FCC Test Report

FCC ID	:	**TVE-371BB072**
Equipment	:	**Secured Wireless Access Point**
Brand Name	:	**FORTINET**
Model Name	:	**FortiAP U231Fxxxxxx, FAP-U231Fxxxxxx, FORTIAP-U231Fxxxxxx (Where "x" can be used as "A-Z", or "0-9", or "-", or blank for sofware 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, Tsaotuen, Nantou 54261, Taiwan**
Standard	:	**47 CFR FCC Part 15.247**

The product was received on Jul. 08, 2020, and testing was started from Aug. 04, 2020 and completed on Sep. 14, 2020. 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 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.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR040829-01AZ	01	Initial issue of report	Oct. 06, 2020

Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(a)	DTS Bandwidth	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power	PASS	-
3.4	15.247(e)	Power Spectral Density	PASS	-
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.6	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and explanations:
None

Reviewed by: Sam Tsai
Report Producer: Debby Hung

1 General Description

1.1 Information

The EUT has Four radio chip.

Function	Radio 1	Radio 2	Radio 3	Radio 4
WiFi 2.4G	V	X	V	X
WiFi 5G	V	V	V	X
Bluetooth / Zigbee	X	X	X	V

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std.	Ch. Frequency (MHz)	Channel Number
2400-2483.5	802.15.4	2405-2480	11-26 [16]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	Zigbee	5	1

Note:.
- Zigbee uses a O-QPSK (250kbps) modulation for DSSS.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Radio	Brand	Model Name	Antenna Type	Connector
1	1	ARISTOTLE	-	PIFA Antenna	IPEX
2		ARISTOTLE	-	PIFA Antenna	IPEX
3	2	ARISTOTLE	-	PIFA Antenna	IPEX
4		ARISTOTLE	-	PIFA Antenna	IPEX
5	3	ARISTOTLE	-	PIFA Antenna	IPEX
6		ARISTOTLE	-	PIFA Antenna	IPEX
7	4	ARISTOTLE	-	PIFA Antenna	IPEX

Ant.	Gain (dBi)							
	Radio 1		Radio 2		Radio 3		Radio 4	
	2.4G	5G	5G	5G	2.4G	5G	BT	Zigbee
1	3.89	4.53	-	-	-	-	-	-
2	3.86	5.07	-	-	-	-	-	-
3	-	-	5.89	-	-	-	-	-
4	-	-	-	5.07	-	-	-	-
5	-	-	-	-	3.78	5.26	-	-
6	-	-	-	-	3.97	5.44	-	-
7	-	-	-	-	-	-	3.69	3.69

Ant.	BF Gain (dBi)
	Radio 1 & 2 & 3
-	3.01

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

Ant. 1, Ant.2, Ant.5 and Ant.6 could transmit/receive simultaneously.(2TX/2RX)

For 5GHz function:

For IEEE 802.11 a/n/ac/ax mode

Ant. 1, Ant.2, Ant.3, Ant.4, Ant.5and Ant.6 could transmit/receive simultaneously.(2TX/2RX)

For Bluetooth function:

For IEEE 802.15.1 Bluetooth mode

Ant. 7 could transmit/receive. (1TX/1RX)

For Zigbee function:

For IEEE 802.15.3 Zigbee mode

Ant. 7 could transmit/receive. (1TX/1RX)

1.1.3 EUT Information

Operational Condition				
EUT Power Type	From AC Adapter			
EUT Function	☒	Point-to-multipoint	☐	Point-to-point

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 Table for Multiple Listing

Model Name	Description
FortiAP U231Fxxxxxx, FAP-U231Fxxxxxx, FORTIAP-U231Fxxxxxx (Where "x" can be used as "A-Z", or "0-9", or “-", or blank for sofware changes or marketing purposes only)	The difference of models is in sales marketing.

Note: The information from manufacturer.

1.1.5 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
Zigbee	1	0	20.001m	10

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

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
- ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF:

- KDB 558074 D01 v05r02
- KDB 414788 D01 v01r01

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.			
☐	Wen Shan	ADD : No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)	
		TEL : 886-3-318-0787	FAX : 886-3-318-0287
Test site Designation No. TW1097 with FCC.			

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO04-HY	Edward	23.5~25.8°C / 58~60%	17/Aug/2020
RF Conducted	TH06-HY	Alan	20.1~26.9°C / 50~60%	04/Aug/2020~10/Sep/2020
Radiated	03CH03-HY	Edward	24.5~26.1°C / 54~68%	04/Aug/2020~14/Sep/2020

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)	0.9 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	2.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.0 dB	Confidence levels of 95%
Temperature	0.41 °C	Confidence levels of 95%
Humidity	3.4 %	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 Version	MTool3.1.0.1

Mode	Power Setting
Zigbee	-
2405MHz	9
2440MHz	9
2480MHz	9

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

The Worst Case Mode for Following Conformance Tests	
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density 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		
Operating Mode > 1GHz	CTX		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
			
Worst Planes of EUT	V		

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis
Operating Mode	CTX
1	Bluetooth+WLAN 2.4GHz+WLAN 5GHz+Zigbee
Refer to Sporton Test Report No.: FA040829-01 for Co-location RF Exposure Evaluation.	

2.4 Support Equipment

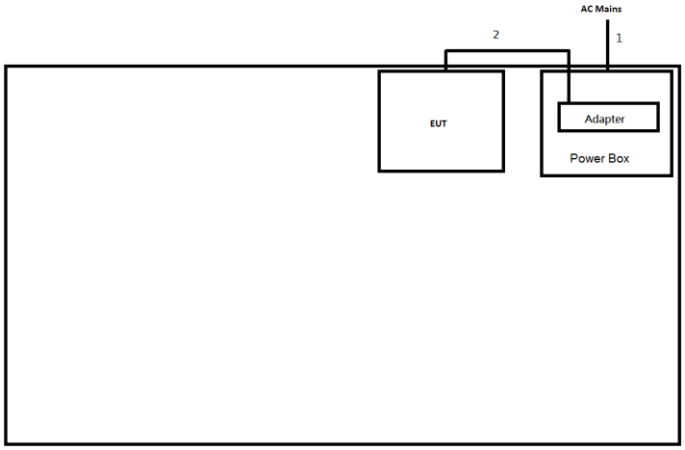
Support Equipment – Conducted					
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**	**Remark**
1	Notebook	DELL	E5410	-	-
2	Adapter for NB	DELL	HA65NM130	-	-
3	AC adapter	APD	WA-30J12R	-	Customer provided

Support Equipment –conducted emissions					
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**	**Remark**
1	AC adapter	APD	WA-30J12R	-	Customer provided

Support Equipment – Radiated emissions					
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**	**Remark**
1	AC adapter	APD	WA-30J12R	-	Customer provided

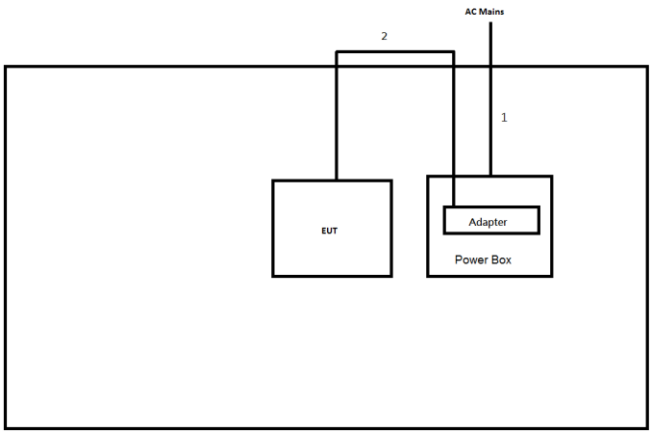
2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



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

Test Setup Diagram - Radiated Test



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

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

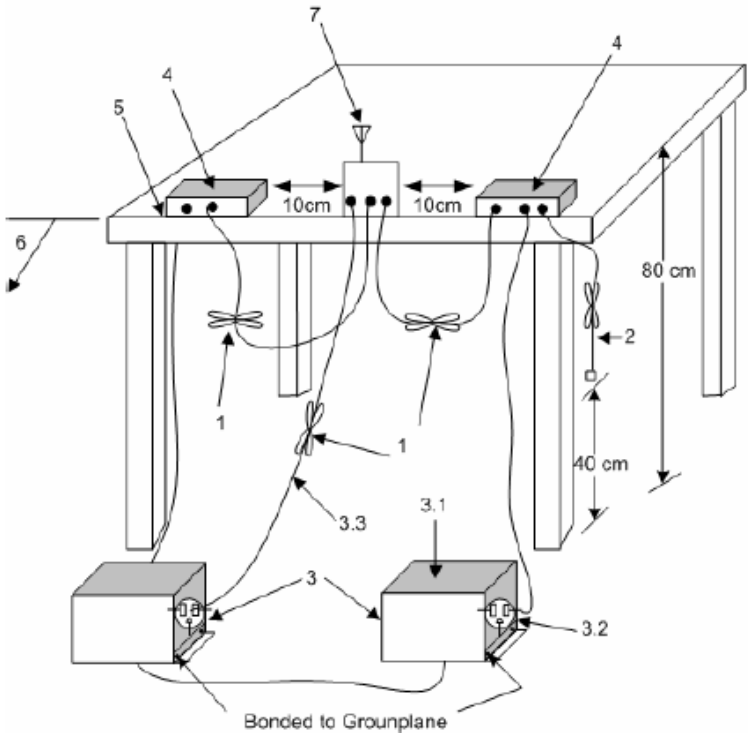
Test Method
☒ Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

3.1.4 Measurement Results Calculation

The measured Level is calculated using:
Corrected Reading: Raw(Read Level) +LISN(LISN Factor) + CL(Cable Loss) + AT(Attenuator).

3.1.5 Test Setup

AC Power-line Conducted Emissions



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.
2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
3.1—All other equipment powered from additional LISN(s).
3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
3.3—LISN at least 80 cm from nearest part of EUT chassis.
4—Non-EUT components of EUT system being tested.
5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit
Systems using digital modulation techniques:
▪ 6 dB bandwidth ≥ 500 kHz.

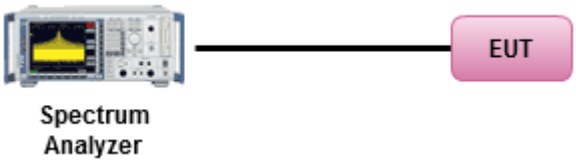
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method	
▪ For the emission bandwidth shall be measured using one of the options below:	
	☒ Refer as KDB 558074, clause 8.2 (11.8 of ANSI C63.10) DTS bandwidth measurement.
	☐ Refer as RSS-Gen, clause 6.7 for for occupied bandwidth testing.
	☐ Refer as ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.

3.2.4 Test Setup

Emission Bandwidth


3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit		
	▪ If G_{TX} ≤ 6 dBi, then P_{Out} ≤ 30 dBm (1 W)	
	▪ Point-to-multipoint systems (P2M): If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6) dBm	
	▪ Point-to-point systems (P2P): If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6)/3 dBm	
	▪ Smart antenna system (SAS):	
		- Single beam: If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6)/3 dBm
		- Overlap beam: If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6)/3 dBm
		- Aggregate power on all beams: If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6)/3 + 8dB dBm
e.i.r.p. Power Limit:		
▪ 2400-2483.5 MHz Band		
	▪ Point-to-multipoint systems (P2M): P_{eirp} ≤ 36 dBm (4 W)	
	▪ Point-to-point systems (P2P): P_{eirp} ≤ MAX(36, [P_{Out} + G_{TX}]) dBm	
	▪ Smart antenna system (SAS)	
		- Single beam: P_{eirp} ≤ MAX(36, P_{Out} + G_{TX}) dBm
		- Overlap beam: P_{eirp} ≤ MAX(36, P_{Out} + G_{TX}) dBm
		- Aggregate power on all beams: P_{eirp} ≤ MAX(36, [P_{Out} + G_{TX} + 8]) dBm
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, **G_{TX}** = the maximum transmitting antenna directional gain in dBi.		

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
▪ Maximum Peak Conducted Output Power	
	☐ Refer as KDB 558074, clause 8.3.1.1 (11.9.1.1 of ANSI C63.10) RBW ≥ EBW method.
	☐ Refer as KDB 558074, clause 8.3.1.2 (11.9.1.2 of ANSI C63.10) integrated band power method.
	☐ Refer as KDB 558074, clause 8.3.1.3 (11.9.1.3 of ANSI C63.10) peak power meter.
▪ Maximum Average Conducted Output Power	
	☐ Refer as KDB 558074, clause 8.3.2.2 (11.9.2.2 of ANSI C63.10) using a spectrum analyzer.
	☒ Refer as KDB 558074, clause 8.3.2.3 (11.9.2.3 of ANSI C63.10) using a power meter.
▪ For conducted measurement.	
	▪ If the EUT supports multiple transmit chains using options given below: Refer as KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	▪ If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \ldots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

3.3.4 Test Setup

Maximum Conducted Output Power (Power Meter)


3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit
▪ Power Spectral Density (PSD) ≤ 8 dBm/3kHz

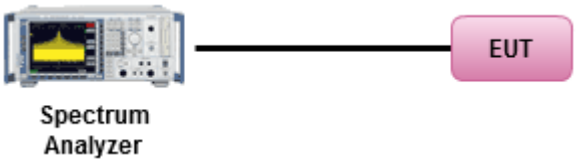
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

Test Method		
▪ Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).		
	☒ Refer as KDB 558074, clause 8.4 (11.10 of ANSI C63.10) Max. PSD.	
▪ For conducted measurement.		
	▪ If The EUT supports multiple transmit chains using options given below:	
		▪ Measure and sum the spectra across the outputs. Refer as KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.

3.4.4 Test Setup

Power Spectral Density


3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	**Limit (dB)**
Peak output power procedure	20
Average output power procedure	30
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 level. Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average level.	

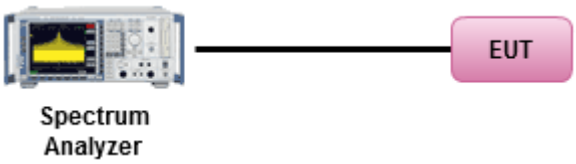
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method
▪ Refer as KDB 558074, clause 8.5 (11.11 of ANSI C63.10) for non-restricted frequency bands.

3.5.4 Test Setup

Emissions in Non-restricted Frequency Bands


3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

3.6 Emissions in Restricted Frequency Bands

3.6.1 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.

3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

Test Method	
▪	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].
▪	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.
▪	For the transmitter unwanted emissions shall be measured using following options below:
	▪ Refer as KDB 558074, clause 8.6 (11.12 of ANSI C63.10) for restricted frequency bands.
▪	For the transmitter band-edge emissions shall be measured using following options below:
	▪ Refer as KDB 558074 clause 8.7.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
	▪ Refer as KDB 558074, clause 8.7.2 (6.10.6 of ANSI C63.10) for marker-delta method for band-edge measurements.
	▪ Refer as KDB 558074, clause 8.7.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
▪	Use the following spectrum analyzer settings:
	▪ Set RBW=100 kHz for f < 1 GHz; VBW=3 * RBW; Sweep = auto; Detector function = peak; Trace = max hold.
	▪ Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement. For average measurement, refer as 1.1.4.
▪	KDB 414788 Open-Field Test Sites and Chamber Correlation Justification.
	▪ Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field.
	▪ Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

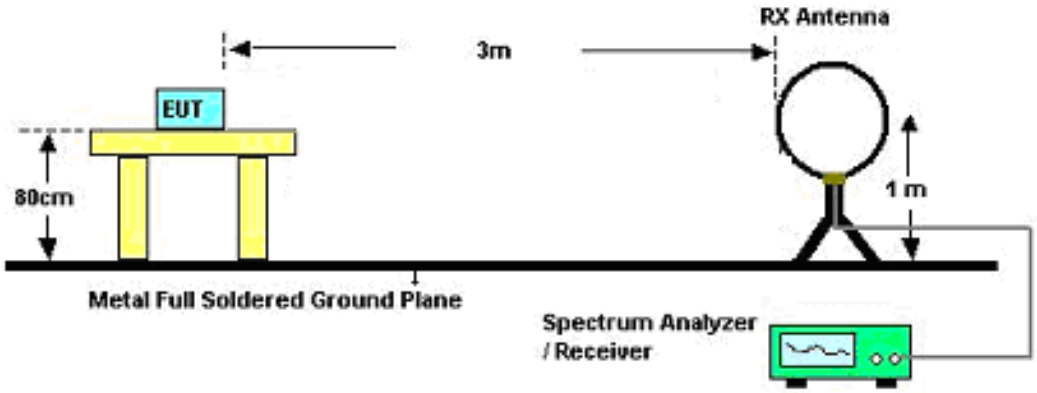
3.6.4 Measurement Results Calculation

The measured Level is calculated using:
Corrected Reading: Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)

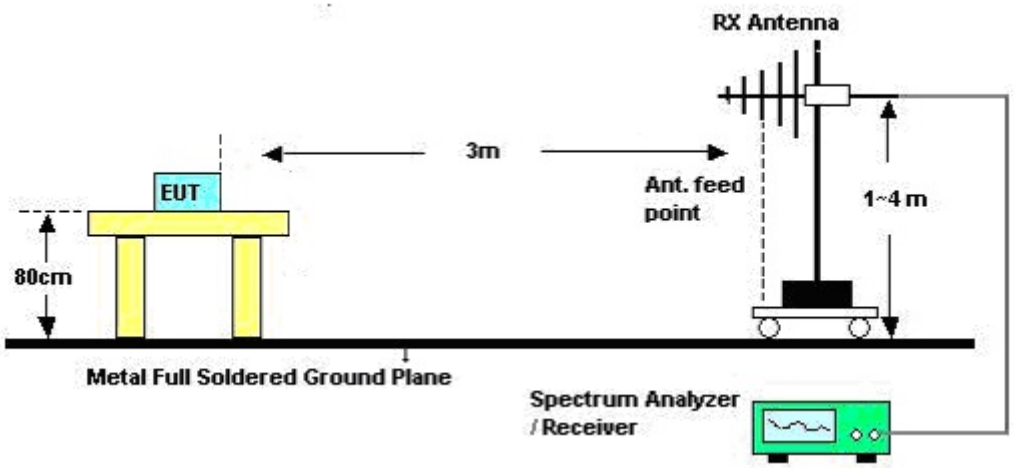
3.6.5 Test Setup

Emissions in Restricted Frequency Bands

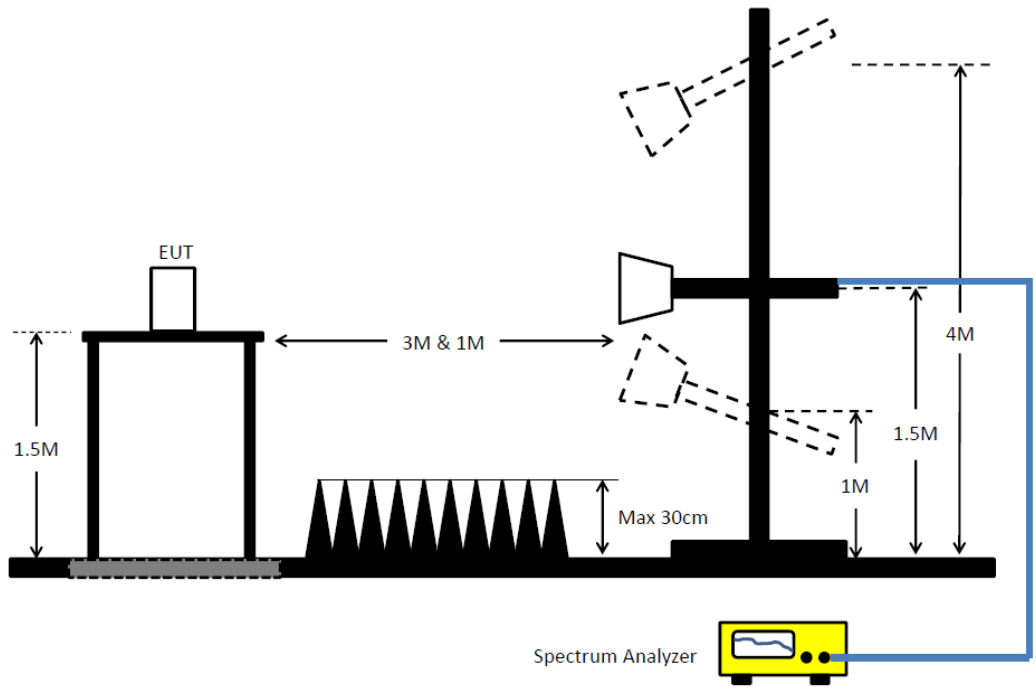
9kHz ~30MHz



30MHz~1GHz



Above 1GHz



3.6.6 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.

3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR3	102051	9kHz ~ 3.6GHz	29/May/2020	28/May/2021
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	05/Nov/2019	04/Nov/2020
RF Cable-CON	MTJ	RG142	CB002-CO	9kHz ~ 200MHz	23/Sep/2019	22/Sep/2020
Impuls Begrenzer Puls e Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9kHz ~ 30MHz	24/Sep/2019	23/Sep/2020

NCR: Non-Calibration Require

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV 40	101029	10KHz ~ 40GHz	01/Oct/2019	30/Sep/2020
SMB100A Signal Generator	R&S	SMB100A03	181147	100kHz~40GHz	12/Nov/2018	11/Nov/2020
Pulse Sensor	Anritsu	MA2411B	1027452	300MHz~40GHz	18/Mar/2020	17/Mar/2021
Power Meter	Anritsu	ML2495A	1124009	300MHz~40GHz	18/Mar/2020	17/Mar/2021

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	06/Aug/2020	05/Aug/2021
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1GHz~18GHz 3m	04/Aug/2020	03/Aug/2021
Signal Analyzer	R&S	FSV40	101500	10Hz~40GHz	15/Aug/2019	14/Aug/2020
Signal Analyzer	R&S	FSV40	101500	10Hz~40GHz	19/Aug/2020	18/Aug/2021
Amplifier	HP	8447D	2944A08033	10kHz~1.3GHz	14/Apr/2020	13/Apr/2021
Microwave System Preamplifier	KEYSIGHT	83017A	MY53270196	1GHz~26.5GHz	09/Sep/2019	08/Sep/2020
Microwave System Preamplifier	KEYSIGHT	83017A	MY53270197	1GHz~26.5GHz	27/Nov/2019	26/Nov/2020
Bilog Antenna & 6dB Attenuator	SCHAFFNER / EMCI	CBL6112B / N-6-05	22237 / AT-N-0603	30MHz~1GHz	19/Apr/2020	18/Apr/2021
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1531	1GHz~18GHz	26/Mar/2020	25/Mar/2021
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz~30MHz	19/Jun/2020	18/Jun/2021
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	18/Mar/2020	17/Mar/2021
RF CABLE 5+6m	HUBER+SUHNER	SUOFLEX 104	SN MY38596/4+SN 804300/4	1GHz~40GHz	04/Aug/2020	03/Aug/2021
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170221	18GHz~40GHz	13/Mar/2020	12/Mar/2021
Preamplifier	MITEQ	TTA1840-35-HG	1864481	18GHz~40GHz	10/Mar/2020	09/Mar/2021
Loop Antenna	TESEQ	HLA 6120	31244	9kHz~30MHz	16/Mar/2020	15/Mar/2021
EMI Test Receiver	R&S	ESR3	102051	9kHz~3.6GHz	29/May/2020	28/May/2021

Summary

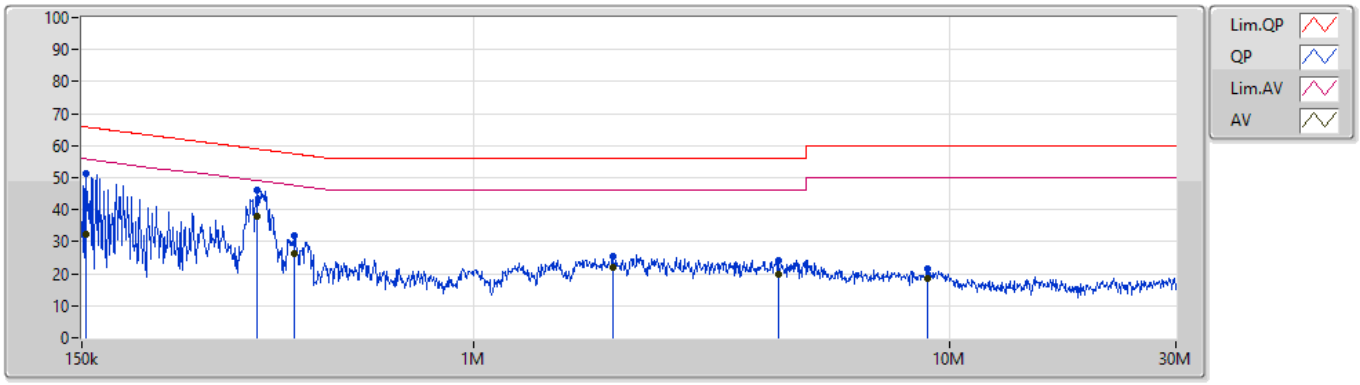
Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	AV	351.053k	37.81	48.94	-11.13	Line

Mode Configure

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition	Comments
Mode 1	Pass	QP	153.024k	51.42	65.83	-14.41	Line	-
Mode 1	Pass	AV	153.024k	32.47	55.83	-23.36	Line	-
Mode 1	Pass	QP	351.053k	46.17	58.94	-12.77	Line	-
Mode 1	Pass	AV	351.053k	37.81	48.94	-11.13	Line	"Worst"
Mode 1	Pass	QP	420.135k	32.01	57.45	-25.44	Line	-
Mode 1	Pass	AV	420.135k	26.12	47.45	-21.33	Line	-
Mode 1	Pass	QP	1.962M	25.54	56.00	-30.46	Line	-
Mode 1	Pass	AV	1.962M	21.95	46.00	-24.05	Line	-
Mode 1	Pass	QP	4.376M	24.22	56.00	-31.78	Line	-
Mode 1	Pass	AV	4.376M	19.92	46.00	-26.08	Line	-
Mode 1	Pass	QP	9.013M	21.62	60.00	-38.38	Line	-
Mode 1	Pass	AV	9.013M	18.33	50.00	-31.67	Line	-
Mode 1	Pass	QP	152.414k	51.31	65.87	-14.56	Neutral	-
Mode 1	Pass	AV	152.414k	33.41	55.87	-22.46	Neutral	-
Mode 1	Pass	QP	349.654k	45.87	58.96	-13.09	Neutral	-
Mode 1	Pass	AV	349.654k	37.19	48.96	-11.77	Neutral	"Worst"
Mode 1	Pass	QP	599.363k	29.94	56.00	-26.06	Neutral	-
Mode 1	Pass	AV	599.363k	24.57	46.00	-21.43	Neutral	-
Mode 1	Pass	QP	1.163M	28.92	56.00	-27.08	Neutral	-
Mode 1	Pass	AV	1.163M	25.32	46.00	-20.68	Neutral	-
Mode 1	Pass	QP	4.222M	23.98	56.00	-32.02	Neutral	-
Mode 1	Pass	AV	4.222M	19.58	46.00	-26.42	Neutral	-
Mode 1	Pass	QP	8.906M	23.62	60.00	-36.38	Neutral	-
Mode 1	Pass	AV	8.906M	19.91	50.00	-30.09	Neutral	-

Conducted Emissions at Powerline_Mode 1

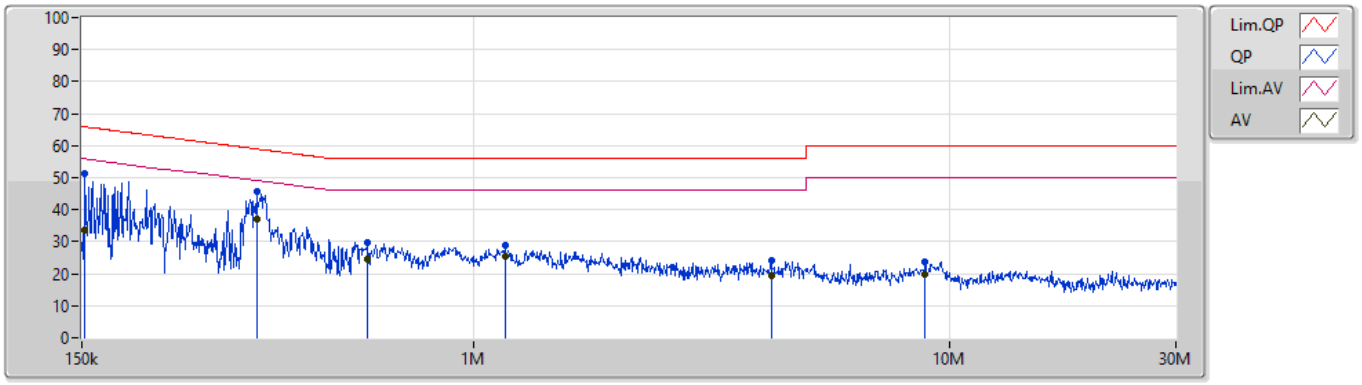
17/08/2020



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	153.024k	51.42	65.83	-14.41	19.64	Line	-	31.78	9.66	0.11	9.87
AV	153.024k	32.47	55.83	-23.36	19.64	Line	-	12.83	9.66	0.11	9.87
QP	351.053k	46.17	58.94	-12.77	19.64	Line	-	26.53	9.64	0.13	9.87
AV	351.053k	37.81	48.94	-11.13	19.64	Line	"Worst"	18.17	9.64	0.13	9.87
QP	420.135k	32.01	57.45	-25.44	19.64	Line	-	12.37	9.64	0.13	9.87
AV	420.135k	26.12	47.45	-21.33	19.64	Line	-	6.48	9.64	0.13	9.87
QP	1.962M	25.54	56.00	-30.46	19.66	Line	-	5.88	9.65	0.14	9.87
AV	1.962M	21.95	46.00	-24.05	19.66	Line	-	2.29	9.65	0.14	9.87
QP	4.376M	24.22	56.00	-31.78	19.73	Line	-	4.49	9.66	0.19	9.88
AV	4.376M	19.92	46.00	-26.08	19.73	Line	-	0.19	9.66	0.19	9.88
QP	9.013M	21.62	60.00	-38.38	19.83	Line	-	1.79	9.69	0.26	9.88
AV	9.013M	18.33	50.00	-31.67	19.83	Line	-	-1.50	9.69	0.26	9.88

Conducted Emissions at Powerline_Mode 1

17/08/2020



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	152.414k	51.31	65.87	-14.56	19.63	Neutral	-	31.68	9.65	0.11	9.87
AV	152.414k	33.41	55.87	-22.46	19.63	Neutral	-	13.78	9.65	0.11	9.87
QP	349.654k	45.87	58.96	-13.09	19.63	Neutral	-	26.24	9.63	0.13	9.87
AV	349.654k	37.19	48.96	-11.77	19.63	Neutral	"Worst"	17.56	9.63	0.13	9.87
QP	599.363k	29.94	56.00	-26.06	19.62	Neutral	-	10.32	9.63	0.12	9.87
AV	599.363k	24.57	46.00	-21.43	19.62	Neutral	-	4.95	9.63	0.12	9.87
QP	1.163M	28.92	56.00	-27.08	19.63	Neutral	-	9.29	9.63	0.12	9.88
AV	1.163M	25.32	46.00	-20.68	19.63	Neutral	-	5.69	9.63	0.12	9.88
QP	4.222M	23.98	56.00	-32.02	19.73	Neutral	-	4.25	9.66	0.19	9.88
AV	4.222M	19.58	46.00	-26.42	19.73	Neutral	-	-0.15	9.66	0.19	9.88
QP	8.906M	23.62	60.00	-36.38	19.83	Neutral	-	3.79	9.69	0.26	9.88
AV	8.906M	19.91	50.00	-30.09	19.83	Neutral	-	0.08	9.69	0.26	9.88

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
Zigbee	1.644M	2.249M	2M25G1D	1.619M	2.239M

Max-N dB = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

Result

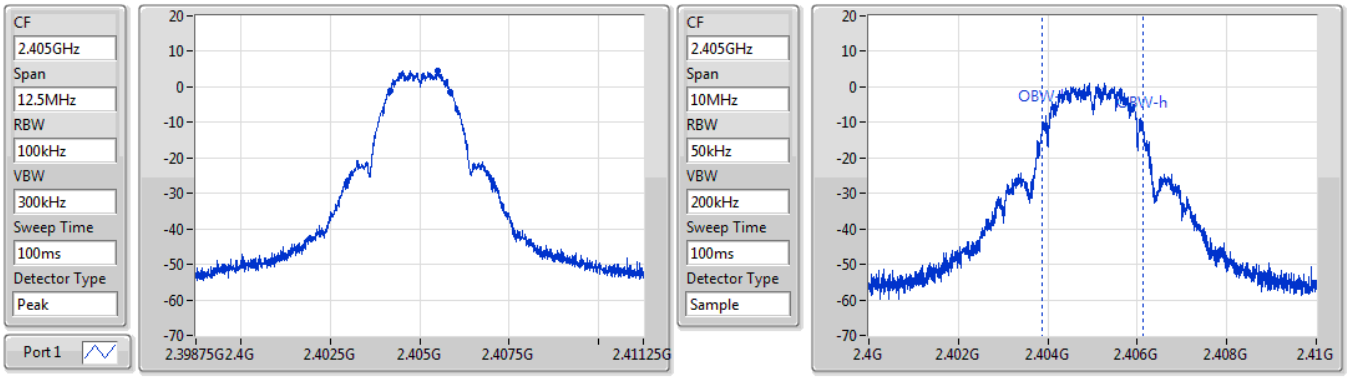
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
Zigbee	-	-	-	-
2405MHz	Pass	500k	1.644M	2.249M
2440MHz	Pass	500k	1.631M	2.239M
2480MHz	Pass	500k	1.619M	2.239M

Port X-N dB = Port **X** 6dB down bandwidth; **Port X-OBW** = Port **X** 99% occupied bandwidth;

Zigbee EBW

2405MHz

07/08/2020

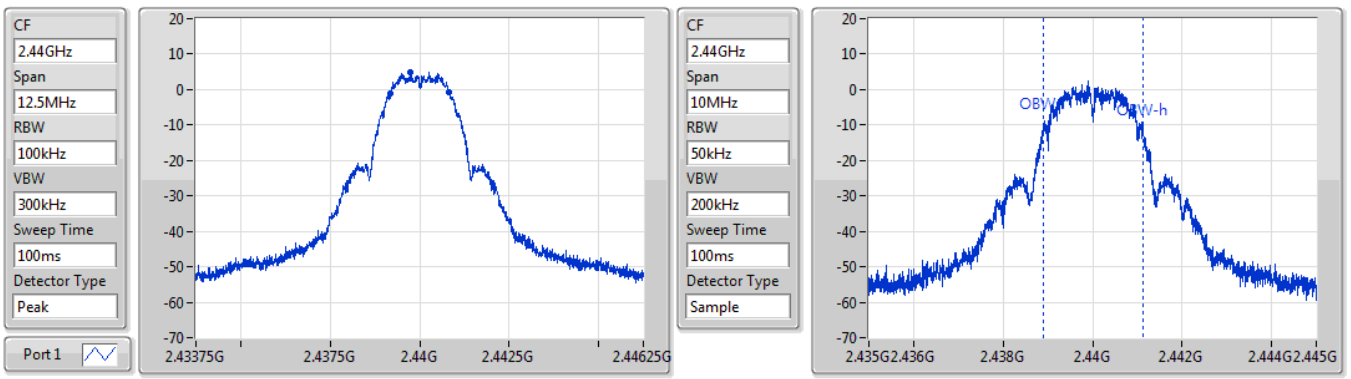


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.644M	2.404194G	2.405838G	2.249M	2.403881G	2.406129G	500k	1

Zigbee EBW

2440MHz

07/08/2020

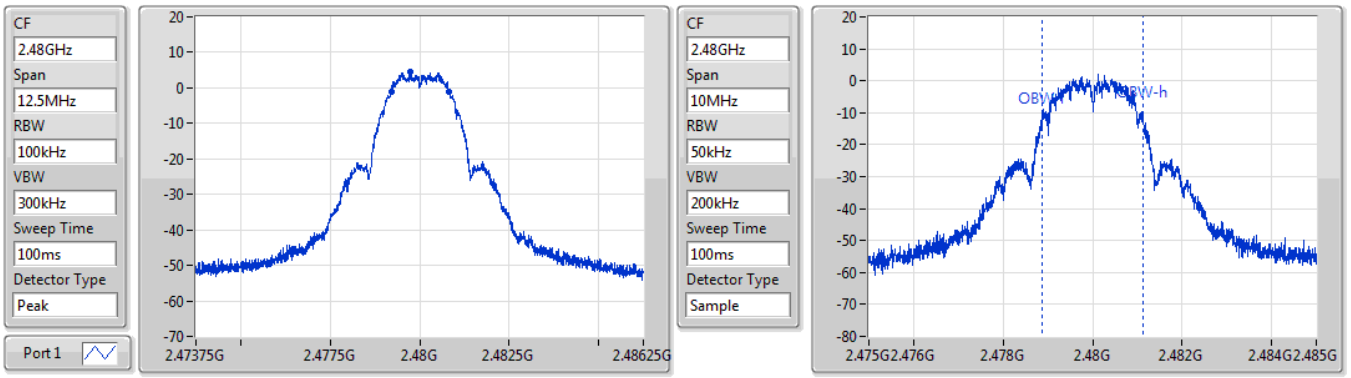


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.631M	2.439194G	2.440825G	2.239M	2.438891G	2.441129G	500k	1

Zigbee **EBW**

2480MHz

07/08/2020



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.619M	2.479206G	2.480825G	2.239M	2.478886G	2.481124G	500k	1

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee	8.43	0.00697

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-	-
2405MHz	Pass	3.69	8.43	8.43	Inf
2440MHz	Pass	3.69	8.36	8.36	Inf
2480MHz	Pass	3.69	8.19	8.19	Inf

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

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
Zigbee	-8.29

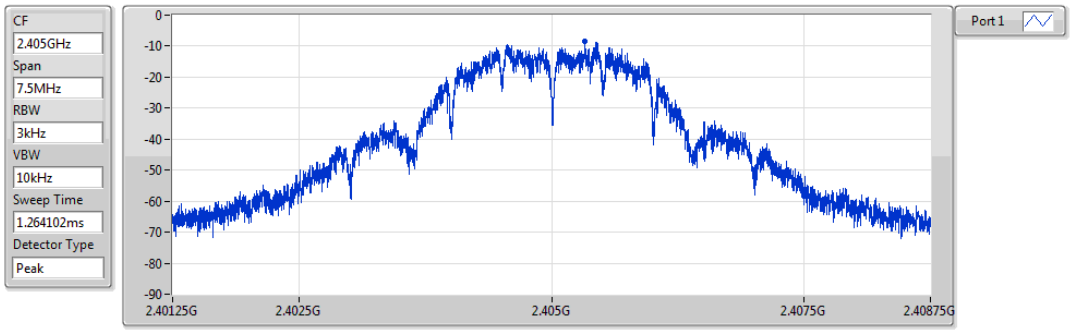
Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
Zigbee	-	-	-	-	-
2405MHz	Pass	3.69	-8.29	-8.29	8.00
2440MHz	Pass	3.69	-8.87	-8.87	8.00
2480MHz	Pass	3.69	-8.99	-8.99	8.00

PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;

Zigbee **PSD**

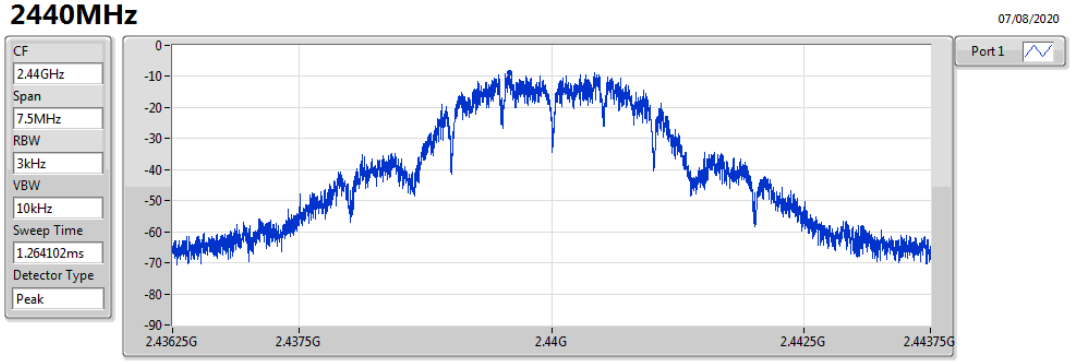
2405MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.29	-8.29	-8.29

Zigbee **PSD**

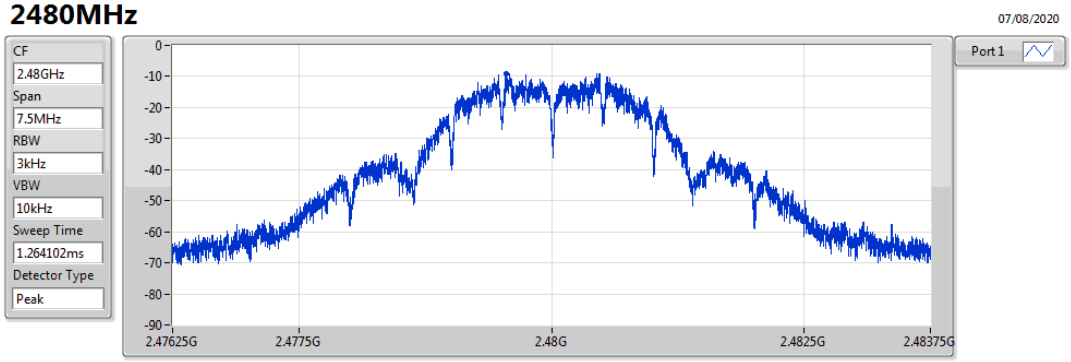
2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.87	-8.87	-8.87

Zigbee **PSD**

2480MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.99	-8.99	-8.99

Summary

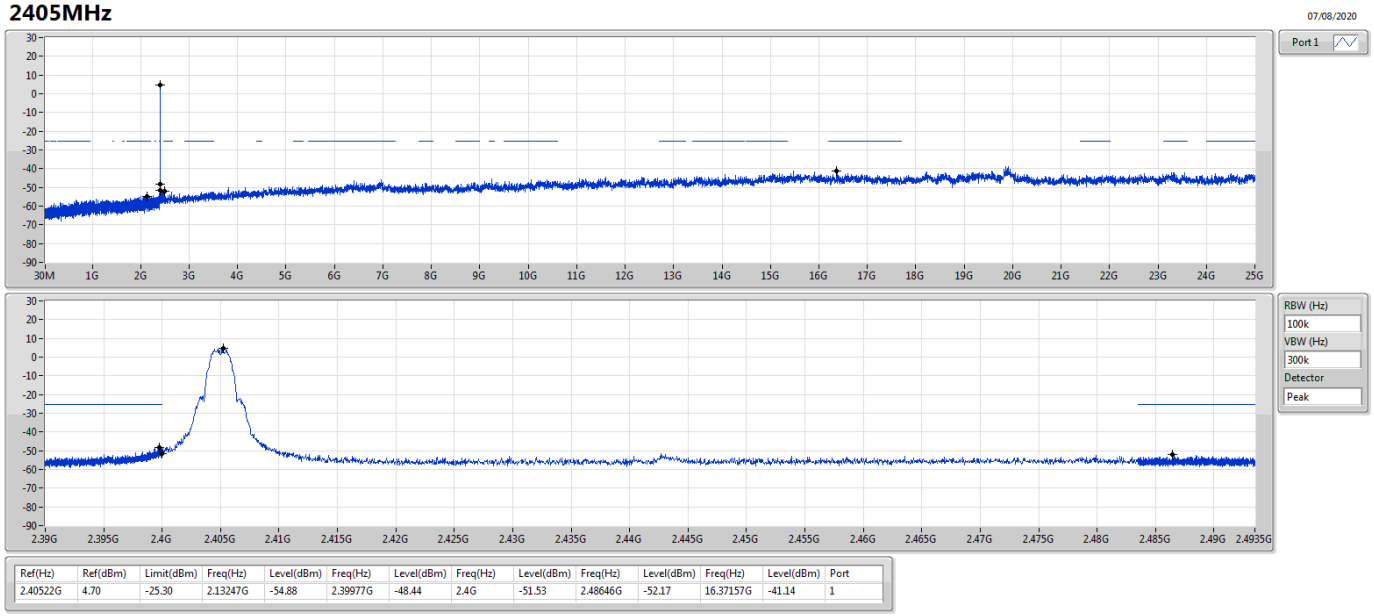
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	2.40522G	4.70	-25.30	2.13247G	-54.88	2.39977G	-48.44	2.4G	-51.53	2.48646G	-52.17	16.37157G	-41.14	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)	Freq (Hz)	Level (dBm)	Port
Zigbee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	2.40522G	4.70	-25.30	2.13247G	-54.88	2.39977G	-48.44	2.4G	-51.53	2.48646G	-52.17	16.37157G	-41.14	1
2440MHz	Pass	2.40522G	4.70	-25.30	2.16728G	-54.74	2.3943G	-52.87	2.4835G	-52.48	2.4934G	-51.97	16.87515G	-41.64	1
2480MHz	Pass	2.40522G	4.70	-25.30	2.154G	-54.21	2.39343G	-52.89	2.4835G	-47.54	2.48351G	-44.64	16.59382G	-41.70	1

Zigbee **CSENdB**

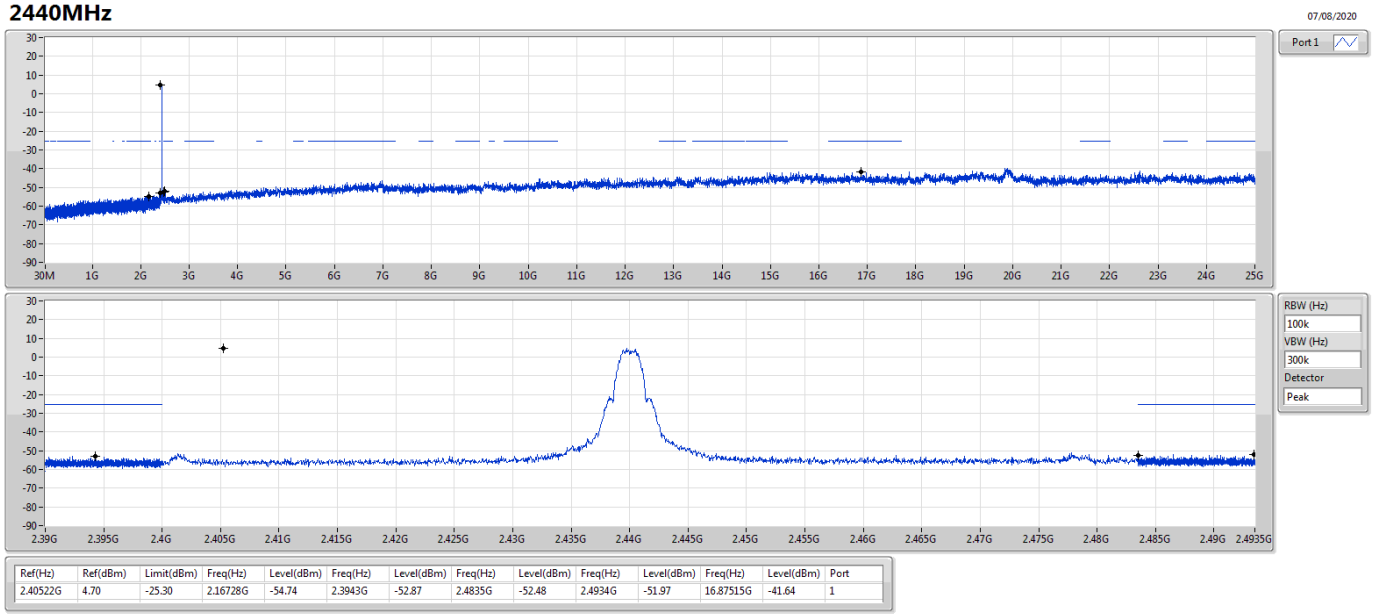
2405MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40522G	4.70	-25.30	2.13247G	-54.88	2.39977G	-48.44	2.4G	-51.53	2.48646G	-52.17	16.37157G	-41.14	1

Zigbee **CSENdB**

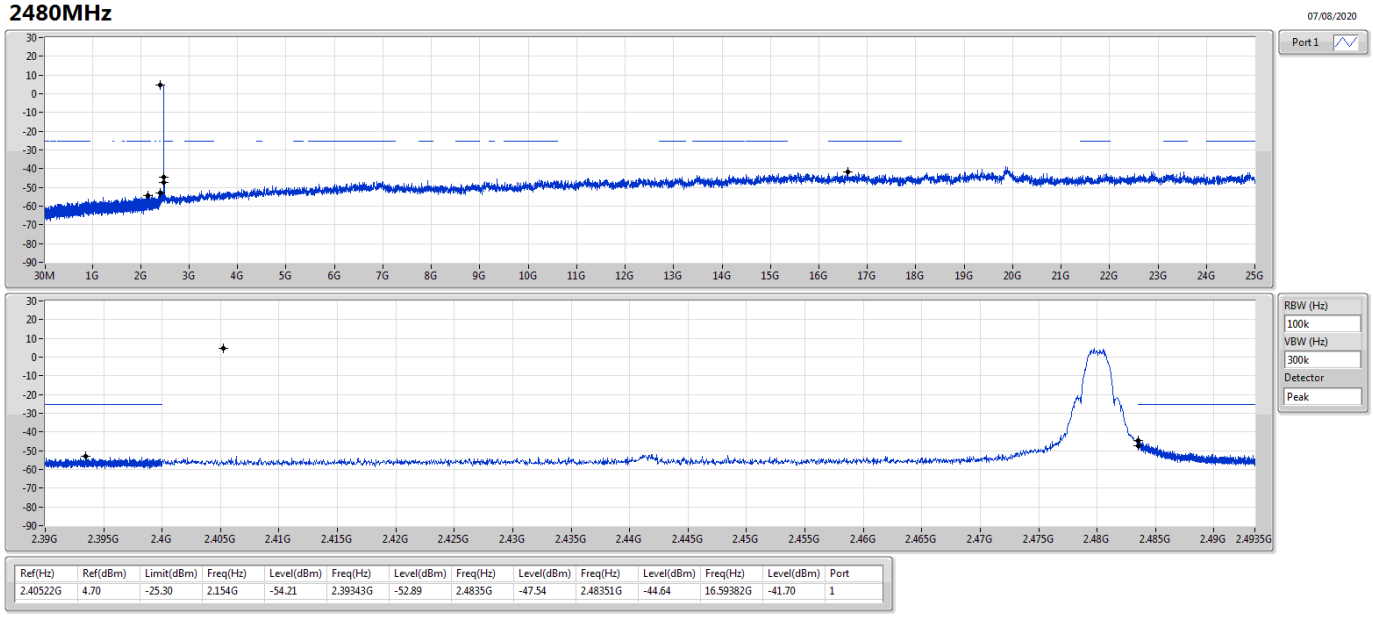
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40522G	4.70	-25.30	2.16728G	-54.74	2.3943G	-52.87	2.4835G	-52.48	2.4934G	-51.97	16.87515G	-41.64	1

Zigbee **CSENdB**

2480MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40522G	4.70	-25.30	2.154G	-54.21	2.39343G	-52.89	2.4835G	-47.54	2.48351G	-44.64	16.59382G	-41.70	1

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	QP	61.04M	32.60	40.00	-7.40	3	Vertical	165	1.07	-

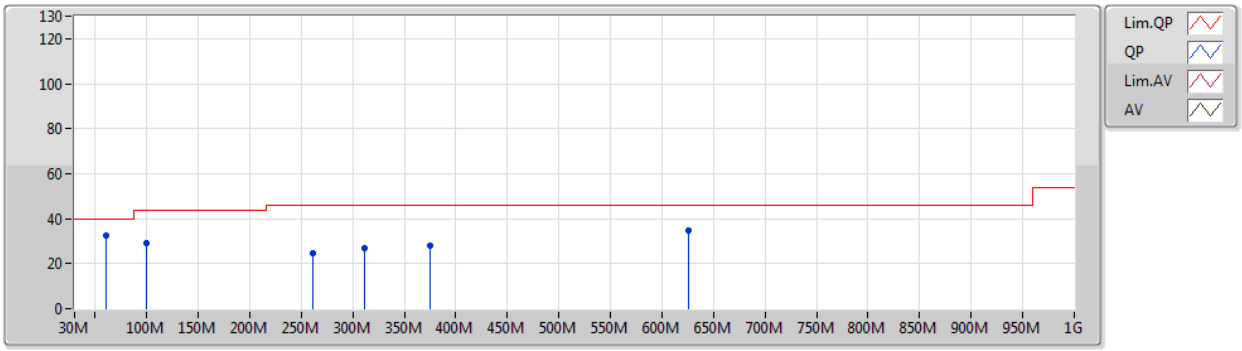
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
Zigbee	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	99.84M	29.02	43.50	-14.48	3	Vertical	0	1.00	-
2440MHz	Pass	PK	260.86M	24.53	46.00	-21.47	3	Vertical	0	1.00	-
2440MHz	Pass	PK	311.3M	26.81	46.00	-19.19	3	Vertical	0	1.00	-
2440MHz	Pass	PK	375.32M	27.91	46.00	-18.09	3	Vertical	0	1.00	-
2440MHz	Pass	PK	625.58M	34.57	46.00	-11.43	3	Vertical	0	1.00	-
2440MHz	Pass	QP	61.04M	32.60	40.00	-7.40	3	Vertical	165	1.07	-
2440MHz	Pass	PK	62.98M	32.01	40.00	-7.99	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	99.84M	28.25	43.50	-15.25	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	274.44M	24.77	46.00	-21.23	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	375.32M	28.89	46.00	-17.11	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	499.48M	30.27	46.00	-15.73	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	547.98M	31.15	46.00	-14.85	3	Horizontal	360	1.00	-

Zigbee

12/08/2020

2440MHz_Adapter

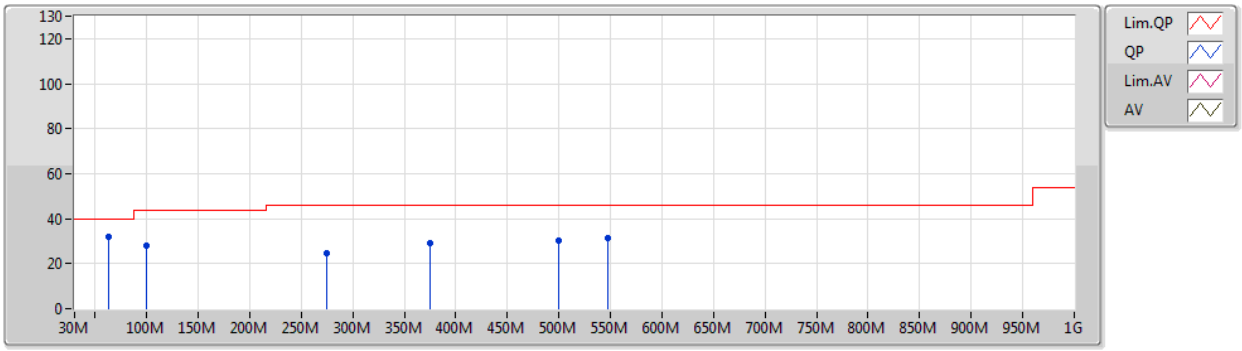


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	99.84M	29.02	43.50	-14.48	-9.86	3	Vertical	0	1.00	-	38.88	15.93	1.60	27.39
PK	260.86M	24.53	46.00	-21.47	-5.22	3	Vertical	0	1.00	-	29.75	18.81	2.67	26.70
PK	311.3M	26.81	46.00	-19.19	-5.09	3	Vertical	0	1.00	-	31.90	18.68	2.95	26.72
PK	375.32M	27.91	46.00	-18.09	-3.85	3	Vertical	0	1.00	-	31.76	20.05	3.20	27.10
PK	625.58M	34.57	46.00	-11.43	-0.01	3	Vertical	0	1.00	-	34.58	23.85	4.20	28.06
QP	61.04M	32.60	40.00	-7.40	-14.99	3	Vertical	165	1.07	-	47.59	11.28	1.22	27.49

Zigbee

12/08/2020

2440MHz_Adapter



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	62.98M	32.01	40.00	-7.99	-14.81	3	Horizontal	360	1.00	-	46.82	11.41	1.26	27.48
PK	99.84M	28.25	43.50	-15.25	-9.86	3	Horizontal	360	1.00	-	38.11	15.93	1.60	27.39
PK	274.44M	24.77	46.00	-21.23	-6.00	3	Horizontal	360	1.00	-	30.77	17.93	2.75	26.68
PK	375.32M	28.89	46.00	-17.11	-3.85	3	Horizontal	360	1.00	-	32.74	20.05	3.20	27.10
PK	499.48M	30.27	46.00	-15.73	-1.62	3	Horizontal	360	1.00	-	31.89	22.47	3.70	27.79
PK	547.98M	31.15	46.00	-14.85	-0.17	3	Horizontal	360	1.00	-	31.32	23.95	3.89	28.01

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	AV	2.4835G	52.25	54.00	-1.75	3	Horizontal	58	2.29	-

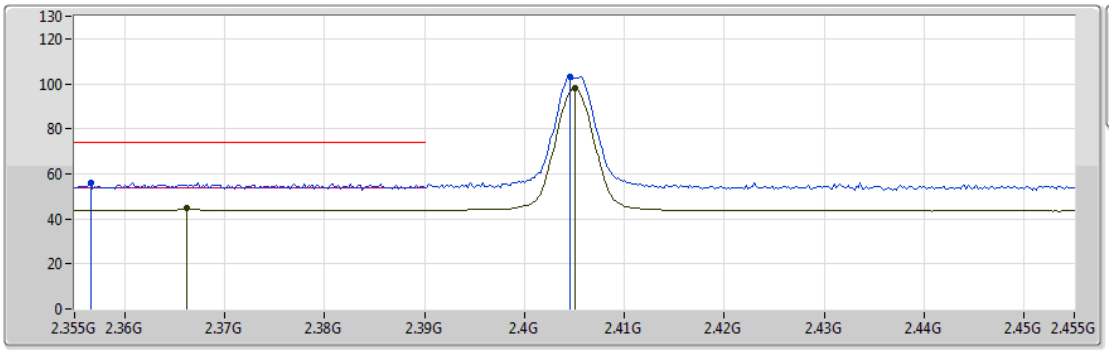
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
Zigbee	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	AV	2.3662G	44.56	54.00	-9.44	3	Vertical	14	2.48	-
2405MHz	Pass	AV	2.405G	98.06	Inf	-Inf	3	Vertical	14	2.48	-
2405MHz	Pass	PK	2.3566G	56.10	74.00	-17.90	3	Vertical	14	2.48	-
2405MHz	Pass	PK	2.4046G	103.14	Inf	-Inf	3	Vertical	14	2.48	-
2405MHz	Pass	PK	2.3602G	56.04	74.00	-17.96	3	Horizontal	297	1.12	-
2405MHz	Pass	AV	2.3664G	45.30	54.00	-8.70	3	Horizontal	297	1.12	-
2405MHz	Pass	PK	2.4056G	106.15	Inf	-Inf	3	Horizontal	297	1.12	-
2405MHz	Pass	AV	2.405G	101.21	Inf	-Inf	3	Horizontal	297	1.12	-
2405MHz	Pass	AV	4.81108G	34.10	54.00	-19.90	3	Vertical	343	1.79	-
2405MHz	Pass	PK	4.81092G	46.38	74.00	-27.62	3	Vertical	343	1.79	-
2405MHz	Pass	AV	4.81108G	32.77	54.00	-21.23	3	Horizontal	300	2.26	-
2405MHz	Pass	PK	4.81104G	45.46	74.00	-28.54	3	Horizontal	300	2.26	-
2440MHz	Pass	AV	2.34G	44.07	54.00	-9.93	3	Vertical	12	2.67	-
2440MHz	Pass	AV	2.44G	97.52	Inf	-Inf	3	Vertical	12	2.67	-
2440MHz	Pass	AV	2.4976G	43.57	54.00	-10.43	3	Vertical	12	2.67	-
2440MHz	Pass	PK	2.368G	55.98	74.00	-18.02	3	Vertical	12	2.67	-
2440MHz	Pass	PK	2.4404G	102.49	Inf	-Inf	3	Vertical	12	2.67	-
2440MHz	Pass	PK	2.4952G	56.19	74.00	-17.81	3	Vertical	12	2.67	-
2440MHz	Pass	AV	2.3408G	44.07	54.00	-9.93	3	Horizontal	296	1.07	-
2440MHz	Pass	AV	2.44G	100.75	Inf	-Inf	3	Horizontal	296	1.07	-
2440MHz	Pass	AV	2.498G	43.61	54.00	-10.39	3	Horizontal	296	1.07	-
2440MHz	Pass	PK	2.3476G	56.40	74.00	-17.60	3	Horizontal	296	1.07	-
2440MHz	Pass	PK	2.4396G	105.63	Inf	-Inf	3	Horizontal	296	1.07	-
2440MHz	Pass	PK	2.4952G	55.47	74.00	-18.53	3	Horizontal	296	1.07	-
2440MHz	Pass	AV	4.879G	33.48	54.00	-20.52	3	Vertical	0	1.87	-
2440MHz	Pass	PK	4.88084G	46.29	74.00	-27.71	3	Vertical	0	1.87	-
2440MHz	Pass	AV	4.87898G	32.48	54.00	-21.52	3	Horizontal	301	2.06	-
2440MHz	Pass	PK	4.8794G	45.22	74.00	-28.78	3	Horizontal	301	2.06	-
2480MHz	Pass	AV	2.48G	97.48	Inf	-Inf	3	Vertical	0	3.00	-
2480MHz	Pass	AV	2.4835G	50.66	54.00	-3.34	3	Vertical	0	3.00	-
2480MHz	Pass	PK	2.4806G	101.25	Inf	-Inf	3	Vertical	0	3.00	-
2480MHz	Pass	PK	2.4835G	61.57	74.00	-12.43	3	Vertical	0	3.00	-
2480MHz	Pass	AV	2.48G	100.68	Inf	-Inf	3	Horizontal	58	2.29	-
2480MHz	Pass	AV	2.4835G	52.25	54.00	-1.75	3	Horizontal	58	2.29	-
2480MHz	Pass	PK	2.4794G	104.48	Inf	-Inf	3	Horizontal	58	2.29	-
2480MHz	Pass	PK	2.4835G	63.30	74.00	-10.70	3	Horizontal	58	2.29	-
2480MHz	Pass	AV	4.95896G	38.78	54.00	-15.22	3	Vertical	0	1.50	-
2480MHz	Pass	PK	4.959G	49.07	74.00	-24.93	3	Vertical	0	1.50	-
2480MHz	Pass	AV	4.95897G	34.08	54.00	-19.92	3	Horizontal	97	2.96	-
2480MHz	Pass	PK	4.95911G	46.71	74.00	-27.29	3	Horizontal	97	2.96	-

Zigbee

12/08/2020

2405MHz_TX

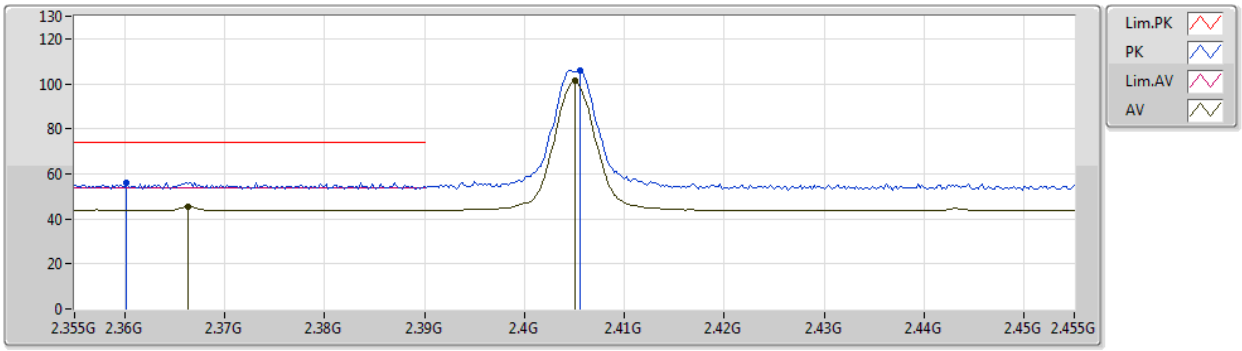


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3662G	44.56	54.00	-9.44	31.94	3	Vertical	14	2.48	-	12.62	27.67	4.27	-
AV	2.405G	98.06	Inf	-Inf	31.89	3	Vertical	14	2.48	-	66.17	27.59	4.30	-
PK	2.3566G	56.10	74.00	-17.90	31.95	3	Vertical	14	2.48	-	24.15	27.69	4.26	-
PK	2.4046G	103.14	Inf	-Inf	31.89	3	Vertical	14	2.48	-	71.25	27.59	4.30	-

Zigbee

12/08/2020

2405MHz_TX

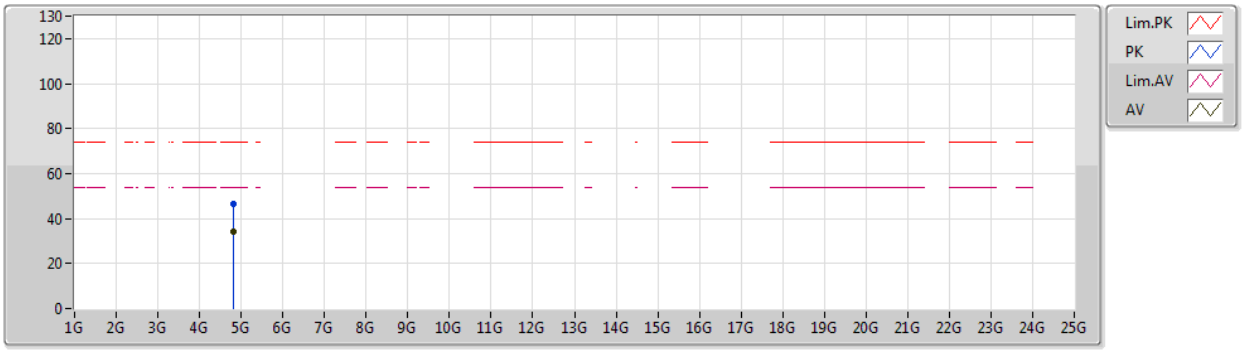


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	2.3602G	56.04	74.00	-17.96	31.94	3	Horizontal	297	1.12	-	24.10	27.68	4.26	-
AV	2.3664G	45.30	54.00	-8.70	31.94	3	Horizontal	297	1.12	-	13.36	27.67	4.27	-
PK	2.4056G	106.15	Inf	-Inf	31.90	3	Horizontal	297	1.12	-	74.25	27.59	4.31	-
AV	2.405G	101.21	Inf	-Inf	31.89	3	Horizontal	297	1.12	-	69.32	27.59	4.30	-

Zigbee

12/08/2020

2405MHz_TX

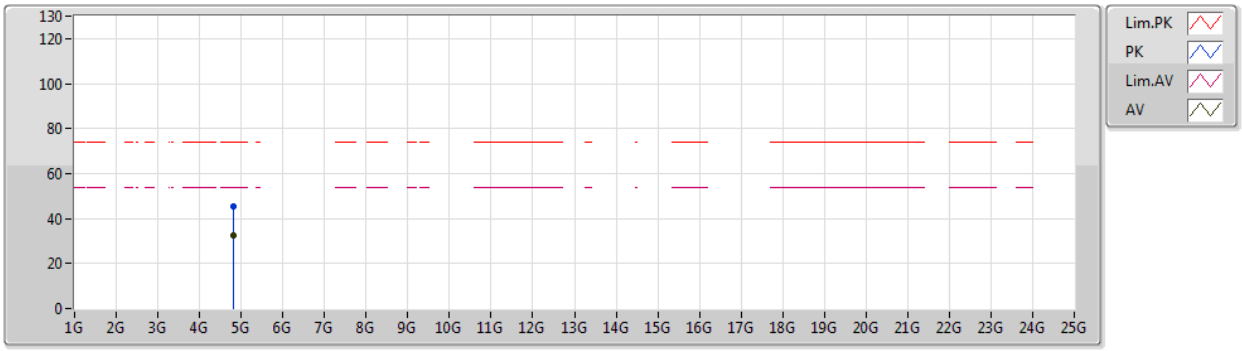


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.81108G	34.10	54.00	-19.90	8.20	3	Vertical	343	1.79	-	25.90	31.10	6.51	29.41
PK	4.81092G	46.38	74.00	-27.62	8.20	3	Vertical	343	1.79	-	38.18	31.10	6.51	29.41

Zigbee

12/08/2020

2405MHz_TX

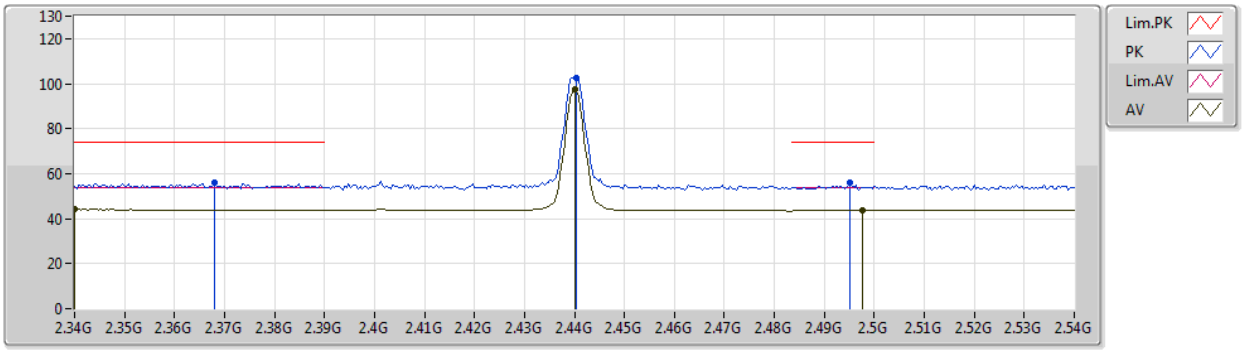


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.81108G	32.77	54.00	-21.23	8.20	3	Horizontal	300	2.26	-	24.57	31.10	6.51	29.41
PK	4.81104G	45.46	74.00	-28.54	8.20	3	Horizontal	300	2.26	-	37.26	31.10	6.51	29.41

Zigbee

12/08/2020

2440MHz_TX

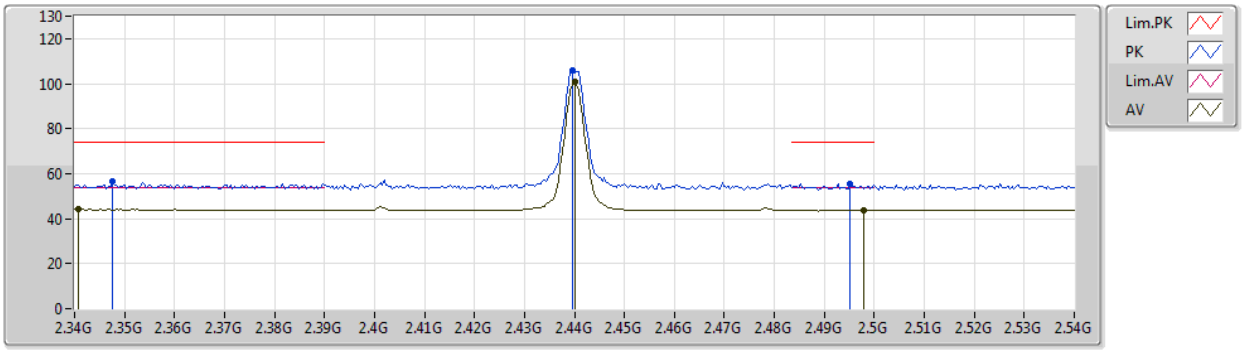


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.34G	44.07	54.00	-9.93	31.98	3	Vertical	12	2.67	-	12.09	27.74	4.24	-
AV	2.44G	97.52	Inf	-Inf	31.86	3	Vertical	12	2.67	-	65.66	27.52	4.34	-
AV	2.4976G	43.57	54.00	-10.43	31.80	3	Vertical	12	2.67	-	11.77	27.40	4.40	-
PK	2.368G	55.98	74.00	-18.02	31.93	3	Vertical	12	2.67	-	24.05	27.66	4.27	-
PK	2.4404G	102.49	Inf	-Inf	31.86	3	Vertical	12	2.67	-	70.63	27.52	4.34	-
PK	2.4952G	56.19	74.00	-17.81	31.81	3	Vertical	12	2.67	-	24.38	27.41	4.40	-

Zigbee

12/08/2020

2440MHz_TX

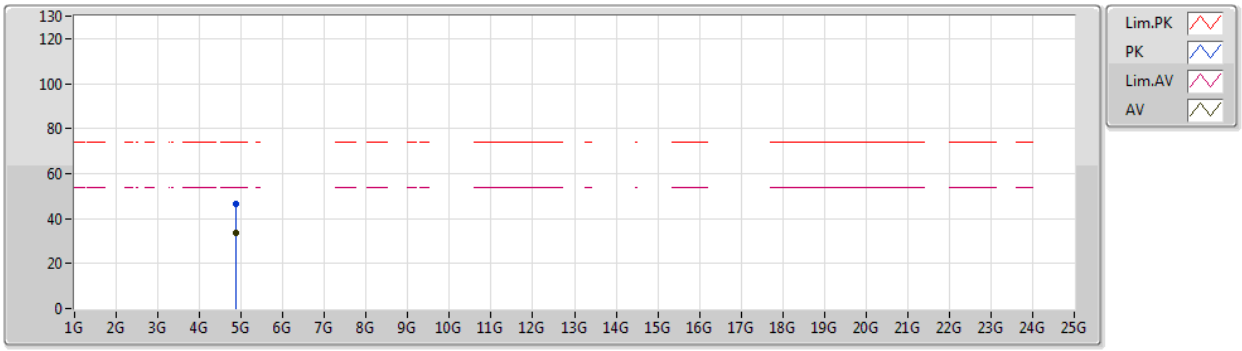


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3408G	44.07	54.00	-9.93	31.98	3	Horizontal	296	1.07	-	12.09	27.74	4.24	-
AV	2.44G	100.75	Inf	-Inf	31.86	3	Horizontal	296	1.07	-	68.89	27.52	4.34	-
AV	2.498G	43.61	54.00	-10.39	31.80	3	Horizontal	296	1.07	-	11.81	27.40	4.40	-
PK	2.3476G	56.40	74.00	-17.60	31.96	3	Horizontal	296	1.07	-	24.44	27.71	4.25	-
PK	2.4396G	105.63	Inf	-Inf	31.86	3	Horizontal	296	1.07	-	73.77	27.52	4.34	-
PK	2.4952G	55.47	74.00	-18.53	31.81	3	Horizontal	296	1.07	-	23.66	27.41	4.40	-

Zigbee

13/08/2020

2440MHz_TX

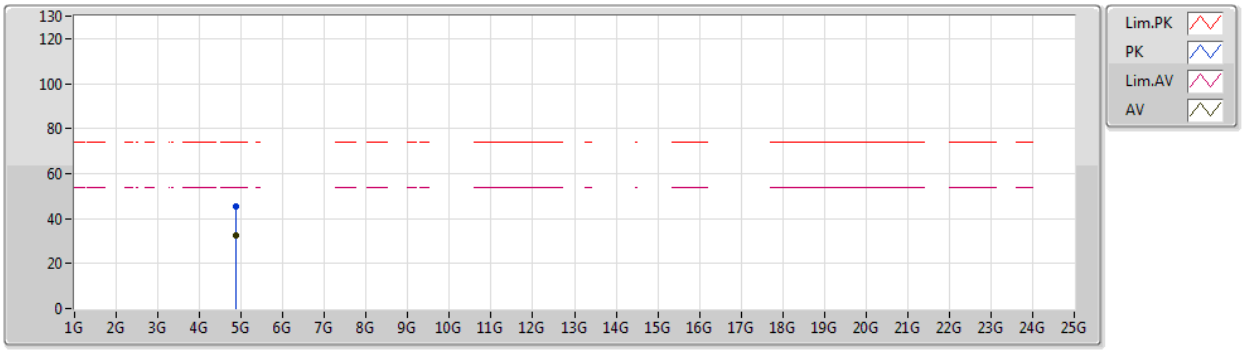


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.879G	33.48	54.00	-20.52	8.30	3	Vertical	0	1.87	-	25.18	31.10	6.58	29.38
PK	4.88084G	46.29	74.00	-27.71	8.31	3	Vertical	0	1.87	-	37.98	31.10	6.58	29.37

Zigbee

13/08/2020

2440MHz_TX

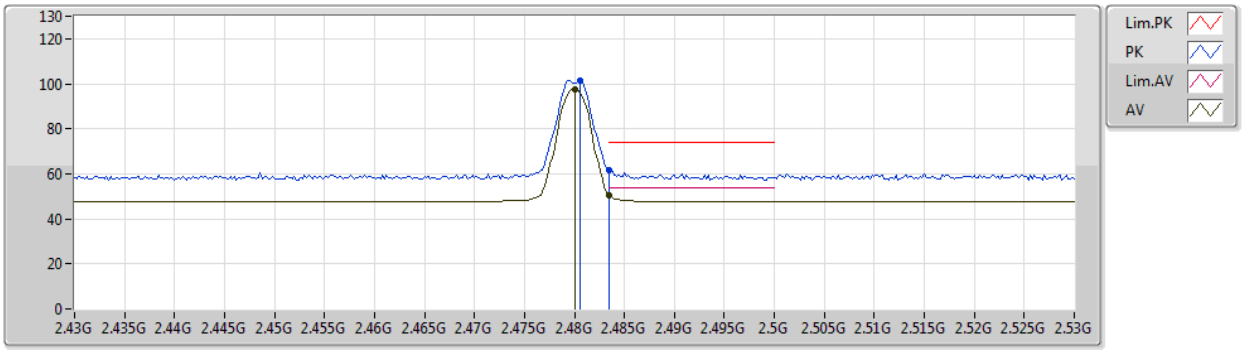


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.87898G	32.48	54.00	-21.52	8.30	3	Horizontal	301	2.06	-	24.18	31.10	6.58	29.38
PK	4.8794G	45.22	74.00	-28.78	8.30	3	Horizontal	301	2.06	-	36.92	31.10	6.58	29.38

Zigbee

10/09/2020

2480MHz_TX

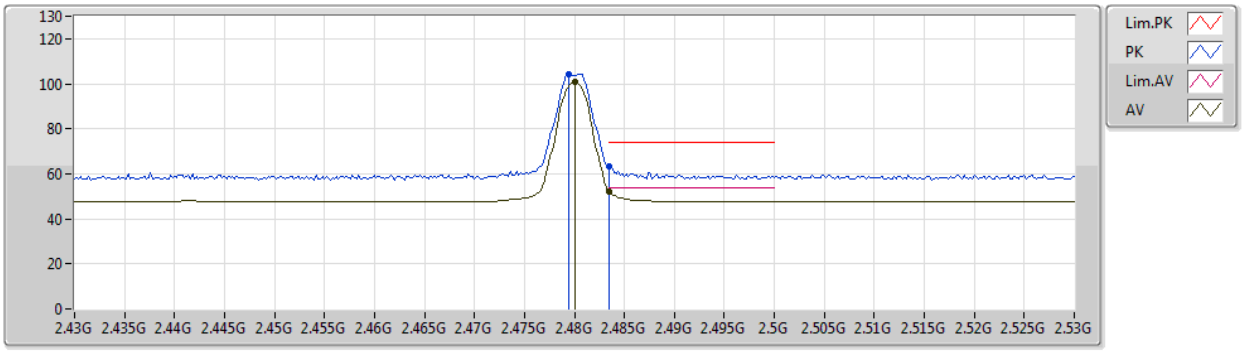


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.48G	97.48	Inf	-Inf	31.82	3	Vertical	0	3.00	-	65.66	27.44	4.38	-
AV	2.4835G	50.66	54.00	-3.34	31.81	3	Vertical	0	3.00	-	18.85	27.43	4.38	-
PK	2.4806G	101.25	Inf	-Inf	31.82	3	Vertical	0	3.00	-	69.43	27.44	4.38	-
PK	2.4835G	61.57	74.00	-12.43	31.81	3	Vertical	0	3.00	-	29.76	27.43	4.38	-

Zigbee

10/09/2020

2480MHz_TX

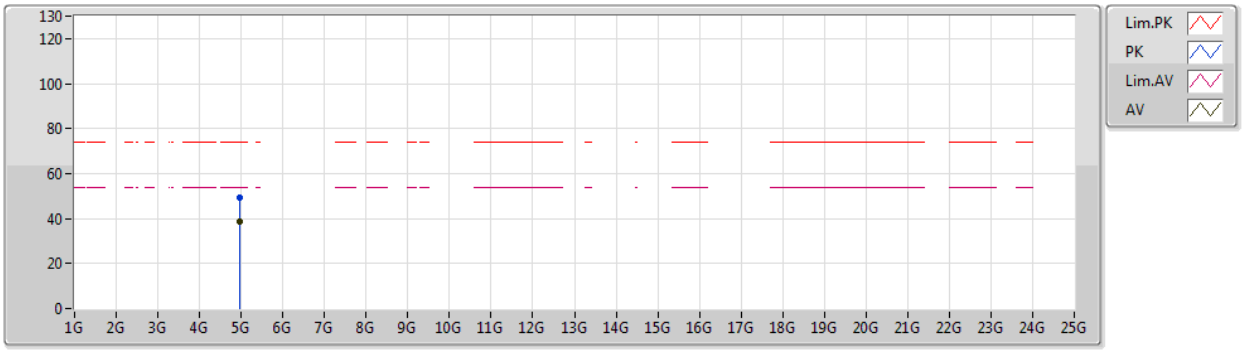


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.48G	100.68	Inf	-Inf	31.82	3	Horizontal	58	2.29	-	68.86	27.44	4.38	-
AV	2.4835G	52.25	54.00	-1.75	31.81	3	Horizontal	58	2.29	-	20.44	27.43	4.38	-
PK	2.4794G	104.48	Inf	-Inf	31.82	3	Horizontal	58	2.29	-	72.66	27.44	4.38	-
PK	2.4835G	63.30	74.00	-10.70	31.81	3	Horizontal	58	2.29	-	31.49	27.43	4.38	-

Zigbee

10/09/2020

2480MHz_TX

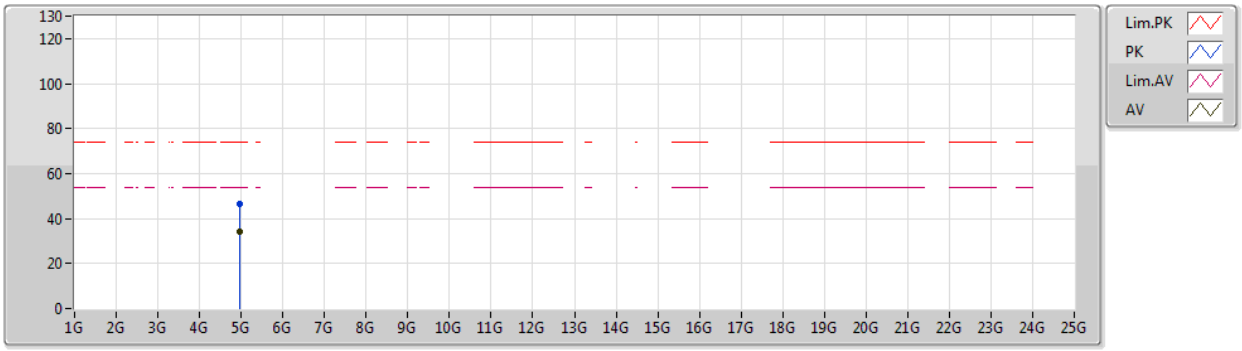


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.95896G	38.78	54.00	-15.22	7.31	3	Vertical	0	1.50	-	31.47	31.20	6.66	30.55
PK	4.959G	49.07	74.00	-24.93	7.31	3	Vertical	0	1.50	-	41.76	31.20	6.66	30.55

Zigbee

10/09/2020

2480MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.95897G	34.08	54.00	-19.92	7.31	3	Horizontal	97	2.96	-	26.77	31.20	6.66	30.55
PK	4.95911G	46.71	74.00	-27.29	7.31	3	Horizontal	97	2.96	-	39.40	31.20	6.66	30.55