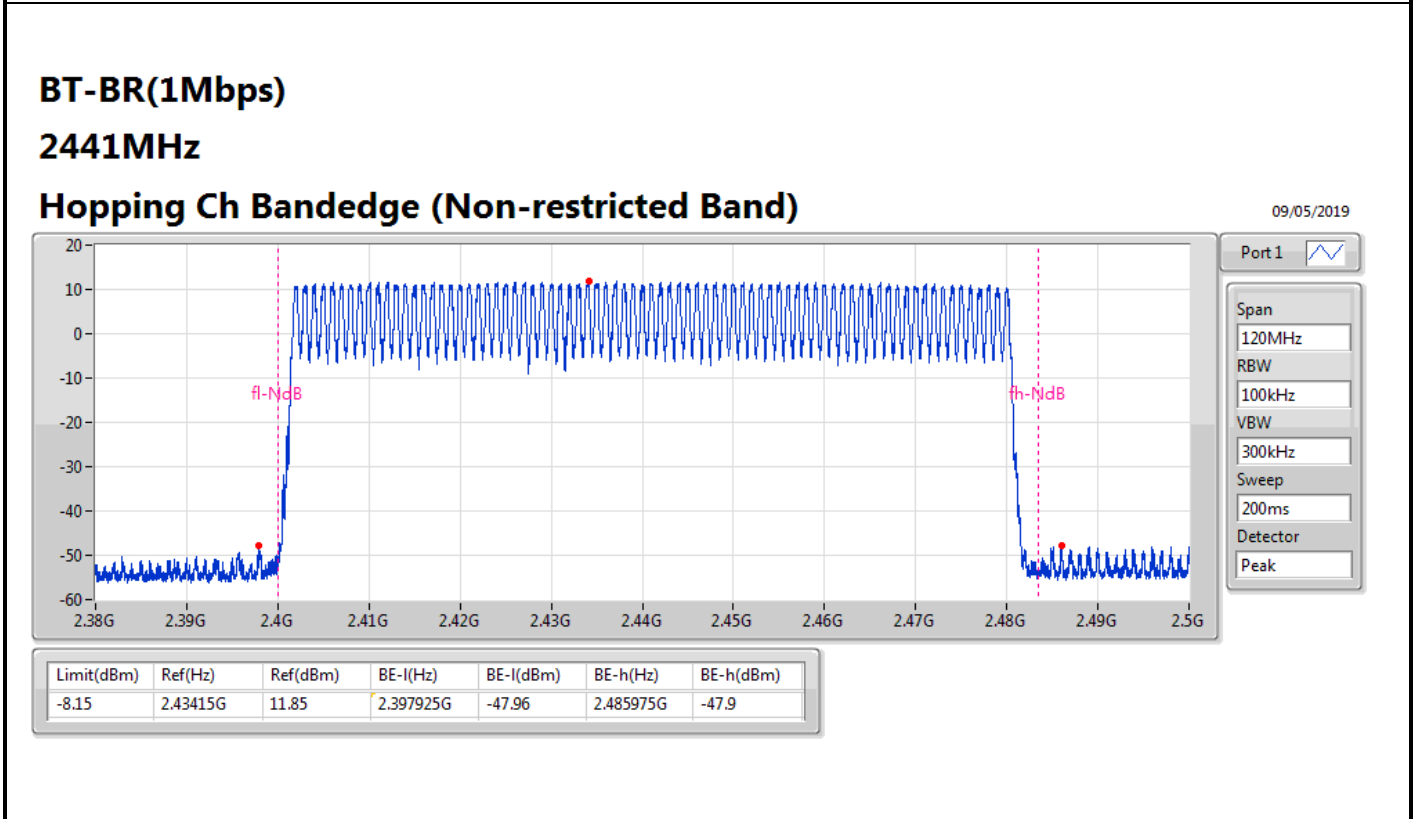
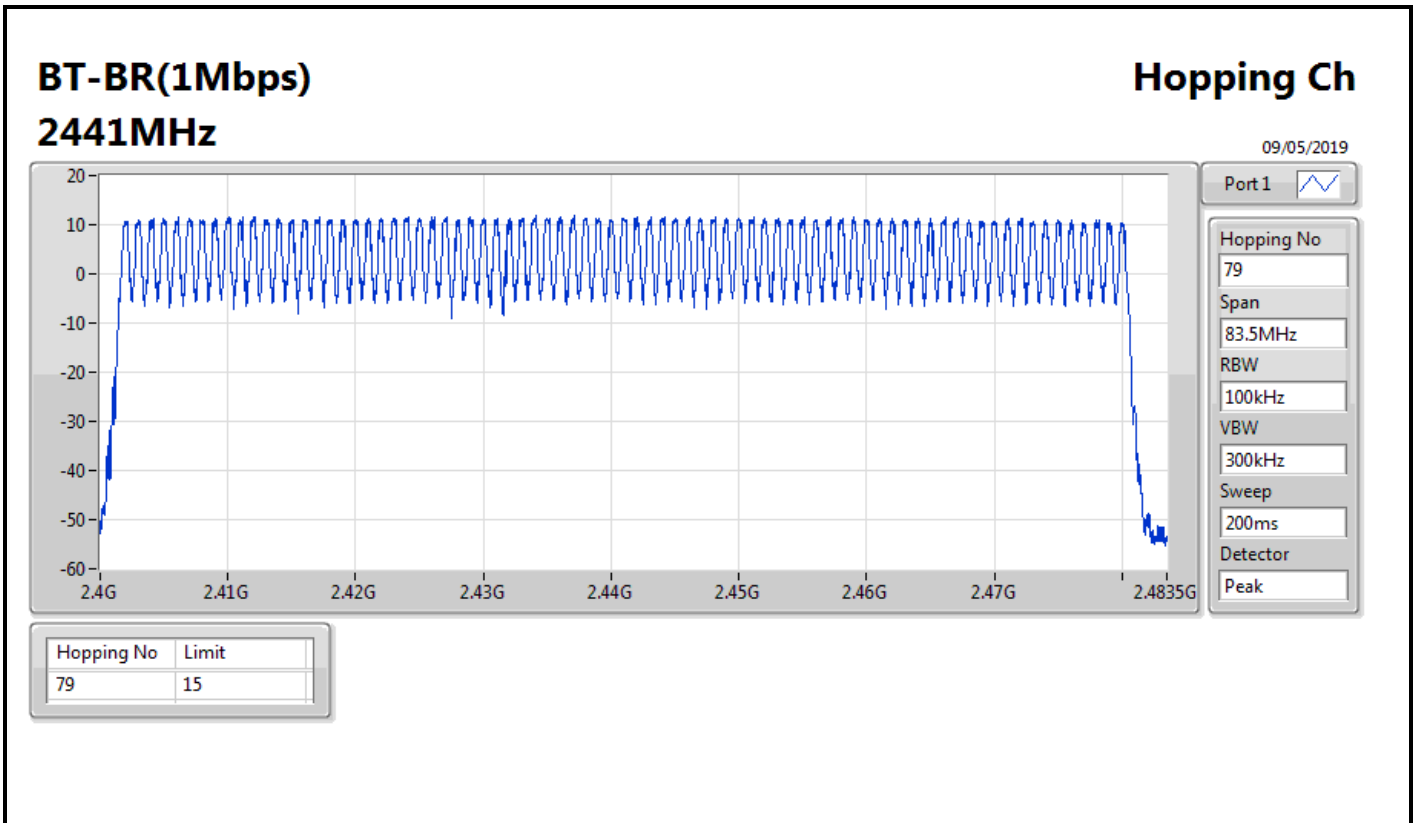
Summary

Mode	Max-Hop No
2.4-2.4835GHz	-
BT-BR(1Mbps)	79
BT-EDR(2Mbps)	79



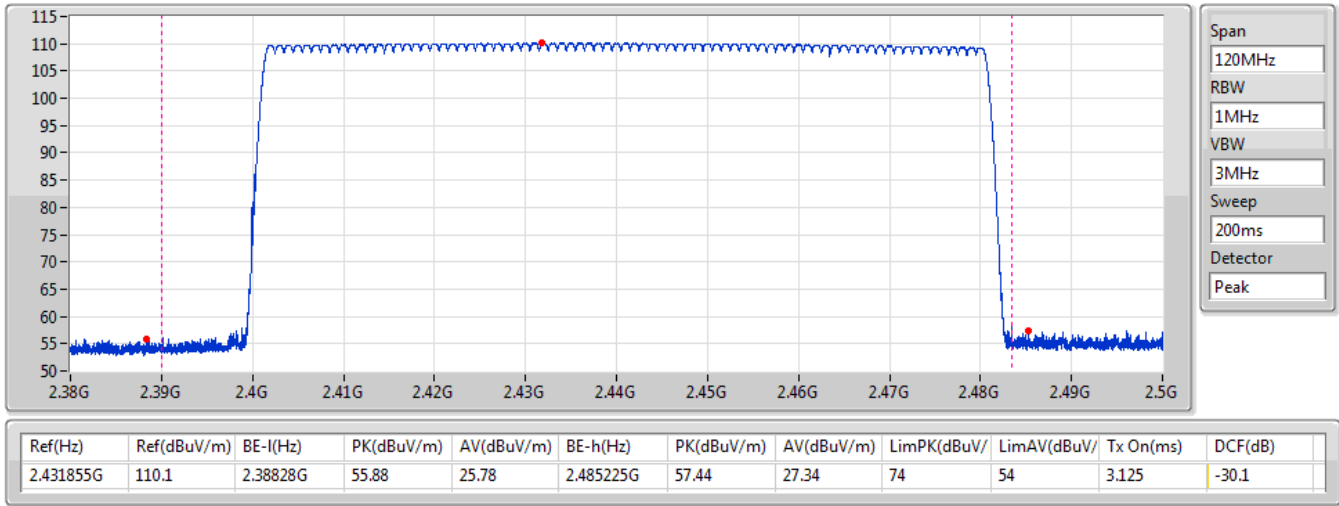
Result

Mode	Result	Hopping No	Limit
BT-BR(1Mbps)	-	-	-
2441MHz	Pass	79	15
BT-EDR(2Mbps)	-	-	-
2441MHz	Pass	79	15



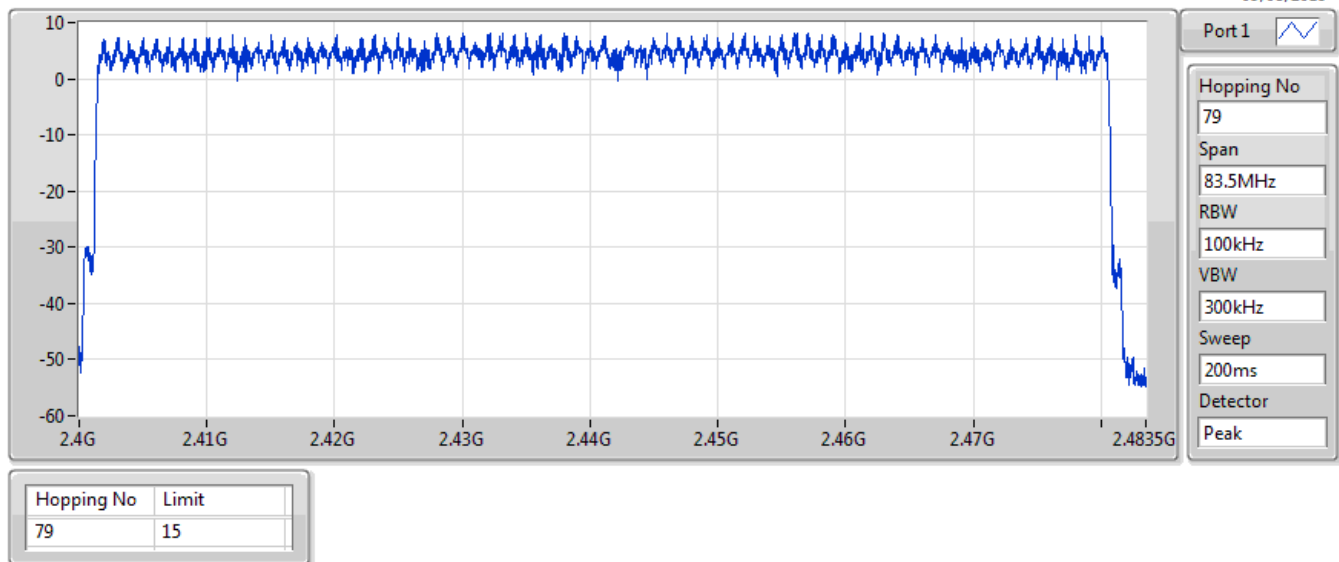
BT-BR(1Mbps)
2441MHz
Hopping Ch Bandedge (Restricted Band)

09/05/2019



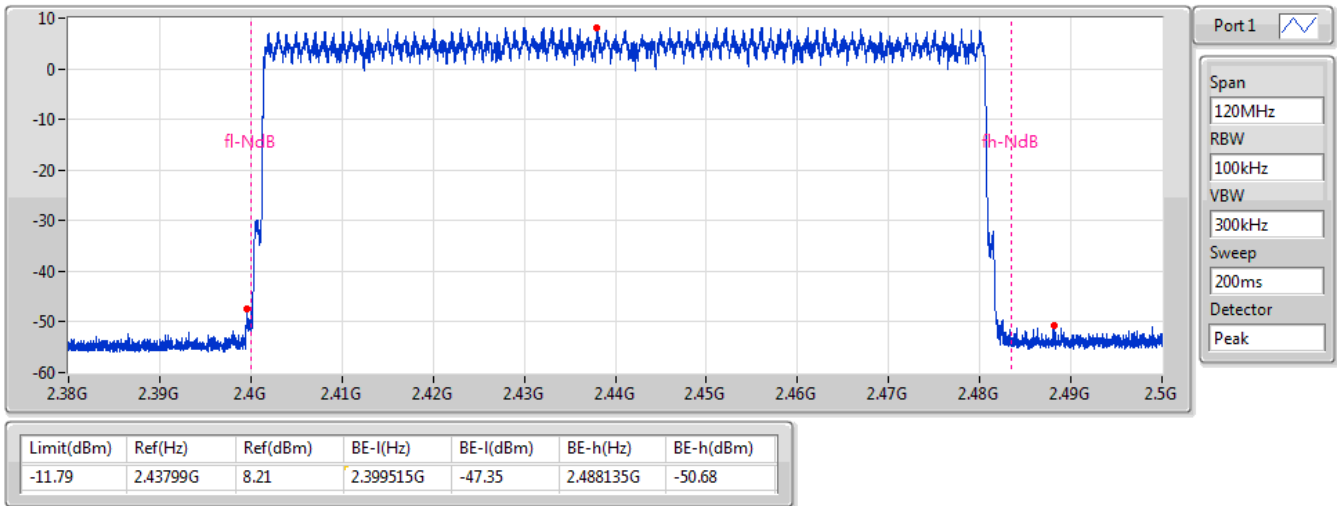
BT-EDR(2Mbps) **Hopping Ch**
2441MHz

09/05/2019



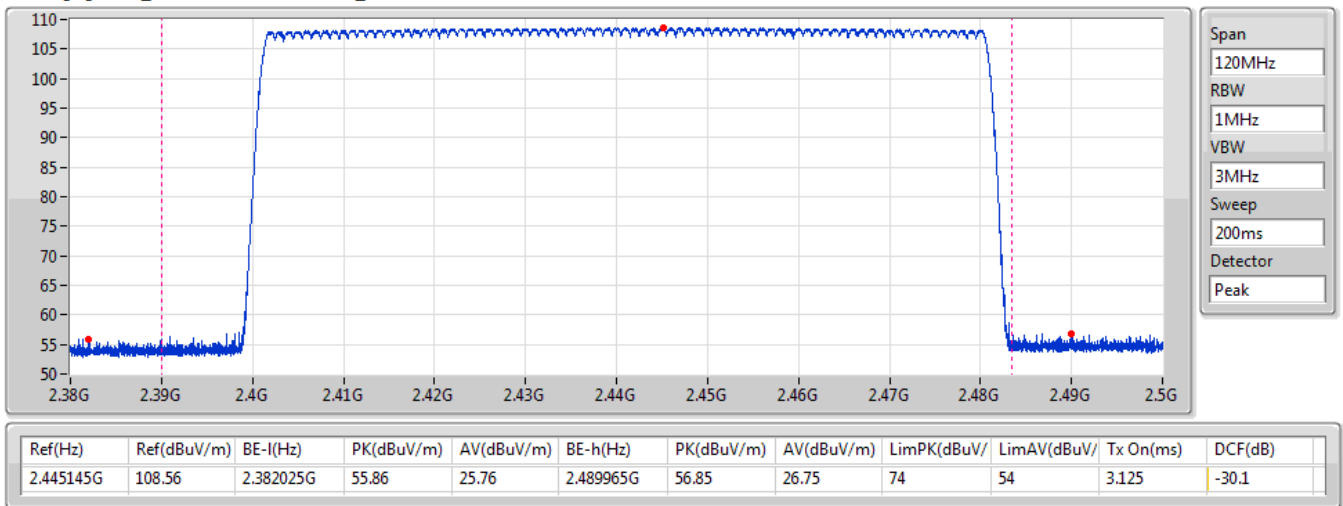
BT-EDR(2Mbps)
2441MHz
Hopping Ch Bandedge (Non-restricted Band)

09/05/2019



BT-EDR(2Mbps)
2441MHz
Hopping Ch Bandedge (Restricted Band)

09/05/2019





Summary

Mode	Max-Dwell (s)
2.4-2.4835GHz	-
BT-BR(1Mbps)	308.1806m
BT-EDR(2Mbps)	99.8842m



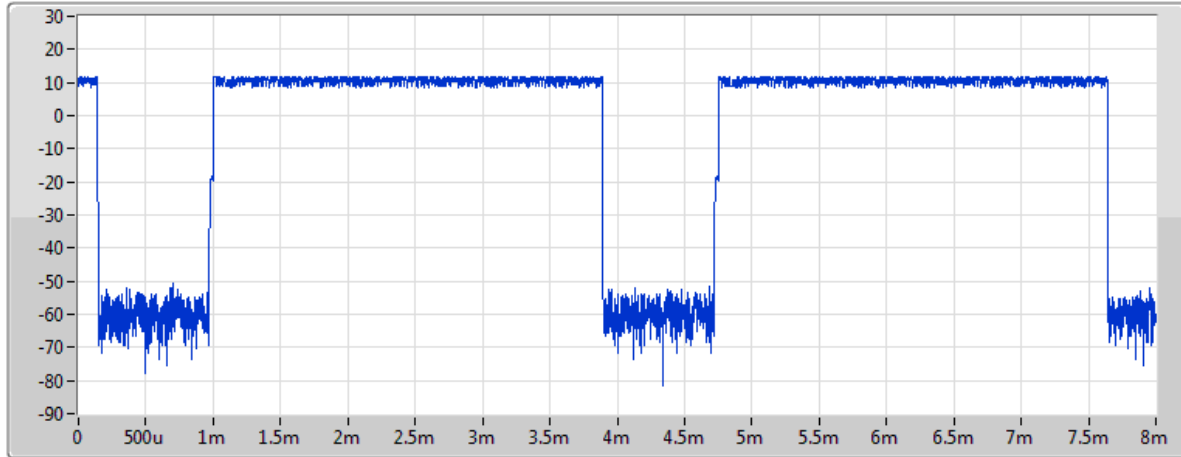
Result

Mode	Result	Period (s)	Dwell (s)	Limit (s)	Tx On (s)
BT-BR(1Mbps)	-	-	-	-	-
2441MHz	Pass	31.6	308.1806m	400m	2.891m
BT-EDR(2Mbps)	-	-	-	-	-
2441MHz	Pass	31.6	99.8842m	400m	937u

BT-BR(1Mbps)

2441MHz

09/05/2019



Port 1 

Ch Freq
2.441GHz

RBW
300kHz

VBW
1MHz

Sweep Time
8ms

TX Time
2.891ms

non AFH Mode

AFH Mode

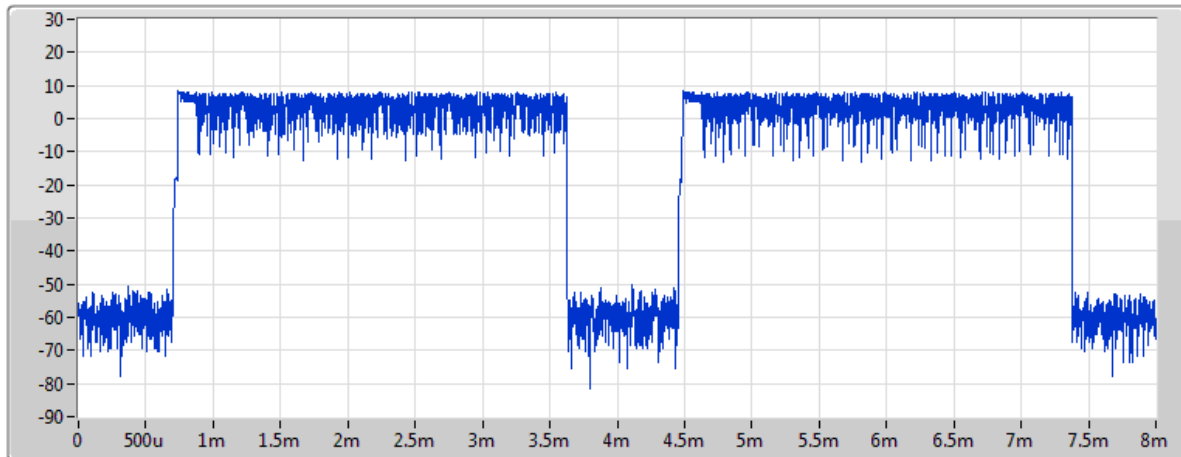
Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	308.1806m	400m	2.891m

Period(s)	Dwell(s)	Limit(s)	Tx On(s)
0	154.0903m	400m	2.891m

BT-EDR(2Mbps)

2441MHz

09/05/2019



Port 1 

Ch Freq
2.441GHz

RBW
300kHz

VBW
1MHz

Sweep Time
8ms

TX Time
937us

non AFH Mode

AFH Mode

Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	99.8842m	400m	937u

Period(s)	Dwell(s)	Limit(s)	Tx On(s)
0	49.9421m	400m	937u



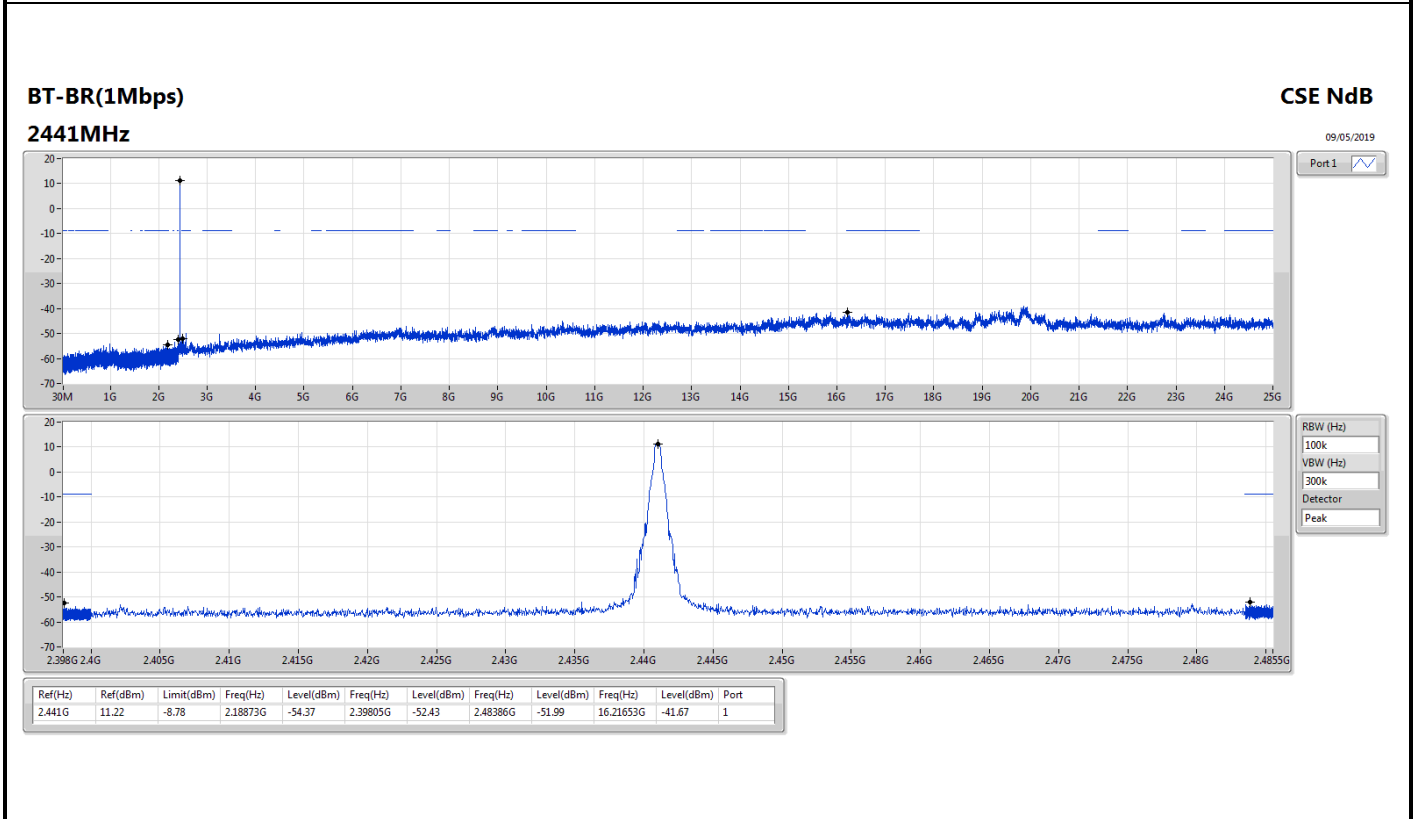
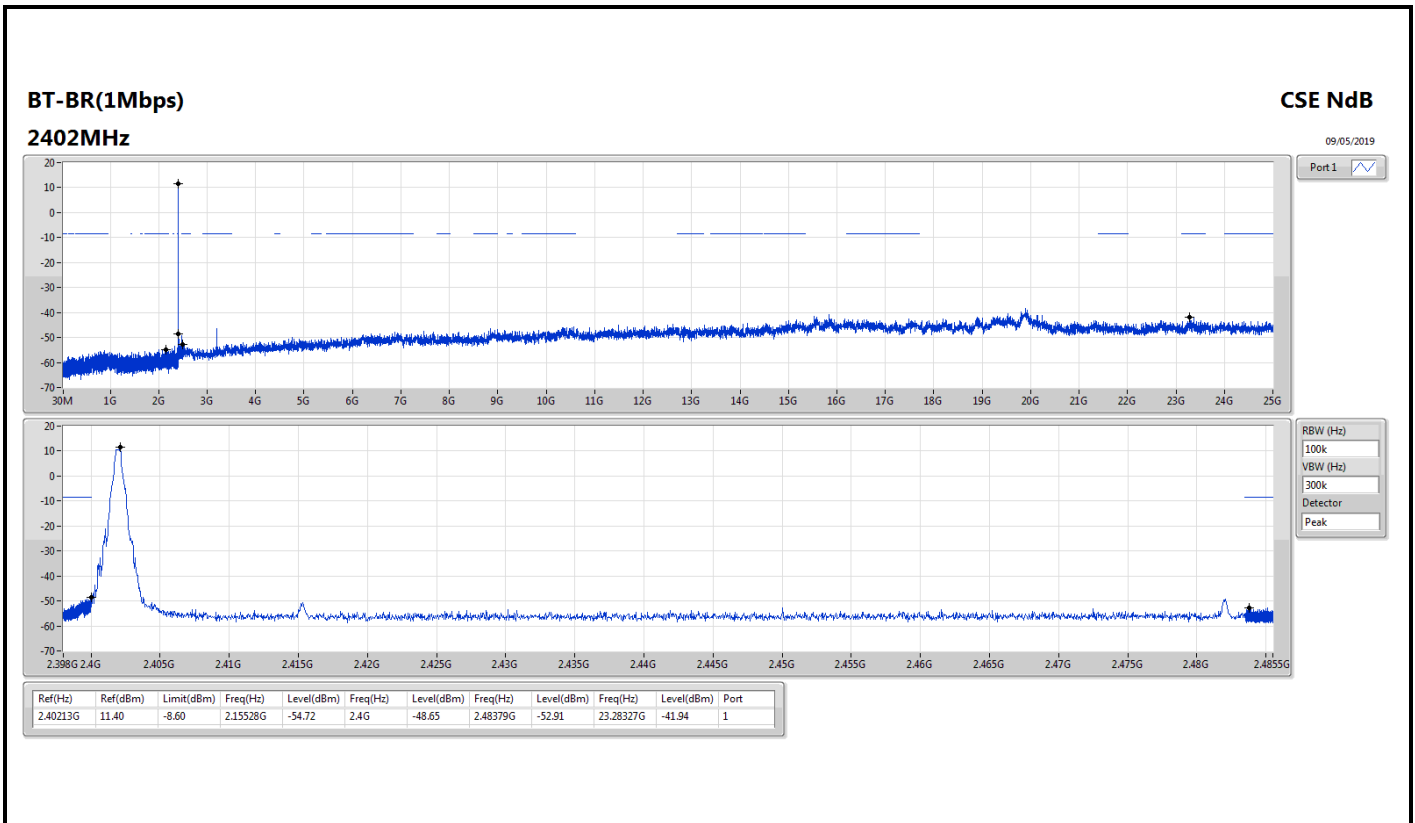
Summary

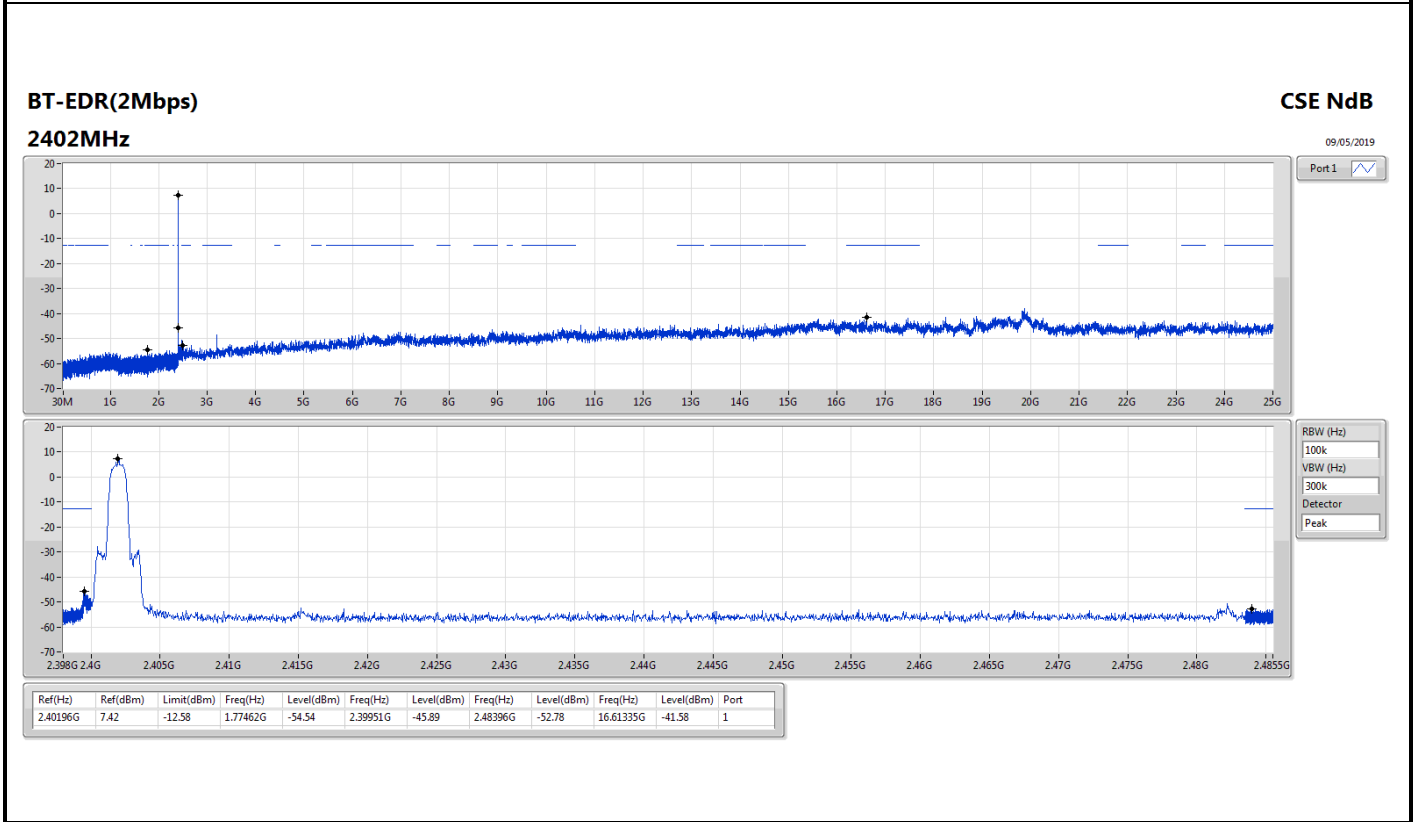
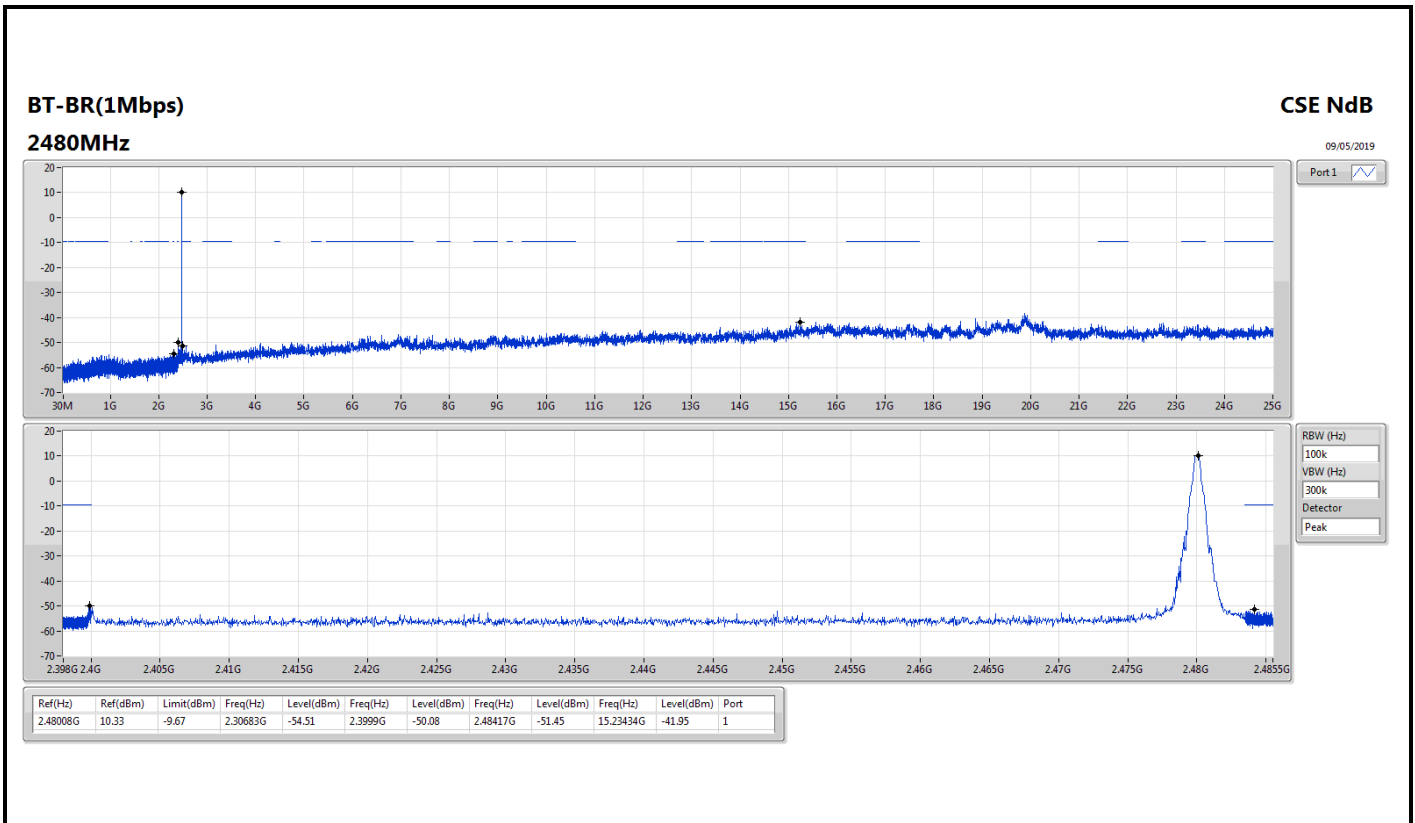
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-BR(1Mbps)	Pass	2.48008G	10.33	-9.67	2.30683G	-54.51	2.3999G	-50.08	2.48417G	-51.45	15.23434G	-41.95	1
BT-EDR(2Mbps)	Pass	2.48003G	7.06	-12.94	2.30713G	-54.64	2.39971G	-52.51	2.48546G	-52.44	16.99328G	-41.72	1

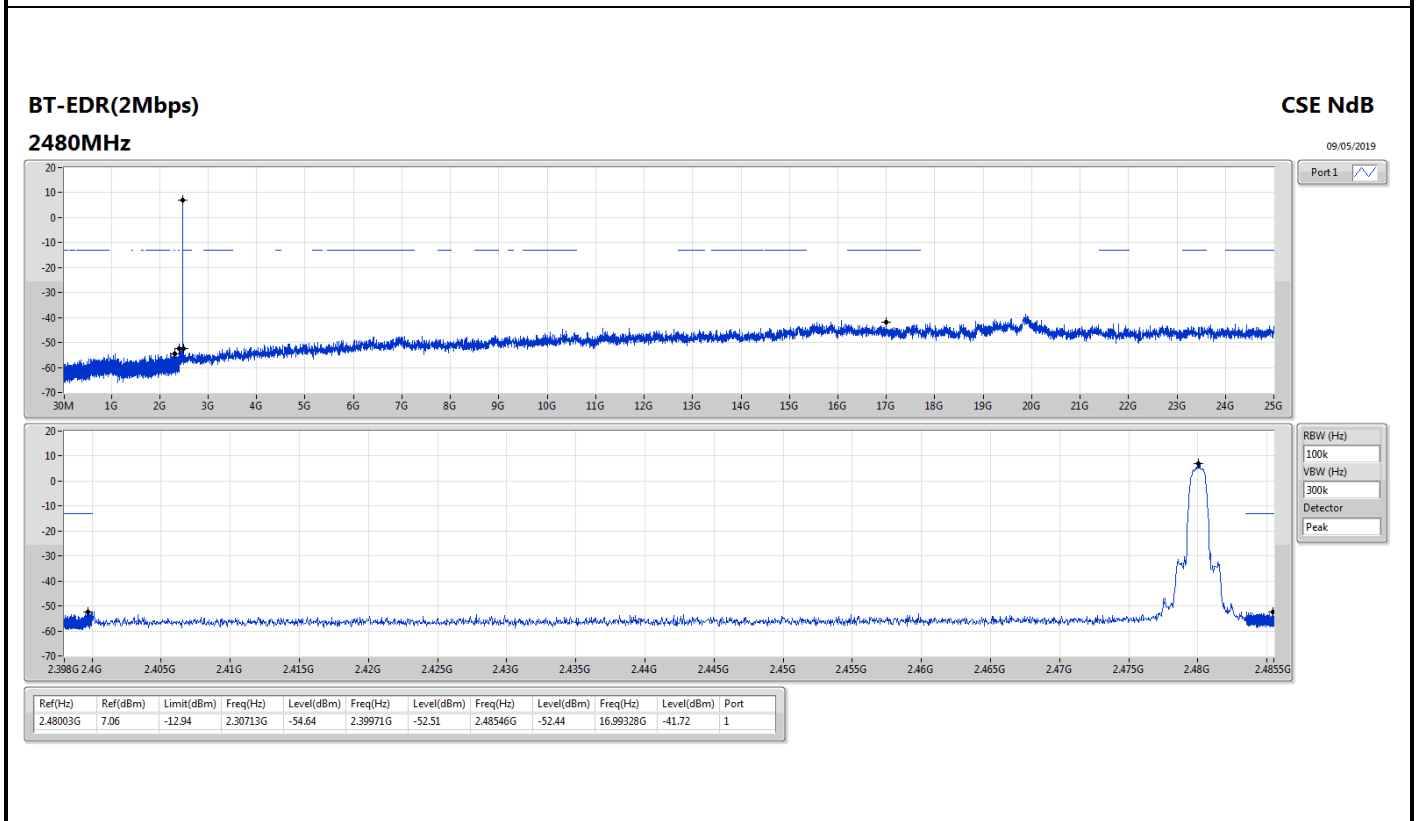
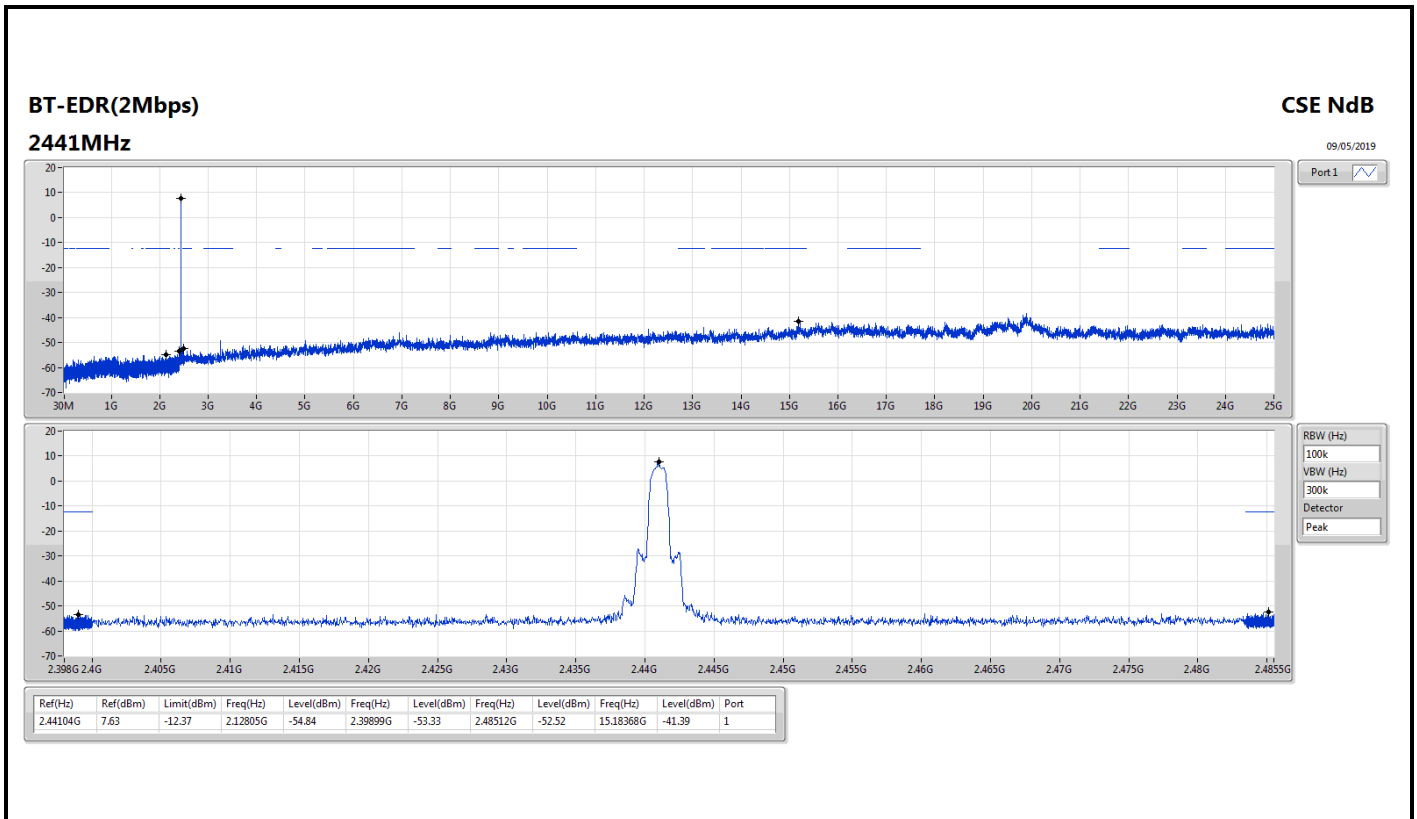


Result

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
BT-BR(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.40213G	11.40	-8.60	2.15528G	-54.72	2.4G	-48.65	2.48379G	-52.91	23.28327G	-41.94	1
2441MHz	Pass	2.441G	11.22	-8.78	2.18873G	-54.37	2.39805G	-52.43	2.48386G	-51.99	16.21653G	-41.67	1
2480MHz	Pass	2.48008G	10.33	-9.67	2.30683G	-54.51	2.3999G	-50.08	2.48417G	-51.45	15.23434G	-41.95	1
BT-EDR(2Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.40196G	7.42	-12.58	1.77462G	-54.54	2.39951G	-45.89	2.48396G	-52.78	16.61335G	-41.58	1
2441MHz	Pass	2.44104G	7.63	-12.37	2.12805G	-54.84	2.39899G	-53.33	2.48512G	-52.52	15.18368G	-41.39	1
2480MHz	Pass	2.48003G	7.06	-12.94	2.30713G	-54.64	2.39971G	-52.51	2.48546G	-52.44	16.99328G	-41.72	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	-	-	-	-	-	-	-	-	-	-	-	-
BT-BR(1Mbps)	Pass	PK	43.58M	35.96	40.00	-4.04	-20.09	3	Vertical	0	1.00	-



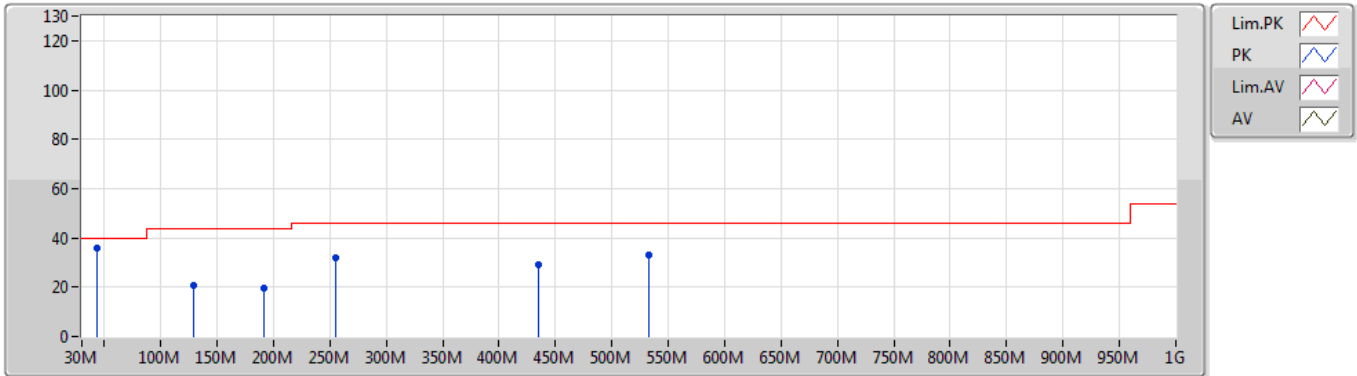
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-BR(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2441MHz	Pass	PK	43.58M	35.96	40.00	-4.04	-20.09	3	Vertical	0	1.00	-
2441MHz	Pass	PK	128.94M	20.83	43.50	-22.67	-18.96	3	Vertical	0	1.00	-
2441MHz	Pass	PK	191.02M	19.47	43.50	-24.03	-21.28	3	Vertical	0	1.00	-
2441MHz	Pass	PK	255.04M	32.09	46.00	-13.91	-16.35	3	Vertical	0	1.00	-
2441MHz	Pass	PK	435.46M	29.34	46.00	-16.66	-12.83	3	Vertical	0	1.00	-
2441MHz	Pass	PK	532.46M	33.06	46.00	-12.94	-11.73	3	Vertical	0	1.00	-
2441MHz	Pass	PK	41.64M	23.56	40.00	-16.44	-19.06	3	Horizontal	360	1.00	-
2441MHz	Pass	PK	92.08M	27.29	43.50	-16.21	-21.91	3	Horizontal	360	1.00	-
2441MHz	Pass	PK	121.18M	25.40	43.50	-18.10	-19.06	3	Horizontal	360	1.00	-
2441MHz	Pass	PK	251.16M	31.76	46.00	-14.24	-16.94	3	Horizontal	360	1.00	-
2441MHz	Pass	PK	421.88M	28.90	46.00	-17.10	-13.00	3	Horizontal	360	1.00	-
2441MHz	Pass	PK	532.46M	32.53	46.00	-13.47	-11.73	3	Horizontal	360	1.00	-

BT-BR(1Mbps)

10/05/2019

2441MHz_Adapter

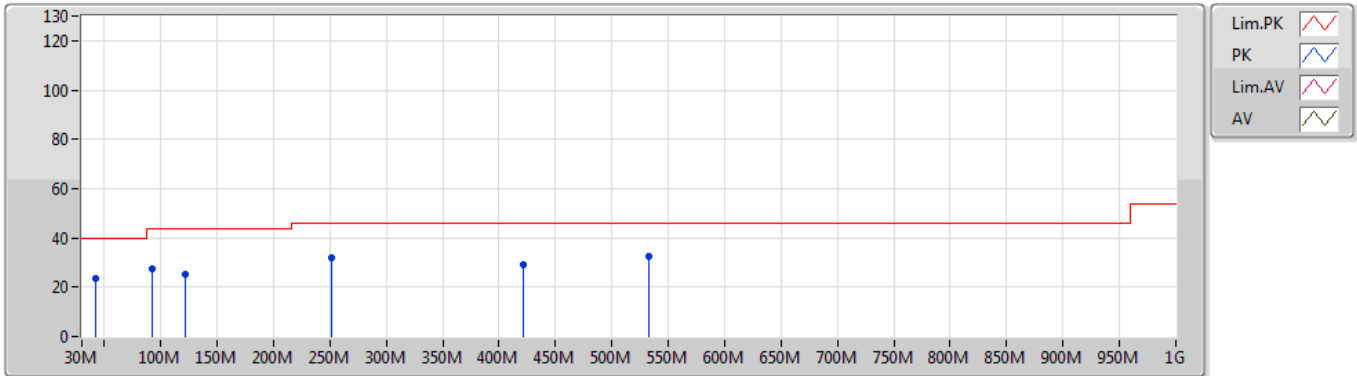


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
PK	43.58M	35.96	40.00	-4.04	-20.09	3	Vertical	0	1.00	-
PK	128.94M	20.83	43.50	-22.67	-18.96	3	Vertical	0	1.00	-
PK	191.02M	19.47	43.50	-24.03	-21.28	3	Vertical	0	1.00	-
PK	255.04M	32.09	46.00	-13.91	-16.35	3	Vertical	0	1.00	-
PK	435.46M	29.34	46.00	-16.66	-12.83	3	Vertical	0	1.00	-
PK	532.46M	33.06	46.00	-12.94	-11.73	3	Vertical	0	1.00	-

BT-BR(1Mbps)

10/05/2019

2441MHz_Adapter



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
PK	41.64M	23.56	40.00	-16.44	-19.06	3	Horizontal	360	1.00	-
PK	92.08M	27.29	43.50	-16.21	-21.91	3	Horizontal	360	1.00	-
PK	121.18M	25.40	43.50	-18.10	-19.06	3	Horizontal	360	1.00	-
PK	251.16M	31.76	46.00	-14.24	-16.94	3	Horizontal	360	1.00	-
PK	421.88M	28.90	46.00	-17.10	-13.00	3	Horizontal	360	1.00	-
PK	532.46M	32.53	46.00	-13.47	-11.73	3	Horizontal	360	1.00	-



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	-	-	-	-	-	-	-	-	-	-	-	-
BT-BR(1Mbps)	Pass	PK	2.4836G	60.82	74.00	-13.18	32.19	3	Horizontal	6	1.54	-
BT-EDR(2Mbps)	Pass	PK	2.4942G	60.62	74.00	-13.38	32.09	3	Vertical	348	1.58	-



Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-BR(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz_TX	Pass	AV	2.366G	34.12	54.00	-19.88	31.77	3	Vertical	28	1.97	-
2402MHz_TX	Pass	AV	2.4018G	73.23	Inf	-Inf	31.89	3	Vertical	28	1.97	-
2402MHz_TX	Pass	PK	2.366G	56.62	74.00	-17.38	31.77	3	Vertical	28	1.97	-
2402MHz_TX	Pass	PK	2.4018G	95.73	Inf	-Inf	31.89	3	Vertical	28	1.97	-
2402MHz_TX	Pass	AV	2.3804G	33.84	54.00	-20.16	31.82	3	Horizontal	323	1.42	-
2402MHz_TX	Pass	AV	2.402G	78.01	Inf	-Inf	31.89	3	Horizontal	323	1.42	-
2402MHz_TX	Pass	PK	2.3804G	56.34	74.00	-17.66	31.82	3	Horizontal	323	1.42	-
2402MHz_TX	Pass	PK	2.402G	100.51	Inf	-Inf	31.89	3	Horizontal	323	1.42	-
2402MHz_TX	Pass	AV	4.81312G	20.20	54.00	-33.80	3.46	3	Vertical	214	1.02	-
2402MHz_TX	Pass	PK	4.81312G	42.70	74.00	-31.30	3.46	3	Vertical	214	1.02	-
2402MHz_TX	Pass	AV	4.79416G	21.38	54.00	-32.62	3.42	3	Horizontal	211	1.98	-
2402MHz_TX	Pass	PK	4.79416G	43.88	74.00	-30.12	3.42	3	Horizontal	211	1.98	-
2441MHz_TX	Pass	AV	2.3862G	34.21	54.00	-19.79	31.84	3	Vertical	27	1.99	-
2441MHz_TX	Pass	AV	2.441G	78.57	Inf	-Inf	32.04	3	Vertical	27	1.99	-
2441MHz_TX	Pass	AV	2.4878G	33.81	54.00	-20.19	32.20	3	Vertical	27	1.99	-
2441MHz_TX	Pass	PK	2.3862G	56.71	74.00	-17.29	31.84	3	Vertical	27	1.99	-
2441MHz_TX	Pass	PK	2.441G	101.07	Inf	-Inf	32.04	3	Vertical	27	1.99	-
2441MHz_TX	Pass	PK	2.4878G	56.31	74.00	-17.69	32.20	3	Vertical	27	1.99	-
2441MHz_TX	Pass	AV	2.3594G	34.71	54.00	-19.29	31.74	3	Horizontal	6	1.31	-
2441MHz_TX	Pass	AV	2.441G	80.86	Inf	-Inf	32.04	3	Horizontal	6	1.31	-
2441MHz_TX	Pass	AV	2.489G	34.28	54.00	-19.72	32.20	3	Horizontal	6	1.31	-
2441MHz_TX	Pass	PK	2.3594G	57.21	74.00	-16.79	31.74	3	Horizontal	6	1.31	-
2441MHz_TX	Pass	PK	2.441G	103.36	Inf	-Inf	32.04	3	Horizontal	6	1.31	-
2441MHz_TX	Pass	PK	2.489G	56.78	74.00	-17.22	32.20	3	Horizontal	6	1.31	-
2441MHz_TX	Pass	AV	4.8814G	20.71	54.00	-33.29	3.63	3	Vertical	358	1.48	-
2441MHz_TX	Pass	AV	7.32528G	28.04	54.00	-25.96	9.75	3	Vertical	331	1.27	-
2441MHz_TX	Pass	PK	4.8814G	43.21	74.00	-30.79	3.63	3	Vertical	358	1.48	-
2441MHz_TX	Pass	PK	7.32528G	50.54	74.00	-23.46	9.75	3	Vertical	331	1.27	-
2441MHz_TX	Pass	AV	4.87936G	21.00	54.00	-33.00	3.62	3	Horizontal	51	1.46	-
2441MHz_TX	Pass	AV	7.31172G	27.69	54.00	-26.31	9.72	3	Horizontal	32	1.43	-
2441MHz_TX	Pass	PK	4.87936G	43.50	74.00	-30.50	3.62	3	Horizontal	51	1.46	-
2441MHz_TX	Pass	PK	7.31172G	50.19	74.00	-23.81	9.72	3	Horizontal	32	1.43	-
2480MHz_TX	Pass	AV	2.4798G	79.91	Inf	-Inf	32.17	3	Vertical	21	1.74	-
2480MHz_TX	Pass	AV	2.4836G	36.20	54.00	-17.80	32.19	3	Vertical	21	1.74	-
2480MHz_TX	Pass	PK	2.4798G	102.41	Inf	-Inf	32.17	3	Vertical	21	1.74	-
2480MHz_TX	Pass	PK	2.4836G	58.70	74.00	-15.30	32.19	3	Vertical	21	1.74	-
2480MHz_TX	Pass	AV	2.4802G	82.70	Inf	-Inf	32.17	3	Horizontal	6	1.54	-
2480MHz_TX	Pass	AV	2.4836G	38.32	54.00	-15.68	32.19	3	Horizontal	6	1.54	-
2480MHz_TX	Pass	PK	2.4802G	105.20	Inf	-Inf	32.17	3	Horizontal	6	1.54	-
2480MHz_TX	Pass	PK	2.4836G	60.82	74.00	-13.18	32.19	3	Horizontal	6	1.54	-
2480MHz_TX	Pass	AV	4.95964G	24.76	54.00	-29.24	3.82	3	Vertical	360	1.59	-
2480MHz_TX	Pass	AV	7.43766G	28.81	54.00	-25.19	10.05	3	Vertical	334	1.99	-
2480MHz_TX	Pass	PK	4.95964G	47.26	74.00	-26.74	3.82	3	Vertical	360	1.59	-
2480MHz_TX	Pass	PK	7.43766G	51.31	74.00	-22.69	10.05	3	Vertical	334	1.99	-
2480MHz_TX	Pass	AV	4.96048G	22.73	54.00	-31.27	3.83	3	Horizontal	326	1.12	-
2480MHz_TX	Pass	AV	7.44582G	28.03	54.00	-25.97	10.07	3	Horizontal	44	1.43	-
2480MHz_TX	Pass	PK	4.96048G	45.23	74.00	-28.77	3.83	3	Horizontal	326	1.12	-



Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2480MHz_TX	Pass	PK	7.44582G	50.53	74.00	-23.47	10.07	3	Horizontal	44	1.43	-
BT-EDR(2Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz_TX	Pass	AV	2.3522G	36.93	54.00	-17.07	32.32	3	Vertical	360	1.50	-
2402MHz_TX	Pass	AV	2.4022G	76.33	Inf	-Inf	32.20	3	Vertical	360	1.50	-
2402MHz_TX	Pass	PK	2.3522G	59.43	74.00	-14.57	32.32	3	Vertical	360	1.50	-
2402MHz_TX	Pass	PK	2.4022G	98.83	Inf	-Inf	32.20	3	Vertical	360	1.50	-
2402MHz_TX	Pass	AV	2.3728G	37.23	54.00	-16.77	32.27	3	Horizontal	350	1.53	-
2402MHz_TX	Pass	AV	2.4022G	79.82	Inf	-Inf	32.20	3	Horizontal	350	1.53	-
2402MHz_TX	Pass	PK	2.3728G	59.73	74.00	-14.27	32.27	3	Horizontal	350	1.53	-
2402MHz_TX	Pass	PK	2.4022G	102.32	Inf	-Inf	32.20	3	Horizontal	350	1.53	-
2402MHz_TX	Pass	AV	4.80346G	27.08	54.00	-26.92	8.12	3	Vertical	6	1.34	-
2402MHz_TX	Pass	PK	4.80346G	49.58	74.00	-24.42	8.12	3	Vertical	6	1.34	-
2402MHz_TX	Pass	AV	4.80364G	27.39	54.00	-26.61	8.12	3	Horizontal	347	2.23	-
2402MHz_TX	Pass	PK	4.80364G	49.89	74.00	-24.11	8.12	3	Horizontal	347	2.23	-
2441MHz_TX	Pass	AV	2.3738G	36.59	54.00	-17.41	32.26	3	Vertical	348	1.58	-
2441MHz_TX	Pass	AV	2.441G	79.93	Inf	-Inf	32.15	3	Vertical	348	1.58	-
2441MHz_TX	Pass	AV	2.4942G	38.12	54.00	-15.88	32.09	3	Vertical	348	1.58	-
2441MHz_TX	Pass	PK	2.3738G	59.09	74.00	-14.91	32.26	3	Vertical	348	1.58	-
2441MHz_TX	Pass	PK	2.441G	102.43	Inf	-Inf	32.15	3	Vertical	348	1.58	-
2441MHz_TX	Pass	PK	2.4942G	60.62	74.00	-13.38	32.09	3	Vertical	348	1.58	-
2441MHz_TX	Pass	AV	2.357G	37.23	54.00	-16.77	32.31	3	Horizontal	56	1.62	-
2441MHz_TX	Pass	AV	2.441G	81.19	Inf	-Inf	32.15	3	Horizontal	56	1.62	-
2441MHz_TX	Pass	AV	2.4934G	37.56	54.00	-16.44	32.08	3	Horizontal	56	1.62	-
2441MHz_TX	Pass	PK	2.357G	59.73	74.00	-14.27	32.31	3	Horizontal	56	1.62	-
2441MHz_TX	Pass	PK	2.441G	103.69	Inf	-Inf	32.15	3	Horizontal	56	1.62	-
2441MHz_TX	Pass	PK	2.4934G	60.06	74.00	-13.94	32.08	3	Horizontal	56	1.62	-
2441MHz_TX	Pass	AV	4.88224G	32.35	54.00	-21.65	8.27	3	Vertical	304	1.80	-
2441MHz_TX	Pass	AV	7.3224G	32.17	54.00	-21.83	14.43	3	Vertical	347	2.32	-
2441MHz_TX	Pass	PK	4.88224G	54.85	74.00	-19.15	8.27	3	Vertical	304	1.80	-
2441MHz_TX	Pass	PK	7.3224G	55.67	74.00	-18.33	14.43	3	Vertical	347	2.32	-
2441MHz_TX	Pass	AV	4.8823G	31.90	54.00	-22.10	8.27	3	Horizontal	40	1.92	-
2441MHz_TX	Pass	AV	7.32352G	35.62	54.00	-18.38	14.43	3	Horizontal	39	1.47	-
2441MHz_TX	Pass	PK	4.8823G	54.40	74.00	-19.60	8.27	3	Horizontal	40	1.92	-
2441MHz_TX	Pass	PK	7.32352G	58.12	74.00	-15.88	14.43	3	Horizontal	39	1.47	-
2480MHz_TX	Pass	AV	2.4798G	78.64	Inf	-Inf	32.10	3	Vertical	345	1.73	-
2480MHz_TX	Pass	AV	2.4874G	37.36	54.00	-16.64	32.10	3	Vertical	345	1.73	-
2480MHz_TX	Pass	PK	2.4798G	101.14	Inf	-Inf	32.10	3	Vertical	345	1.73	-
2480MHz_TX	Pass	PK	2.4874G	59.86	74.00	-14.14	32.10	3	Vertical	345	1.73	-
2480MHz_TX	Pass	AV	2.4798G	82.59	Inf	-Inf	32.10	3	Horizontal	61	2.33	-
2480MHz_TX	Pass	AV	2.4846G	37.22	54.00	-16.78	32.10	3	Horizontal	61	2.33	-
2480MHz_TX	Pass	PK	2.4798G	105.09	Inf	-Inf	32.10	3	Horizontal	61	2.33	-
2480MHz_TX	Pass	PK	2.4846G	59.72	74.00	-14.28	32.10	3	Horizontal	61	2.33	-
2480MHz_TX	Pass	AV	4.9603G	28.92	54.00	-25.08	8.53	3	Vertical	301	1.64	-
2480MHz_TX	Pass	AV	7.43646G	29.79	54.00	-24.21	14.32	3	Vertical	12	1.54	-
2480MHz_TX	Pass	PK	4.9603G	51.42	74.00	-22.58	8.53	3	Vertical	301	1.64	-
2480MHz_TX	Pass	PK	7.43646G	52.29	74.00	-21.71	14.32	3	Vertical	12	1.54	-
2480MHz_TX	Pass	AV	4.96036G	28.09	54.00	-25.91	8.53	3	Horizontal	318	1.52	-
2480MHz_TX	Pass	AV	7.4403G	30.12	54.00	-23.88	14.34	3	Horizontal	18	1.40	-
2480MHz_TX	Pass	PK	4.96036G	50.59	74.00	-23.41	8.53	3	Horizontal	318	1.52	-



RSE TX above 1GHz

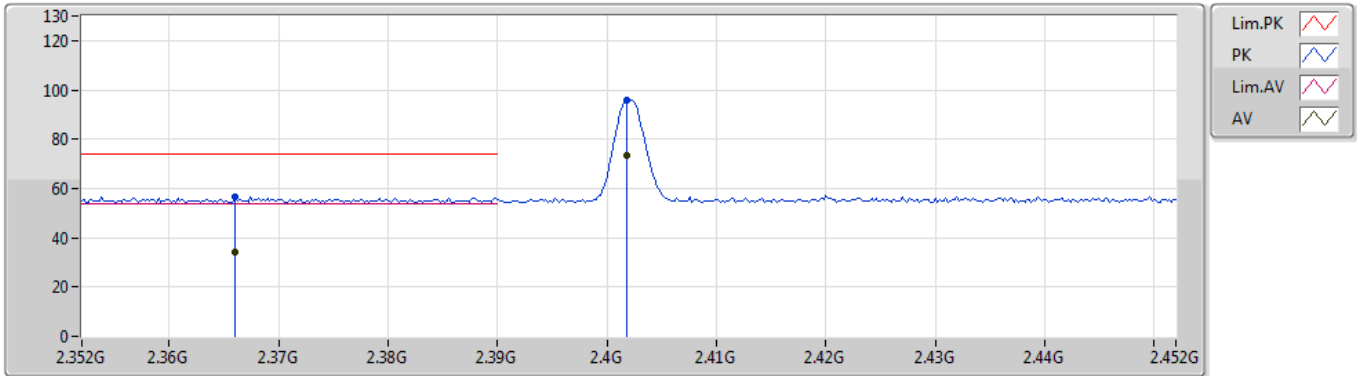
Appendix G.2

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2480MHz_TX	Pass	PK	7.4403G	52.62	74.00	-21.38	14.34	3	Horizontal	18	1.40	-

BT-BR(1Mbps)

04/05/2019

2402MHz_TX

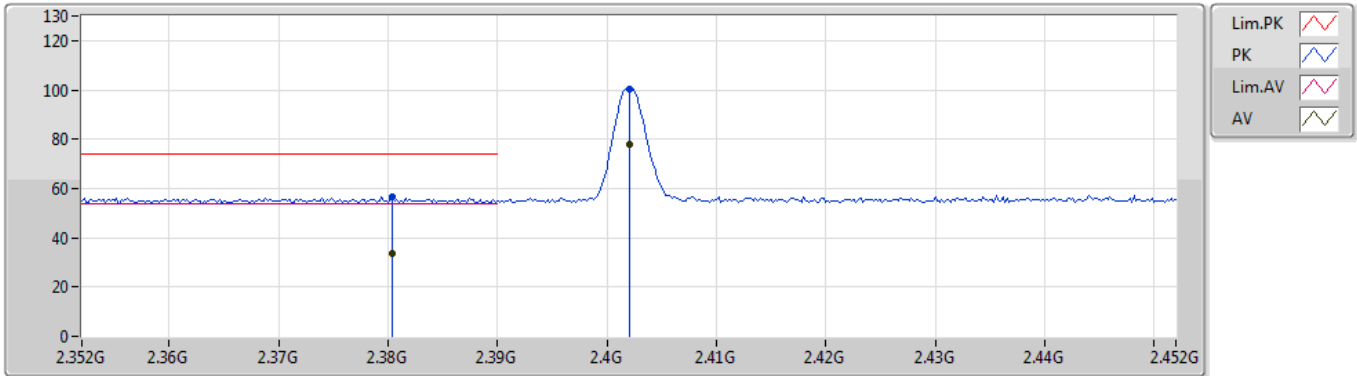


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.366G	34.12	54.00	-19.88	31.77	3	Vertical	28	1.97	-
AV	2.4018G	73.23	Inf	-Inf	31.89	3	Vertical	28	1.97	-
PK	2.366G	56.62	74.00	-17.38	31.77	3	Vertical	28	1.97	-
PK	2.4018G	95.73	Inf	-Inf	31.89	3	Vertical	28	1.97	-

BT-BR(1Mbps)

04/05/2019

2402MHz_TX

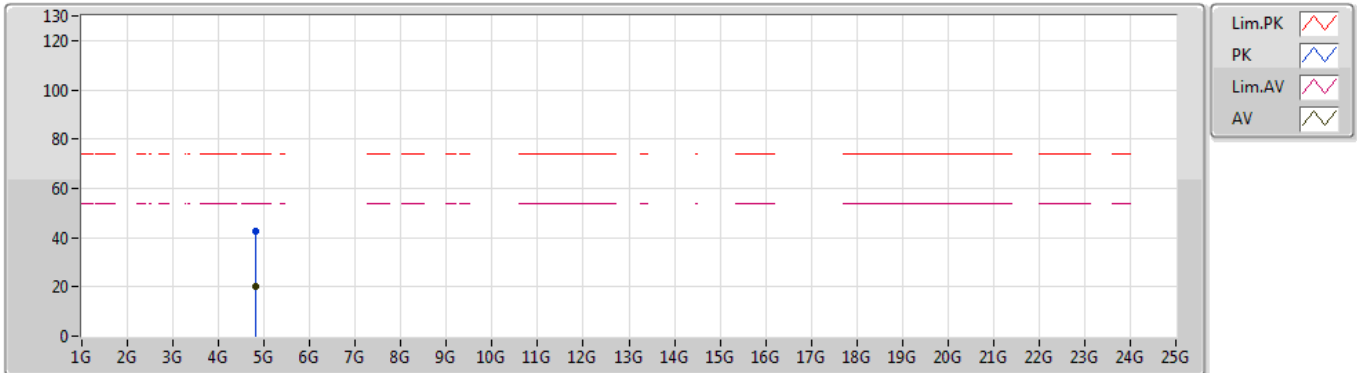


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.3804G	33.84	54.00	-20.16	31.82	3	Horizontal	323	1.42	-
AV	2.402G	78.01	Inf	-Inf	31.89	3	Horizontal	323	1.42	-
PK	2.3804G	56.34	74.00	-17.66	31.82	3	Horizontal	323	1.42	-
PK	2.402G	100.51	Inf	-Inf	31.89	3	Horizontal	323	1.42	-

BT-BR(1Mbps)

04/05/2019

2402MHz_TX

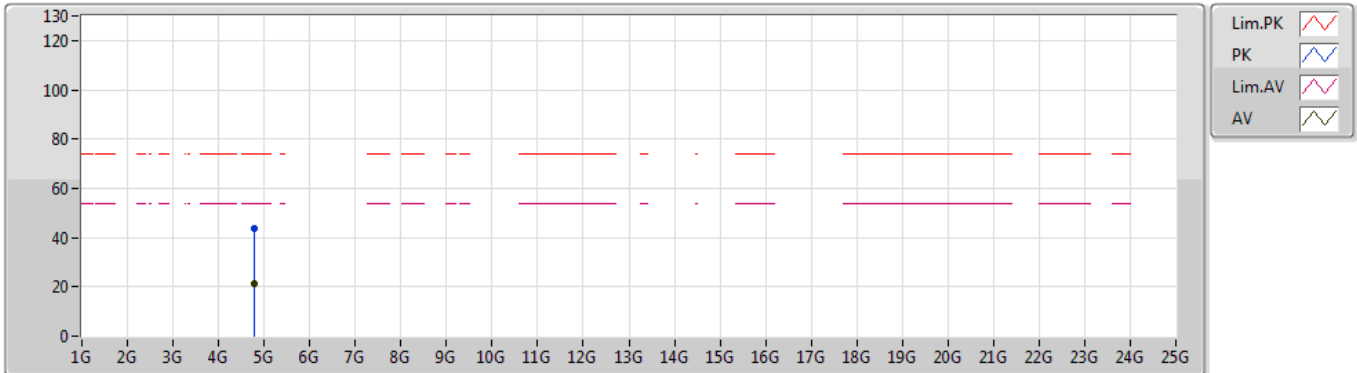


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.81312G	20.20	54.00	-33.80	3.46	3	Vertical	214	1.02	-
PK	4.81312G	42.70	74.00	-31.30	3.46	3	Vertical	214	1.02	-

BT-BR(1Mbps)

04/05/2019

2402MHz_TX

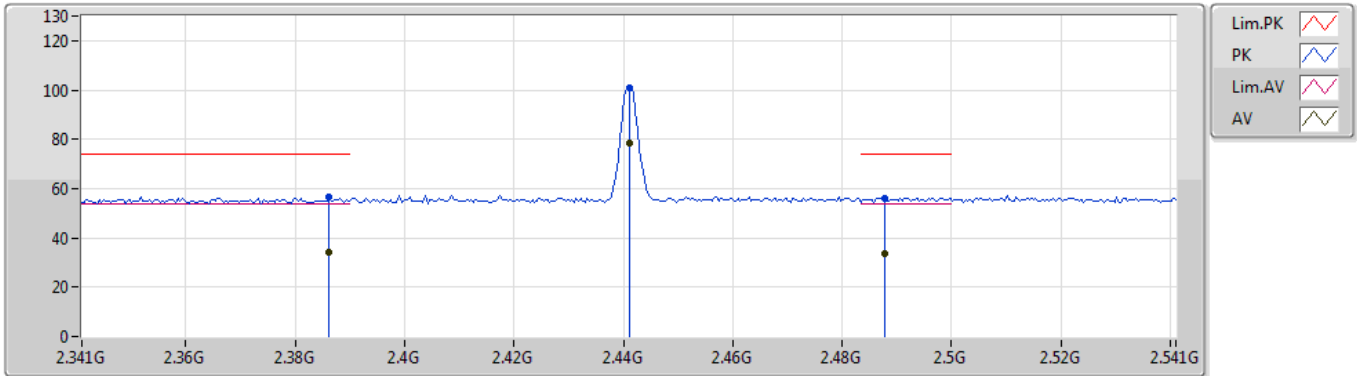


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.79416G	21.38	54.00	-32.62	3.42	3	Horizontal	211	1.98	-
PK	4.79416G	43.88	74.00	-30.12	3.42	3	Horizontal	211	1.98	-

BT-BR(1Mbps)

04/05/2019

2441MHz_TX

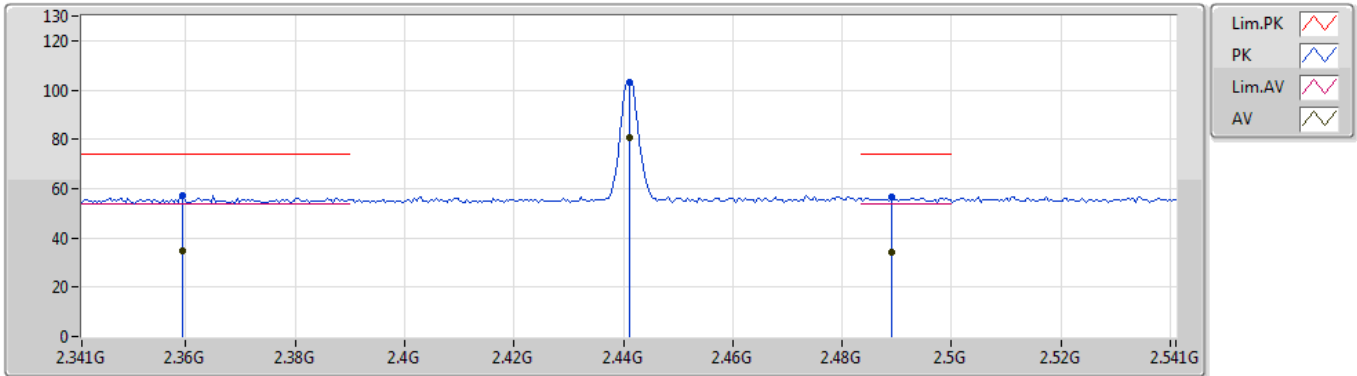


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.3862G	34.21	54.00	-19.79	31.84	3	Vertical	27	1.99	-
AV	2.441G	78.57	Inf	-Inf	32.04	3	Vertical	27	1.99	-
AV	2.4878G	33.81	54.00	-20.19	32.20	3	Vertical	27	1.99	-
PK	2.3862G	56.71	74.00	-17.29	31.84	3	Vertical	27	1.99	-
PK	2.441G	101.07	Inf	-Inf	32.04	3	Vertical	27	1.99	-
PK	2.4878G	56.31	74.00	-17.69	32.20	3	Vertical	27	1.99	-

BT-BR(1Mbps)

04/05/2019

2441MHz_TX

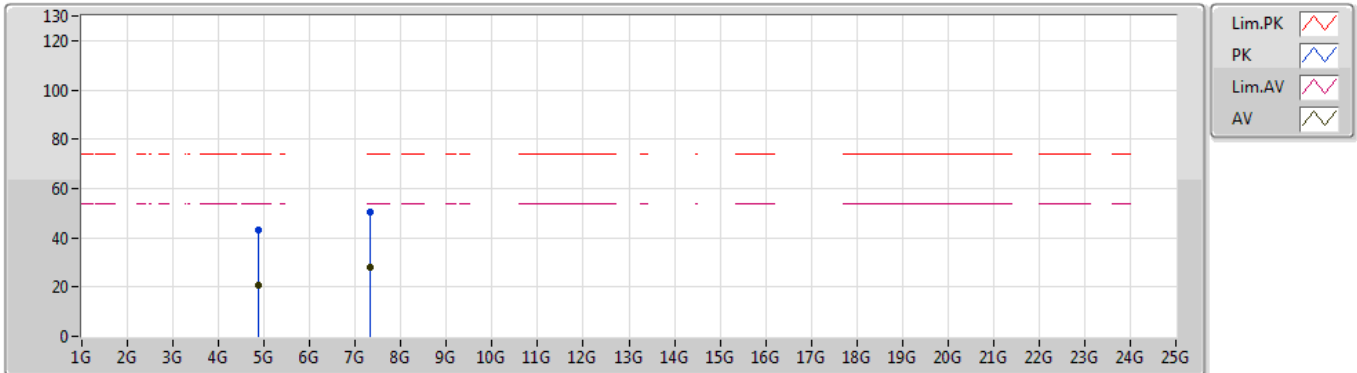


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.3594G	34.71	54.00	-19.29	31.74	3	Horizontal	6	1.31	-
AV	2.441G	80.86	Inf	-Inf	32.04	3	Horizontal	6	1.31	-
AV	2.489G	34.28	54.00	-19.72	32.20	3	Horizontal	6	1.31	-
PK	2.3594G	57.21	74.00	-16.79	31.74	3	Horizontal	6	1.31	-
PK	2.441G	103.36	Inf	-Inf	32.04	3	Horizontal	6	1.31	-
PK	2.489G	56.78	74.00	-17.22	32.20	3	Horizontal	6	1.31	-

BT-BR(1Mbps)

04/05/2019

2441MHz_TX

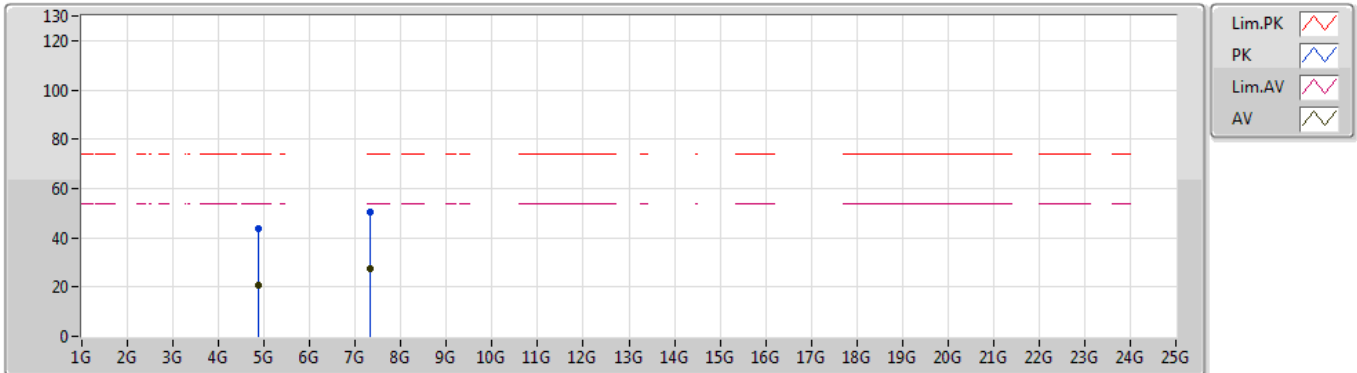


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.8814G	20.71	54.00	-33.29	3.63	3	Vertical	358	1.48	-
AV	7.32528G	28.04	54.00	-25.96	9.75	3	Vertical	331	1.27	-
PK	4.8814G	43.21	74.00	-30.79	3.63	3	Vertical	358	1.48	-
PK	7.32528G	50.54	74.00	-23.46	9.75	3	Vertical	331	1.27	-

BT-BR(1Mbps)

04/05/2019

2441MHz_TX

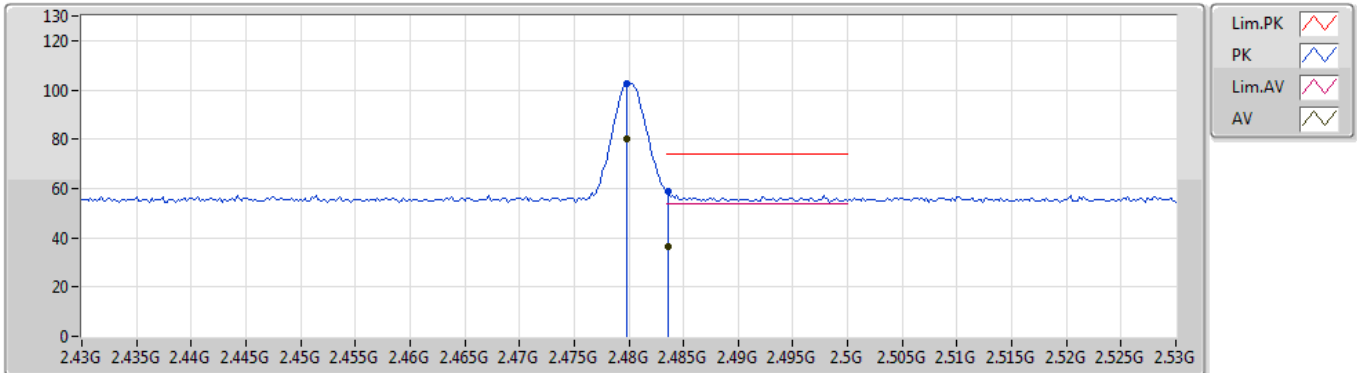


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.87936G	21.00	54.00	-33.00	3.62	3	Horizontal	51	1.46	-
AV	7.31172G	27.69	54.00	-26.31	9.72	3	Horizontal	32	1.43	-
PK	4.87936G	43.50	74.00	-30.50	3.62	3	Horizontal	51	1.46	-
PK	7.31172G	50.19	74.00	-23.81	9.72	3	Horizontal	32	1.43	-

BT-BR(1Mbps)

04/05/2019

2480MHz_TX

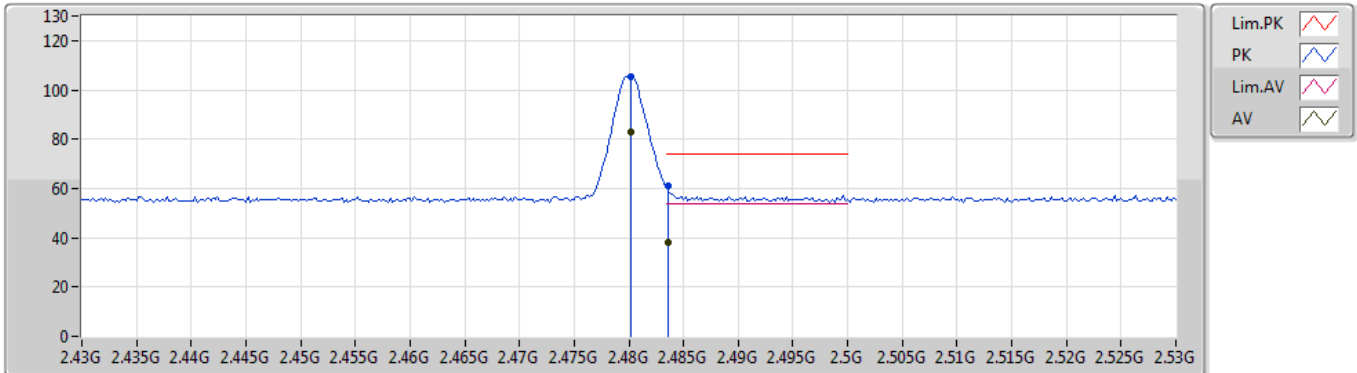


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.4798G	79.91	Inf	-Inf	32.17	3	Vertical	21	1.74	-
AV	2.4836G	36.20	54.00	-17.80	32.19	3	Vertical	21	1.74	-
PK	2.4798G	102.41	Inf	-Inf	32.17	3	Vertical	21	1.74	-
PK	2.4836G	58.70	74.00	-15.30	32.19	3	Vertical	21	1.74	-

BT-BR(1Mbps)

04/05/2019

2480MHz_TX

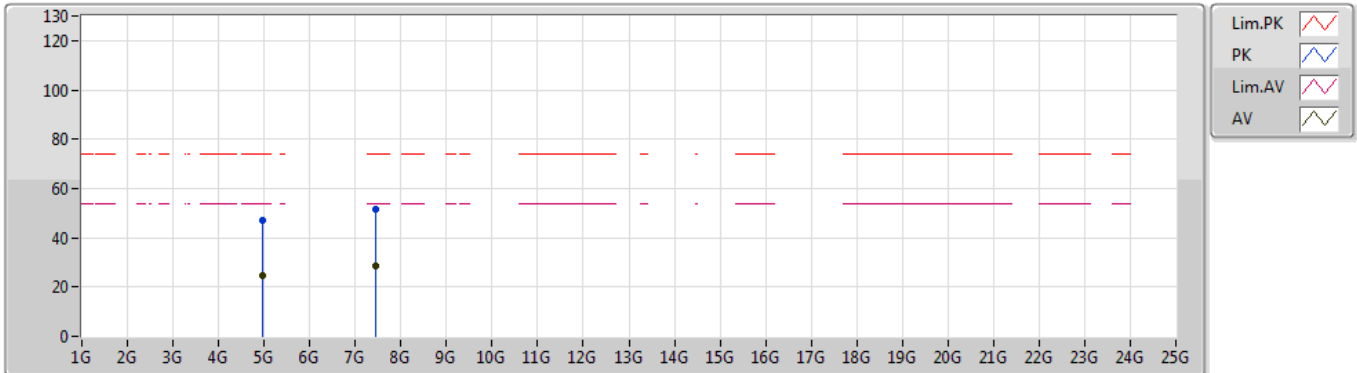


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.4802G	82.70	Inf	-Inf	32.17	3	Horizontal	6	1.54	-
AV	2.4836G	38.32	54.00	-15.68	32.19	3	Horizontal	6	1.54	-
PK	2.4802G	105.20	Inf	-Inf	32.17	3	Horizontal	6	1.54	-
PK	2.4836G	60.82	74.00	-13.18	32.19	3	Horizontal	6	1.54	-

BT-BR(1Mbps)

04/05/2019

2480MHz_TX

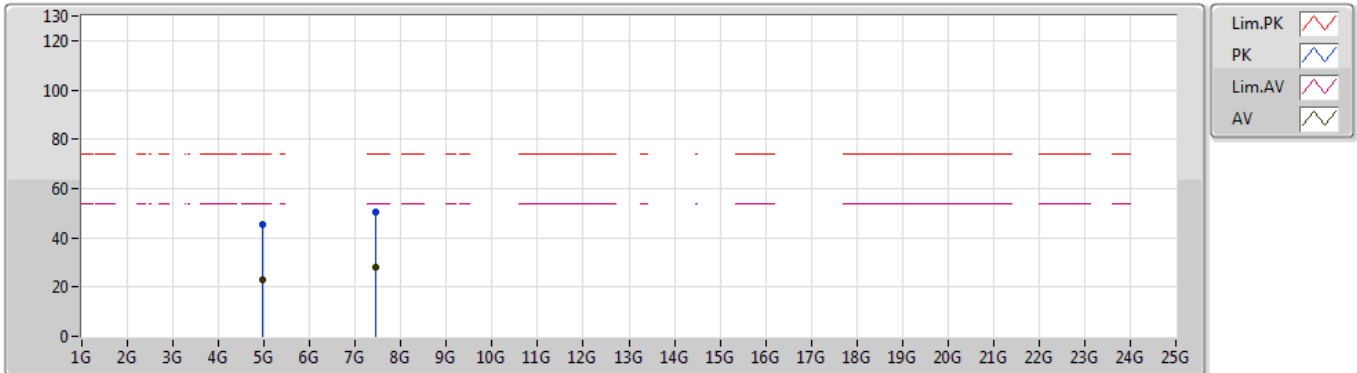


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.95964G	24.76	54.00	-29.24	3.82	3	Vertical	360	1.59	-
AV	7.43766G	28.81	54.00	-25.19	10.05	3	Vertical	334	1.99	-
PK	4.95964G	47.26	74.00	-26.74	3.82	3	Vertical	360	1.59	-
PK	7.43766G	51.31	74.00	-22.69	10.05	3	Vertical	334	1.99	-

BT-BR(1Mbps)

04/05/2019

2480MHz_TX

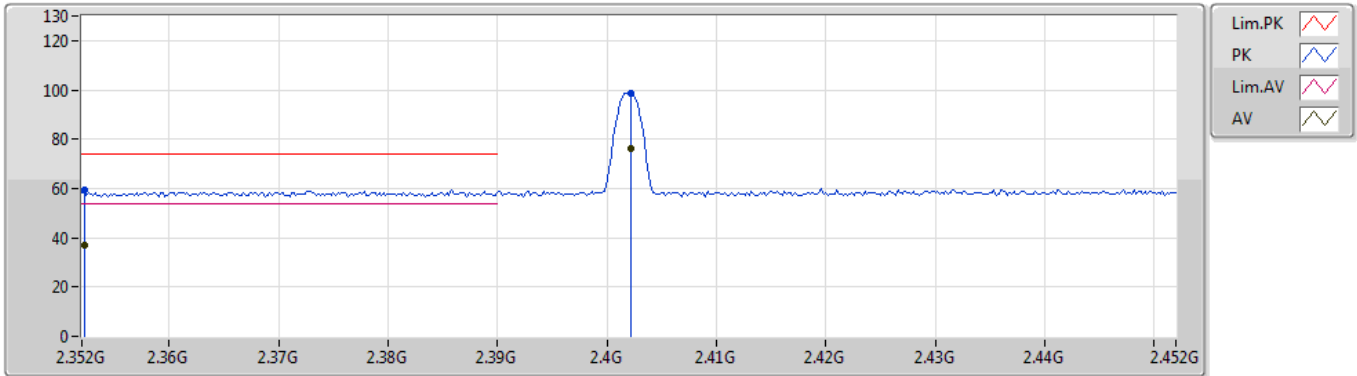


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.96048G	22.73	54.00	-31.27	3.83	3	Horizontal	326	1.12	-
AV	7.44582G	28.03	54.00	-25.97	10.07	3	Horizontal	44	1.43	-
PK	4.96048G	45.23	74.00	-28.77	3.83	3	Horizontal	326	1.12	-
PK	7.44582G	50.53	74.00	-23.47	10.07	3	Horizontal	44	1.43	-

BT-EDR(2Mbps)

28/05/2019

2402MHz_TX

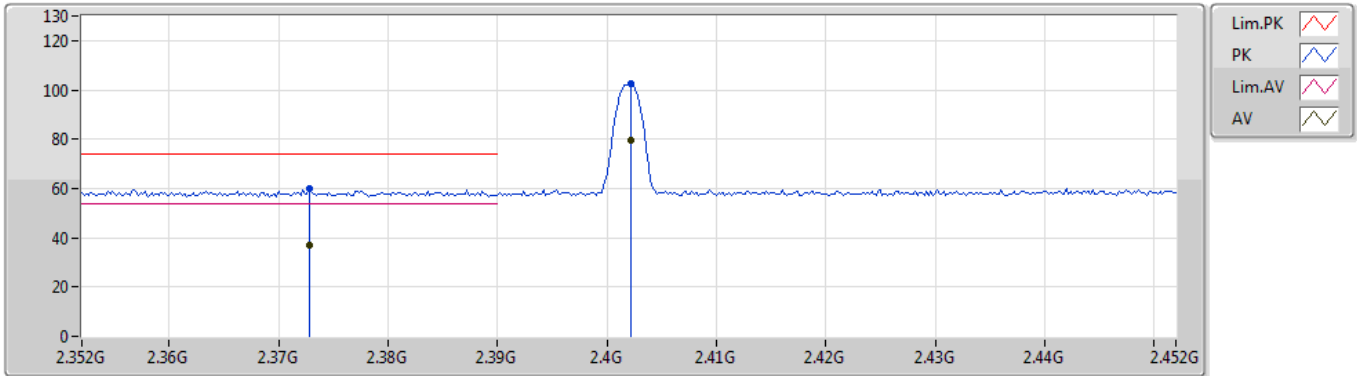


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.3522G	36.93	54.00	-17.07	32.32	3	Vertical	360	1.50	-
AV	2.4022G	76.33	Inf	-Inf	32.20	3	Vertical	360	1.50	-
PK	2.3522G	59.43	74.00	-14.57	32.32	3	Vertical	360	1.50	-
PK	2.4022G	98.83	Inf	-Inf	32.20	3	Vertical	360	1.50	-

BT-EDR(2Mbps)

28/05/2019

2402MHz_TX

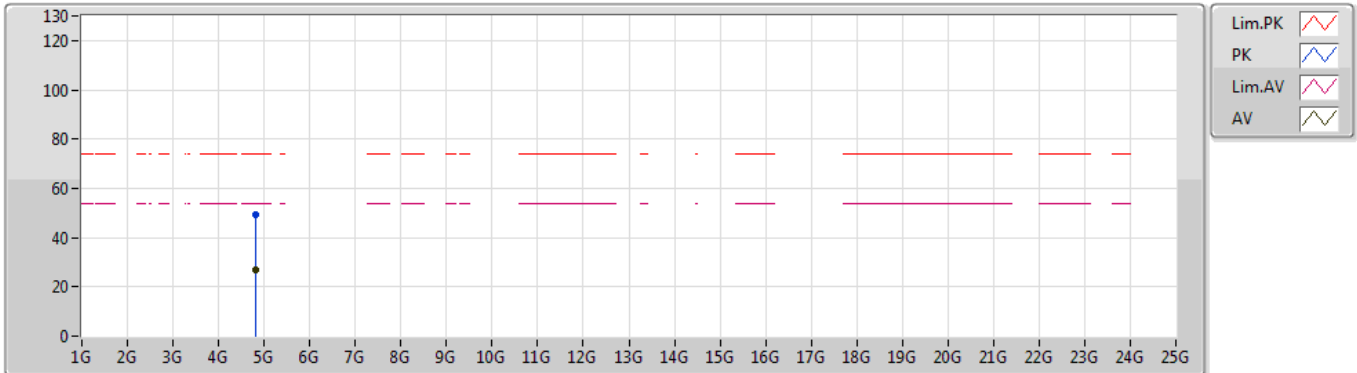


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.3728G	37.23	54.00	-16.77	32.27	3	Horizontal	350	1.53	-
AV	2.4022G	79.82	Inf	-Inf	32.20	3	Horizontal	350	1.53	-
PK	2.3728G	59.73	74.00	-14.27	32.27	3	Horizontal	350	1.53	-
PK	2.4022G	102.32	Inf	-Inf	32.20	3	Horizontal	350	1.53	-

BT-EDR(2Mbps)

28/05/2019

2402MHz_TX

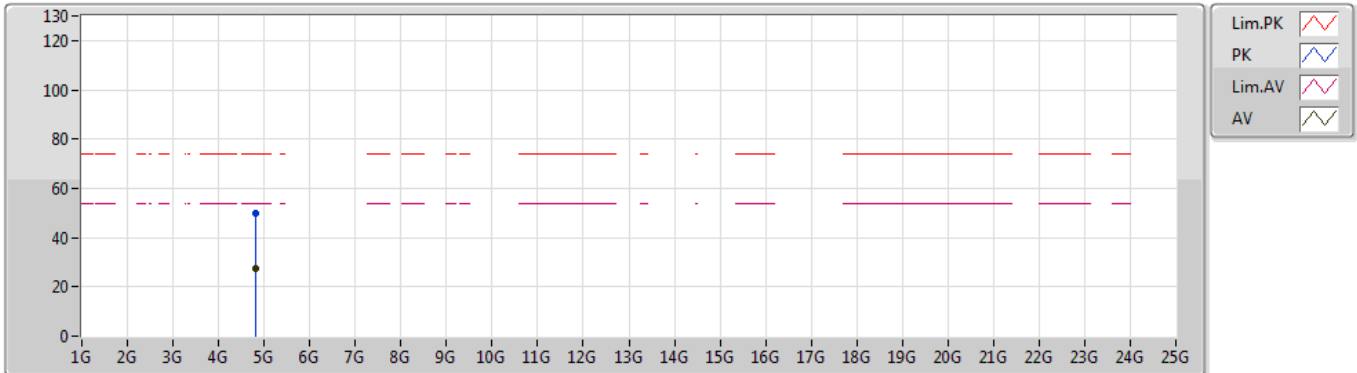


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.80346G	27.08	54.00	-26.92	8.12	3	Vertical	6	1.34	-
PK	4.80346G	49.58	74.00	-24.42	8.12	3	Vertical	6	1.34	-

BT-EDR(2Mbps)

28/05/2019

2402MHz_TX

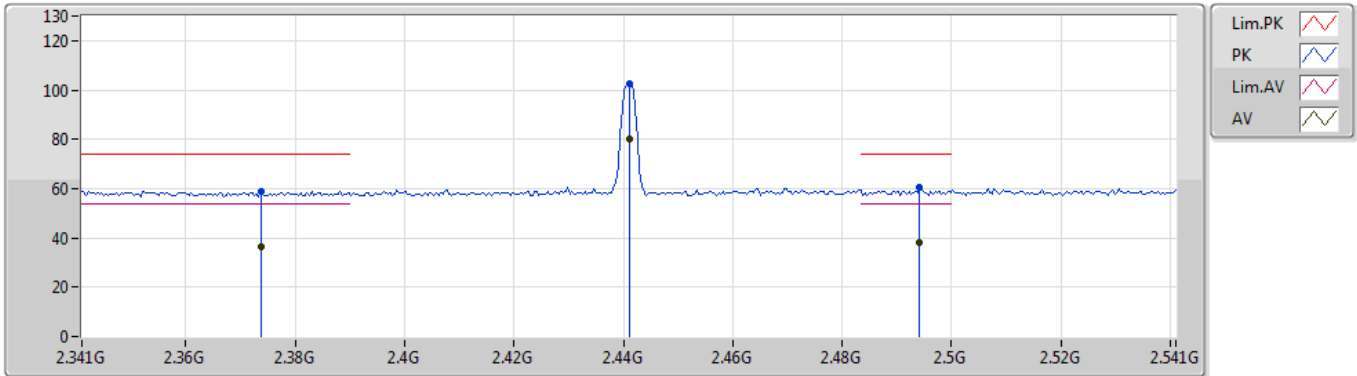


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.80364G	27.39	54.00	-26.61	8.12	3	Horizontal	347	2.23	-
PK	4.80364G	49.89	74.00	-24.11	8.12	3	Horizontal	347	2.23	-

BT-EDR(2Mbps)

28/05/2019

2441MHz_TX

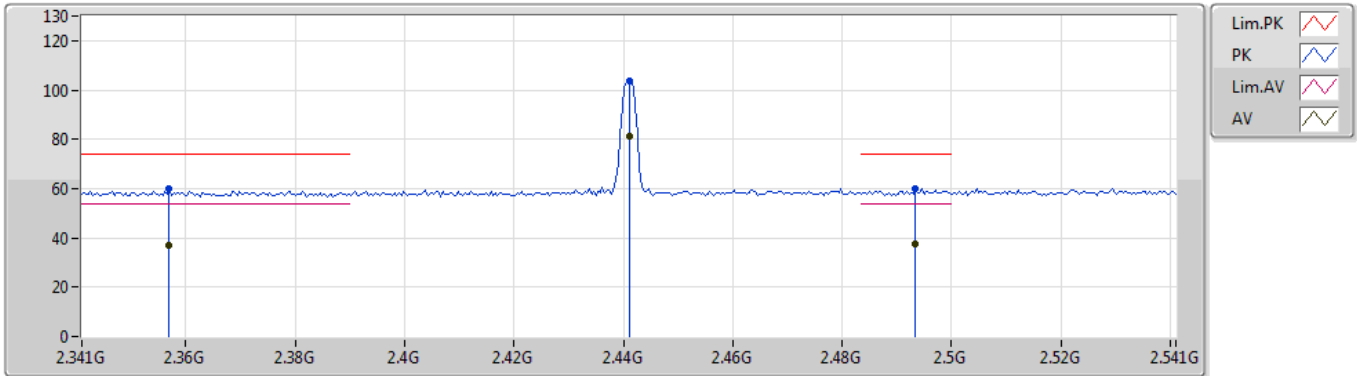


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.3738G	36.59	54.00	-17.41	32.26	3	Vertical	348	1.58	-
AV	2.441G	79.93	Inf	-Inf	32.15	3	Vertical	348	1.58	-
AV	2.4942G	38.12	54.00	-15.88	32.09	3	Vertical	348	1.58	-
PK	2.3738G	59.09	74.00	-14.91	32.26	3	Vertical	348	1.58	-
PK	2.441G	102.43	Inf	-Inf	32.15	3	Vertical	348	1.58	-
PK	2.4942G	60.62	74.00	-13.38	32.09	3	Vertical	348	1.58	-

BT-EDR(2Mbps)

28/05/2019

2441MHz_TX

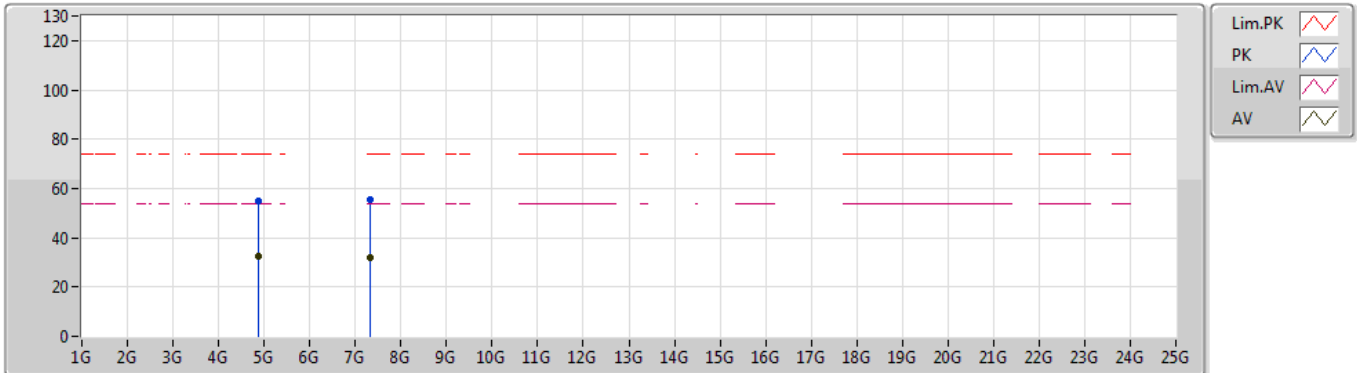


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.357G	37.23	54.00	-16.77	32.31	3	Horizontal	56	1.62	-
AV	2.441G	81.19	Inf	-Inf	32.15	3	Horizontal	56	1.62	-
AV	2.4934G	37.56	54.00	-16.44	32.08	3	Horizontal	56	1.62	-
PK	2.357G	59.73	74.00	-14.27	32.31	3	Horizontal	56	1.62	-
PK	2.441G	103.69	Inf	-Inf	32.15	3	Horizontal	56	1.62	-
PK	2.4934G	60.06	74.00	-13.94	32.08	3	Horizontal	56	1.62	-

BT-EDR(2Mbps)

28/05/2019

2441MHz_TX

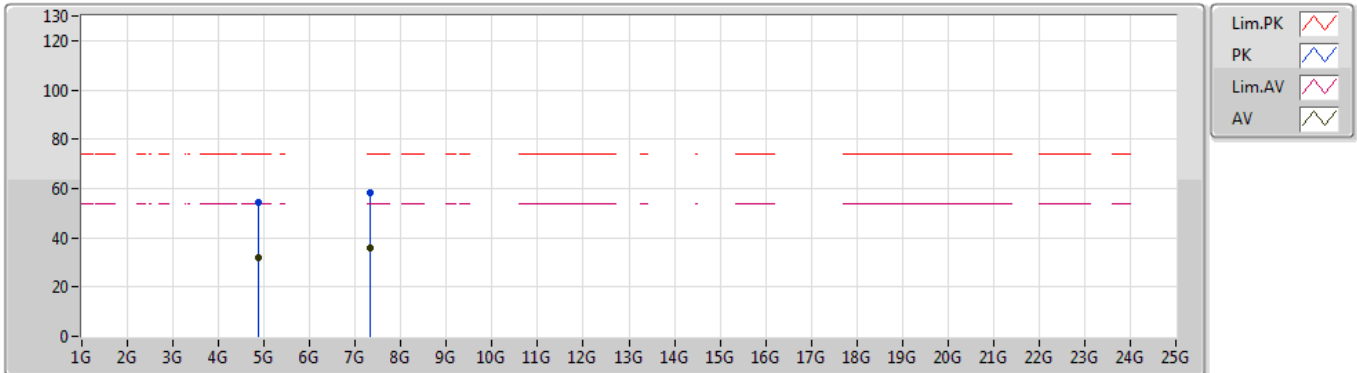


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.88224G	32.35	54.00	-21.65	8.27	3	Vertical	304	1.80	-
AV	7.3224G	32.17	54.00	-21.83	14.43	3	Vertical	347	2.32	-
PK	4.88224G	54.85	74.00	-19.15	8.27	3	Vertical	304	1.80	-
PK	7.3224G	55.67	74.00	-18.33	14.43	3	Vertical	347	2.32	-

BT-EDR(2Mbps)

28/05/2019

2441MHz_TX

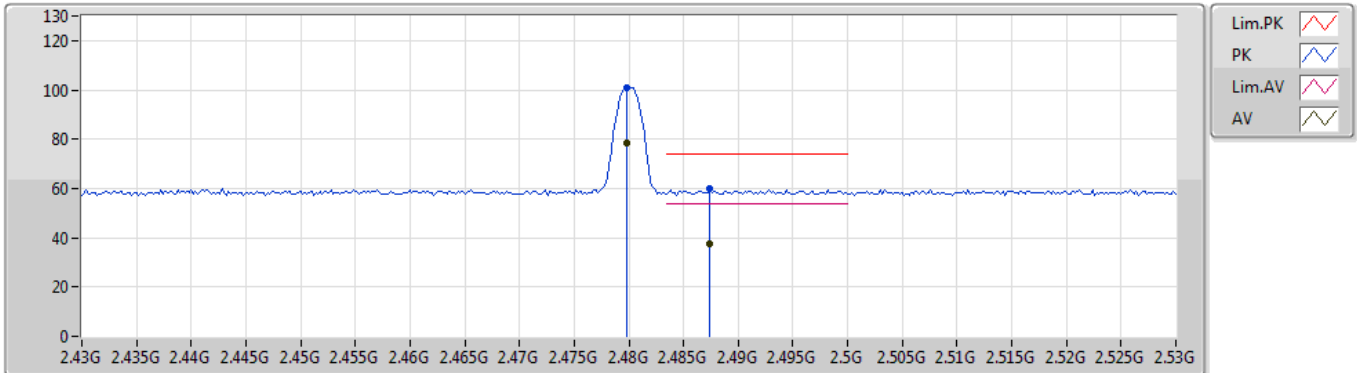


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.8823G	31.90	54.00	-22.10	8.27	3	Horizontal	40	1.92	-
AV	7.32352G	35.62	54.00	-18.38	14.43	3	Horizontal	39	1.47	-
PK	4.8823G	54.40	74.00	-19.60	8.27	3	Horizontal	40	1.92	-
PK	7.32352G	58.12	74.00	-15.88	14.43	3	Horizontal	39	1.47	-

BT-EDR(2Mbps)

28/05/2019

2480MHz_TX

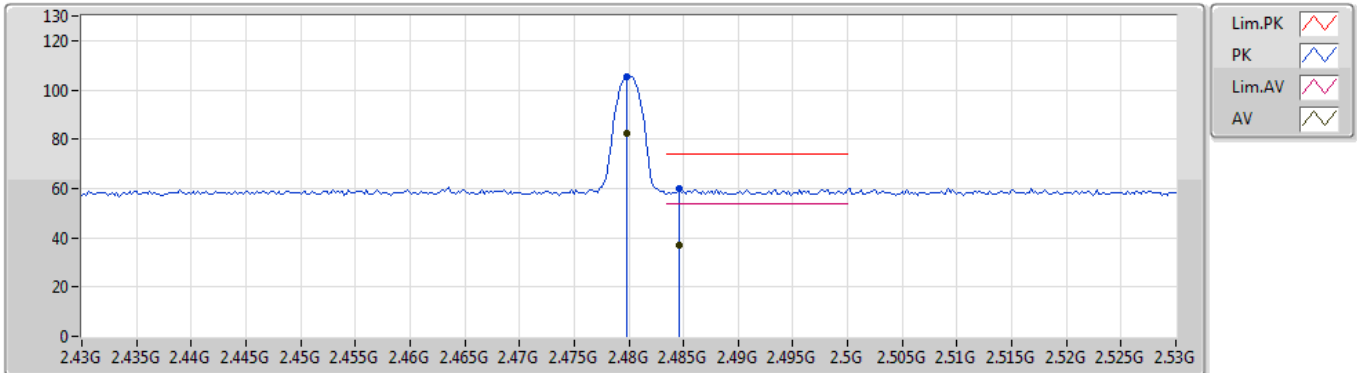


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.4798G	78.64	Inf	-Inf	32.10	3	Vertical	345	1.73	-
AV	2.4874G	37.36	54.00	-16.64	32.10	3	Vertical	345	1.73	-
PK	2.4798G	101.14	Inf	-Inf	32.10	3	Vertical	345	1.73	-
PK	2.4874G	59.86	74.00	-14.14	32.10	3	Vertical	345	1.73	-

BT-EDR(2Mbps)

28/05/2019

2480MHz_TX

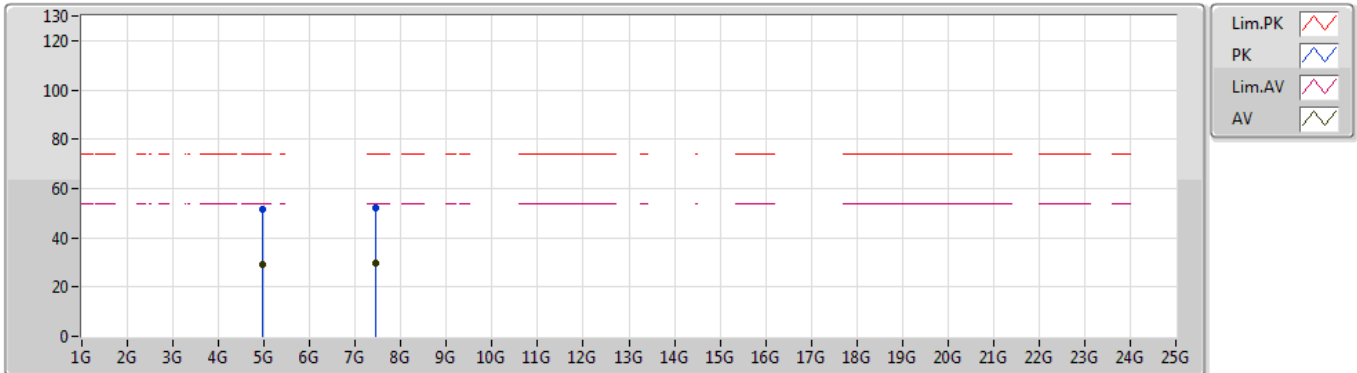


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.4798G	82.59	Inf	-Inf	32.10	3	Horizontal	61	2.33	-
AV	2.4846G	37.22	54.00	-16.78	32.10	3	Horizontal	61	2.33	-
PK	2.4798G	105.09	Inf	-Inf	32.10	3	Horizontal	61	2.33	-
PK	2.4846G	59.72	74.00	-14.28	32.10	3	Horizontal	61	2.33	-

BT-EDR(2Mbps)

28/05/2019

2480MHz_TX

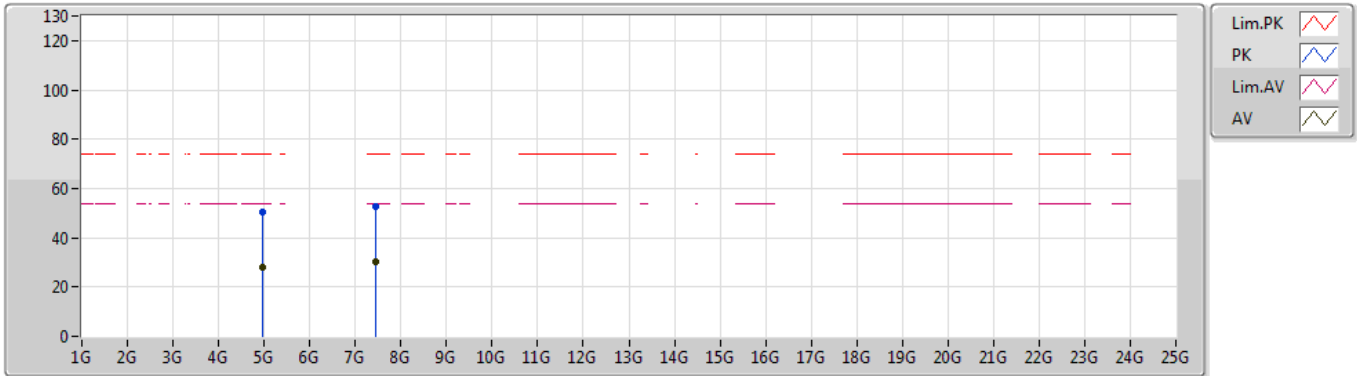


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.9603G	28.92	54.00	-25.08	8.53	3	Vertical	301	1.64	-
AV	7.43646G	29.79	54.00	-24.21	14.32	3	Vertical	12	1.54	-
PK	4.9603G	51.42	74.00	-22.58	8.53	3	Vertical	301	1.64	-
PK	7.43646G	52.29	74.00	-21.71	14.32	3	Vertical	12	1.54	-

BT-EDR(2Mbps)

28/05/2019

2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.96036G	28.09	54.00	-25.91	8.53	3	Horizontal	318	1.52	-
AV	7.4403G	30.12	54.00	-23.88	14.34	3	Horizontal	18	1.40	-
PK	4.96036G	50.59	74.00	-23.41	8.53	3	Horizontal	318	1.52	-
PK	7.4403G	52.62	74.00	-21.38	14.34	3	Horizontal	18	1.40	-