FCC Radio Test Report

FCC ID	:	**TVE-4111BBE0671**
Equipment	:	**Secured Wireless Access Point**
Brand Name	:	**FORTINET**
Model Name	:	**FortiAP U432Fxxxxxx, FAP-U432Fxxxxxx, FORTIAP-U432Fxxxxxx (where "x" can be "A-Z", or "0-9", or "-", or blank for software purposes or marketing purposes only)**
Applicant	:	**Fortinet, Inc. 899 Kifer Road, Sunnyvale, CA 94086, USA**
Manufacturer	:	**Fortinet, Inc. 899 Kifer Road, Sunnyvale, CA 94086, USA**
Standard	:	**47 CFR FCC Part 15.247**

The product was received on Dec. 16, 2020, and testing was started from Dec. 23, 2020 and completed on Feb. 14, 2021. We, SPORTON INTERNATIONAL INC. Hsinhua 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. Hsinhua Laboratory, the test report shall not be reproduced except in full.

Approved by: Allen Lin

SPORTON INTERNATIONAL INC. Hsinhua Laboratory

No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR0D1422AZ	01	Initial issue of report	May 07, 2021

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: Ann Hou

1 General Description

1.1 Information

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	1TX

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

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector
1	SENAO	5718A0619300	Dipole	N-type
2	SENAO	5718A0619300	Dipole	N-type
3	SENAO	5718A0619300	Dipole	N-type
4	SENAO	5718A0619300	Dipole	N-type
5	SENAO	5718A0620300	Dipole	N-type
6	SENAO	5718A0620300	Dipole	N-type
7	SENAO	5718A0620300	Dipole	N-type
8	SENAO	5718A0620300	Dipole	N-type
9	SENAO	5718A0619300	Dipole	N-type
10	SENAO	5718A0619300	Dipole	N-type
11	SENAO	5718A0618300	Dipole	N-type

Radio	Ant.	Port	Antenna Gain (dBi)				Cable Loss Gain (dBi)			
			2.4G	5G	BT	Zigbee	2.4G	5G	BT	Zigbee
1	1	1	5.5	7.2	-	-	0.6	1	-	-
	2	2	5.5	7.2	-	-	0.6	1	-	-
	3	3	5.5	7.2	-	-	0.5	0.8	-	-
	4	4	5.5	7.2	-	-	0.4	0.7	-	-
2	5	1	-	6.3	-	-	-	1	-	-
	6	2	-	6.3	-	-	-	1.1	-	-
	7	3	-	6.3	-	-	-	0.9	-	-
	8	4	-	6.3	-	-	-	0.9	-	-
3	9	1	5.5	7.2	-	-	0.6	1	-	-
	10	2	5.5	7.2	-	-	0.6	1	-	-
BT+Zigbee	11	1	-	-	4.5	4.5	-	-	0.5	0.5

Note 1: The EUT has eleven antennas.

For 2.4GHz function:

Radio 1

For IEEE 802.11 b/g/n/VHT/ax mode (4TX/4RX)

Ant. 1 (port 1), Ant. 2 (port 2), Ant. 3 (port 3) and Ant. 4 (port 4) could transmit/receive simultaneously.

Radio 3

For IEEE 802.11 b/g/n/VHT/ax mode (2TX/2RX)

Ant. 9 (port 1) and Ant. 10 (port 2) could transmit/receive simultaneously.

For 5GHz function:

Radio 1

For IEEE 802.11 a/n/ac/ax mode (4TX/4RX)

Ant. 1 (port 1), Ant. 2 (port 2), Ant. 3 (port 3) and Ant. 4 (port 4) could transmit/receive simultaneously.

Radio 2

For IEEE 802.11 a/n/ac/ax mode (4TX/4RX)

Ant. 5 (port 1), Ant. 6 (port 2), Ant. 7 (port 3) and Ant. 8 (port 4) could transmit/receive simultaneously.

Radio 3

For IEEE 802.11 a/n/ac/ax mode (2TX/2RX)

Ant. 9 (port 1) and Ant. 10 (port 2) could transmit/receive simultaneously.

For Bluetooth function:

For IEEE 802.15.1 Bluetooth mode (1TX/1RX)

Only Ant. 11 (port 1) could transmit/receive.

For Zigbee function:

For Zigbee mode (1TX/1RX)

Only Ant. 11 (port 1) could transmit/receive.

1.1.3 EUT Information

Operational Condition				
EUT Power Type	From PoE			
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 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
Zigbee	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)

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

1.1.5 Table for Multiple Listing

The brand/model names in the following table are all refer to the identical product.

Brand Name	Model Name	Description
FORTINET	FortiAP U432Fxxxxxx	All the models are identical, the difference model for served as marketing strategy.
	FAP-U432Fxxxxxx	
	FORTIAP-U432Fxxxxxx	

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

Test Lab.：Sporton International Inc. Hsinhua Laboratory				
☒ Hsinhua **(TAF:** 3785**)**	**ADD:** No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)			
	TEL: 886-3-327-3456		**FAX:** 886-3-327-0973	
Test site Designation No. TW3785 with FCC.				
Test Condition	**Test Site No.**	**Test Engineer**	**Test Environment**	**Test Date**
AC Conduction	CO04-HY	Edward	18.2~19.2°C / 42~48%	31/Dec/2020
RF Conducted	TH06-HY	Alan	20.1~26.9°C / 50~60%	25/Dec/2020~14/Feb/2021
☒ Wen 33rd.St. **(TAF:** 3785**)**	**ADD:** No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)			
	TEL: 886-3-318-0787		**FAX:** 886-3-318-0287	
Test site Designation No. TW0008 with FCC.				
Test Condition	**Test Site No.**	**Test Engineer**	**Test Environment**	**Test Date**
Radiated	03CH09-HY	Lego	20.5~22.6°C / 50~60%	23/Dec/2020~25/Dec/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 Channel Mode

Test Software Version	DOS 6.1

Mode	Power Setting
Zigbee	-
2405MHz	100
2440MHz	100
2475MHz	100
2480MHz	80

2.2 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 Test Voltage: 120Vac / 60Hz
Operating Mode	CTX
1	PoE 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	PoE mode
Operating Mode > 1GHz	CTX
Orthogonal Planes of EUT	**Y Plane**
	

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis
Operating Mode	CTX
1	Radio 1(2.4G)+ Radio 2(5G)+ Radio 3(2.4G)+ Bluetooth
2	Radio 1(5G)+ Radio 2(5G)+ Radio 3(2.4G)+ Bluetooth
3	Radio 1(5G)+ Radio 2(5G)+ Radio 3(5G)+ Bluetooth
4	Radio 1(2.4G)+ Radio 2(5G)+ Radio 3(5G)+ Bluetooth
5	Radio 1(2.4G)+ Radio 2(5G)+ Radio 3(2.4G)+Zigbee
6	Radio 1(5G)+ Radio 2(5G)+ Radio 3(2.4G)+Zigbee
7	Radio 1(5G)+ Radio 2(5G)+ Radio 3(5G)+Zigbee
8	Radio 1(2.4G)+ Radio 2(5G)+ Radio 3(5G)+Zigbee
Refer to Sporton Test Report No.: FA0D1422 for Co-location RF Exposure Evaluation.	

2.3 Accessories

Accessories				
PoE Adapter	**Brand Name**	Senao Inc.	**Model Name**	PIN060-54PR
	Power Rating	I/P: 100-240Vac, 1.5A, 50-60Hz, O/P: 54Vdc, 1.11A		
AC CORD	**Brand Name**	I-SHENG	**Model Name**	AC CORD 600mm
	Signal Line	0.5 meter, shielded cable, w/o ferrite core		
Ground Wire	**Brand Name**	BO YAO	**Model Name**	WIRE GEN AWG10 180cm
	Signal Line	1.8 meter, shielded cable, w/o ferrite core		
Bracket wall mount	**Brand Name**	XIERTEK	**Model Name**	BRACKET WALL MOUNT
Bracket pole mount	**Brand Name**	CUN SHENG	**Model Name**	BRACKET POLE MOUN

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

2.4 Support Equipment

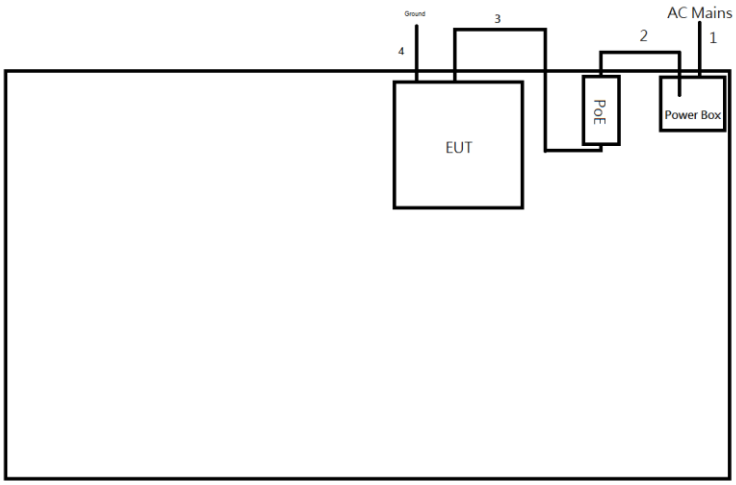
Support Equipment – AC Conduction					
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**	**Remark**
1	RJ45 Cable	Power Sync	CAT-6E-01	-	-

Support Equipment – Conducted					
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**	**Remark**
1	Notebook	DELL	E5410	-	-
2	AC Adapter for NB	DELL	HA65NM130	-	-

Support Equipment – Radiated					
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**	**Remark**
1	RJ45 Cable	Power Sync	CAT-6E-01	-	-

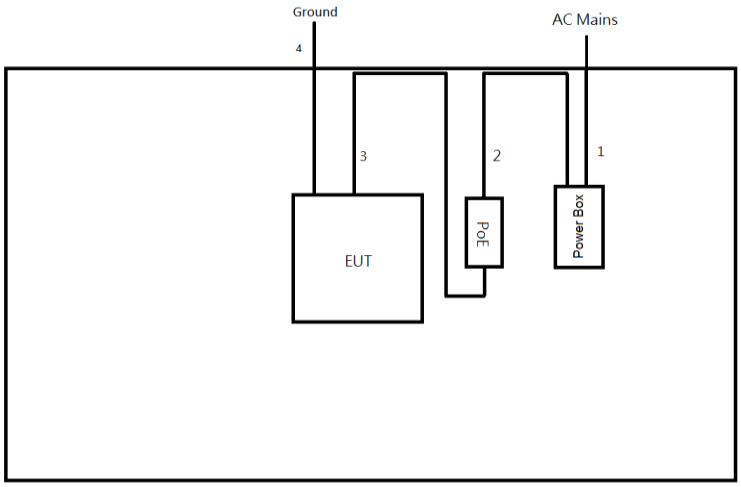
2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length(m)
1	AC Power cable	No	1.5
2	AC Power cable	YES	0.5
3	RJ45 cable	No	1.0
4	Ground Wire	YES	1.8

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length(m)
1	AC Power cable	No	1.8
2	AC Power cable	YES	0.5
3	RJ45 cable	No	1.0
4	Ground Wire	YES	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

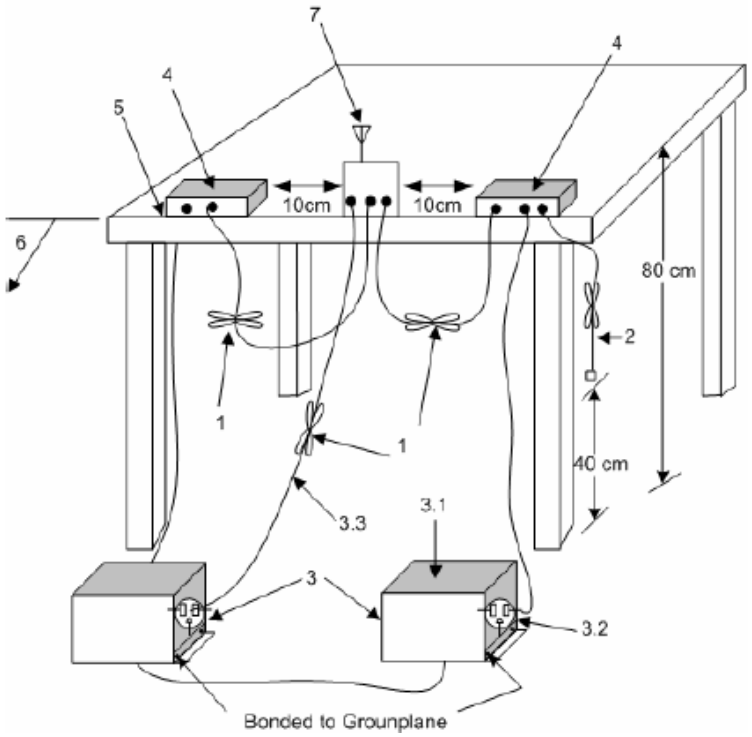
Test Method
☒ Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

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

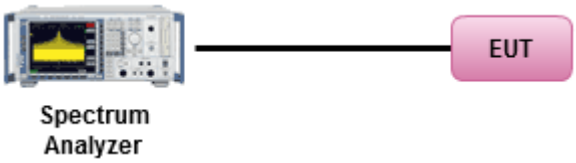
Refer a test equipment and calibration data table in this test report.

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

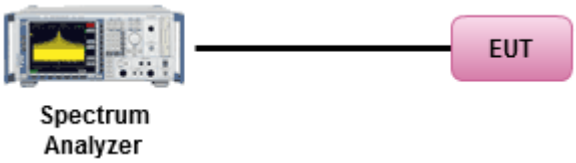
3.4.2 Measuring Instruments

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.	

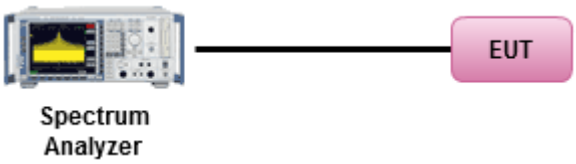
3.5.2 Measuring Instruments

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.

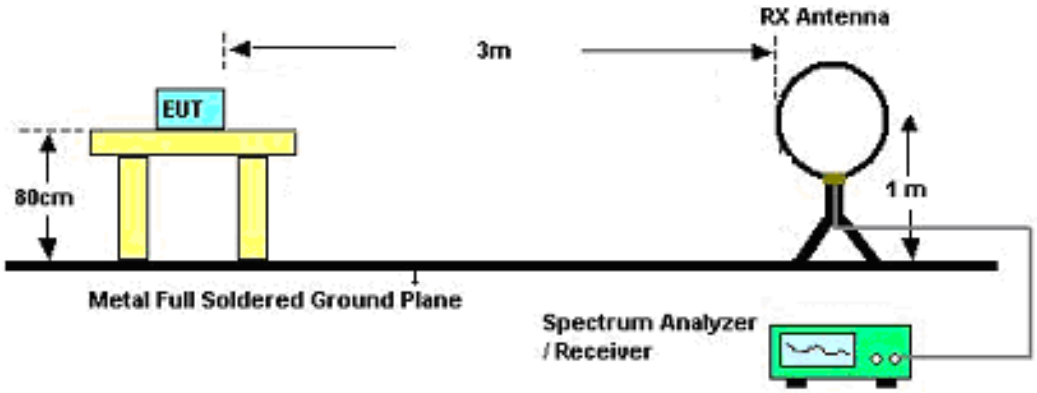
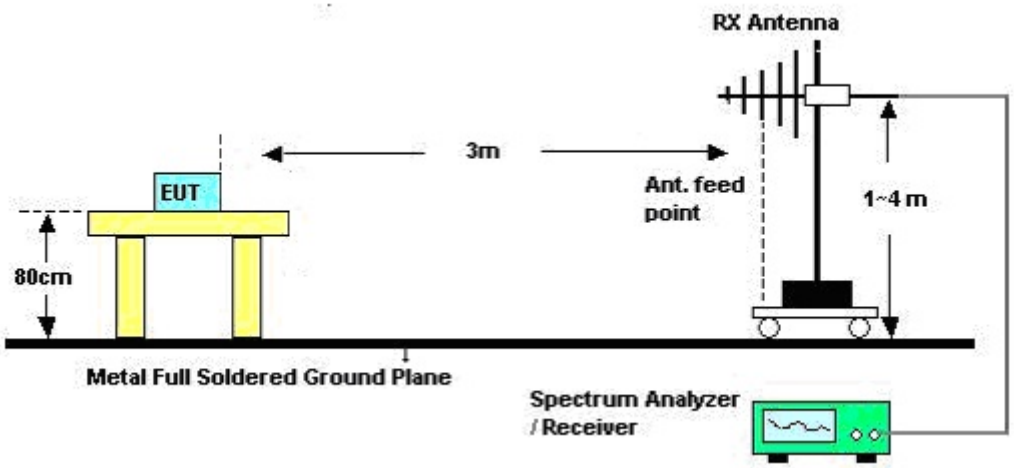
3.6.3 Test Procedures

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.

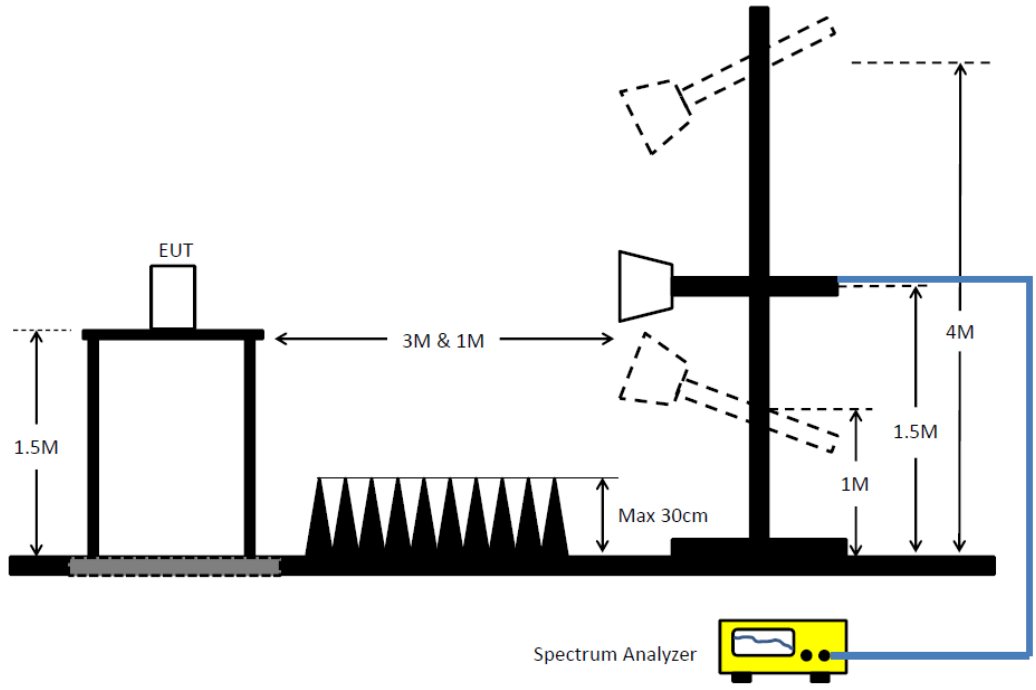
3.6.4 Measurement Results Calculation

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 /Brand	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	11/Nov/2020	10/Nov/2021
RF Cable-CON	MTJ	RG142	CB002-CO	9kHz ~ 200MHz	31/Aug/2020	30/Aug/2021
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9kHz ~ 30MHz	21/Sep/2020	20/Sep/2021

Instrument for Conducted Test

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV 40	101029	10Hz~40GHz	19/Oct/2020	18/Oct/2021
SMB100A Signal Generator	R&S	SMB100A03	181147	100kHz~40GHz	20/Oct/2020	19/Oct/2021
Pulse Sensor	Anritsu	MA2411B	1339407	300MHz~40GHz	27/Nov/2020	26/Nov/2021
Power Meter	Anritsu	ML2495A	1517010	300MHz~40GHz	27/Nov/2020	26/Nov/2021

Instrument for Radiated Test

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	30MHz~1GHz 3m	27/Mar/2020	26/Mar/2021
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	1GHz~18GHz 3m	19/Mar/2020	18/Mar/2021
EXA Signal Analyzer	KEYSIGHT	N9010A	MY54200885	10Hz~44GHz	11/Aug/2020	10/Aug/2021
Amplifier	EMC	EMC9135	980232	9kHz~1GHz	14/Apr/2020	13/Apr/2021
Microwave Preamplifier	Agilent	8449B	3008A02096	1GHz~26.5GHz	24/Jul/2020	23/Jul/2021
Bilog Antenna & 5dB Attenuator	TESEQ & MTJ	CBL6111D&MTJ6 102-05	35418 & 3	30MHz~1GHz	06/Sep/2020	05/Sep/2021
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA9120 D 1534	1GHz~18GHz	28/May/2020	27/May/2021
RF Cable-low	Jye Bao	RG142	CB031+324530/4	9kHz~30MHz	03/Sep/2020	02/Sep/2021
RF Cable-low	Jye Bao	RG142	CB031+324530/4	30MHz~1GHz	12/Feb/2020	11/Feb/2021
RF CABLE 5m+3m+1m	HUBER+SUHNER	SUCOFLEX104	SN MY25918/4+ SN MY39478/4 + SN 324530/4	1GHz~40GHz	15/Aug/2020	14/Aug/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
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

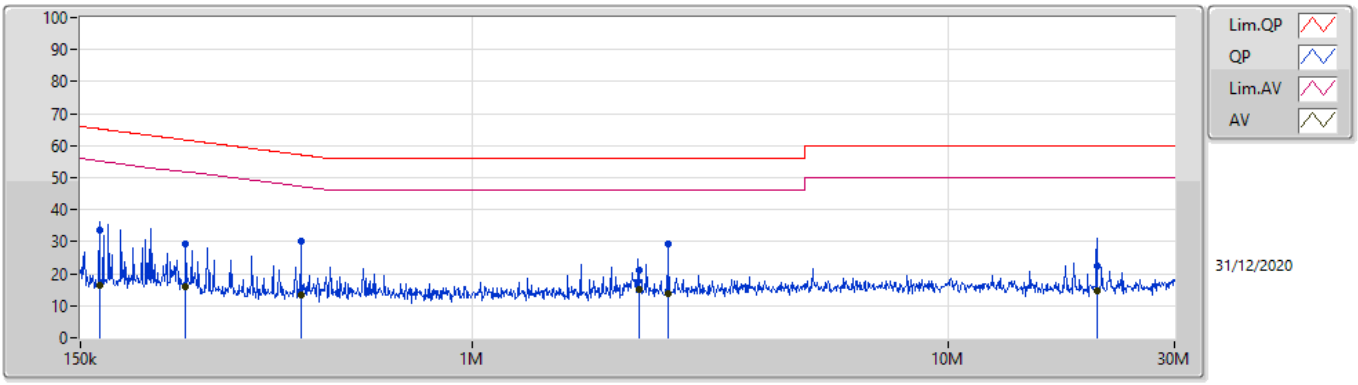
Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	QP	2.584M	29.19	56.00	-26.81	Line

Mode Configure

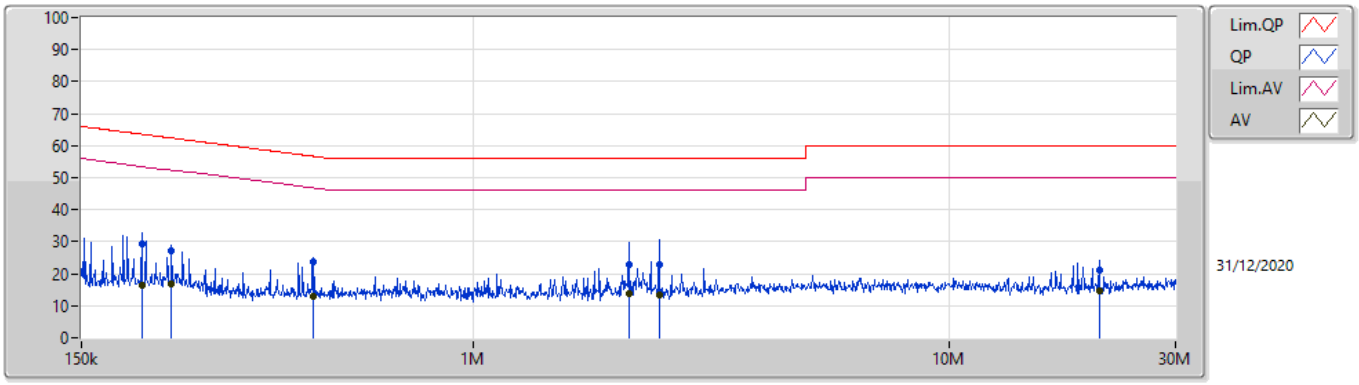
Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition	Comments
Mode 1	Pass	QP	164.425k	33.70	65.24	-31.54	Line	-
Mode 1	Pass	AV	164.425k	16.54	55.24	-38.70	Line	-
Mode 1	Pass	QP	250.038k	29.28	61.76	-32.48	Line	-
Mode 1	Pass	AV	250.038k	15.95	51.76	-35.81	Line	-
Mode 1	Pass	QP	435.504k	30.00	57.15	-27.15	Line	-
Mode 1	Pass	AV	435.504k	13.53	47.15	-33.62	Line	-
Mode 1	Pass	QP	2.238M	21.18	56.00	-34.82	Line	-
Mode 1	Pass	AV	2.238M	14.93	46.00	-31.07	Line	-
Mode 1	Pass	QP	2.584M	29.19	56.00	-26.81	Line	“Worst”
Mode 1	Pass	AV	2.584M	13.99	46.00	-32.01	Line	-
Mode 1	Pass	QP	20.595M	22.26	60.00	-37.74	Line	-
Mode 1	Pass	AV	20.595M	14.50	50.00	-35.50	Line	-
Mode 1	Pass	QP	200.748k	29.17	63.57	-34.40	Neutral	-
Mode 1	Pass	AV	200.748k	16.44	53.57	-37.13	Neutral	-
Mode 1	Pass	QP	231.775k	27.14	62.39	-35.25	Neutral	-
Mode 1	Pass	AV	231.775k	16.64	52.39	-35.75	Neutral	-
Mode 1	Pass	QP	462.379k	23.51	56.65	-33.14	Neutral	-
Mode 1	Pass	AV	462.379k	12.75	46.65	-33.90	Neutral	-
Mode 1	Pass	QP	2.125M	22.70	56.00	-33.30	Neutral	-
Mode 1	Pass	AV	2.125M	13.65	46.00	-32.35	Neutral	“Worst”
Mode 1	Pass	QP	2.463M	22.81	56.00	-33.19	Neutral	-
Mode 1	Pass	AV	2.463M	13.46	46.00	-32.54	Neutral	-
Mode 1	Pass	QP	20.76M	20.98	60.00	-39.02	Neutral	-
Mode 1	Pass	AV	20.76M	14.51	50.00	-35.49	Neutral	-

Conducted Emissions at Powerline_Mode 1



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	164.425k	33.70	65.24	-31.54	19.60	Line	-	14.10	9.69	0.01	9.90
AV	164.425k	16.54	55.24	-38.70	19.60	Line	-	-3.06	9.69	0.01	9.90
QP	250.038k	29.28	61.76	-32.48	19.59	Line	-	9.69	9.68	0.01	9.90
AV	250.038k	15.95	51.76	-35.81	19.59	Line	-	-3.64	9.68	0.01	9.90
QP	435.504k	30.00	57.15	-27.15	19.58	Line	-	10.42	9.67	0.02	9.89
AV	435.504k	13.53	47.15	-33.62	19.58	Line	-	-6.05	9.67	0.02	9.89
QP	2.238M	21.18	56.00	-34.82	19.59	Line	-	1.59	9.68	0.09	9.82
AV	2.238M	14.93	46.00	-31.07	19.59	Line	-	-4.66	9.68	0.09	9.82
QP	2.584M	29.19	56.00	-26.81	19.61	Line	"Worst"	9.58	9.68	0.09	9.84
AV	2.584M	13.99	46.00	-32.01	19.61	Line	-	-5.62	9.68	0.09	9.84
QP	20.595M	22.26	60.00	-37.74	19.86	Line	-	2.40	9.66	0.30	9.90
AV	20.595M	14.50	50.00	-35.50	19.86	Line	-	-5.36	9.66	0.30	9.90

Conducted Emissions at Powerline_Mode 1



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	200.748k	29.17	63.57	-34.40	19.59	Neutral	-	9.58	9.68	0.01	9.90
AV	200.748k	16.44	53.57	-37.13	19.59	Neutral	-	-3.15	9.68	0.01	9.90
QP	231.775k	27.14	62.39	-35.25	19.59	Neutral	-	7.55	9.68	0.01	9.90
AV	231.775k	16.64	52.39	-35.75	19.59	Neutral	-	-2.95	9.68	0.01	9.90
QP	462.379k	23.51	56.65	-33.14	19.57	Neutral	-	3.94	9.67	0.02	9.88
AV	462.379k	12.75	46.65	-33.90	19.57	Neutral	-	-6.82	9.67	0.02	9.88
QP	2.125M	22.70	56.00	-33.30	19.57	Neutral	-	3.13	9.68	0.08	9.81
AV	2.125M	13.65	46.00	-32.35	19.57	Neutral	"Worst"	-5.92	9.68	0.08	9.81
QP	2.463M	22.81	56.00	-33.19	19.60	Neutral	-	3.21	9.68	0.09	9.83
AV	2.463M	13.46	46.00	-32.54	19.60	Neutral	-	-6.14	9.68	0.09	9.83
QP	20.76M	20.98	60.00	-39.02	19.95	Neutral	-	1.03	9.75	0.30	9.90
AV	20.76M	14.51	50.00	-35.49	19.95	Neutral	-	-5.44	9.75	0.30	9.90

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
Zigbee	1.638M	2.274M	2M27G1D	1.613M	2.237M

Result

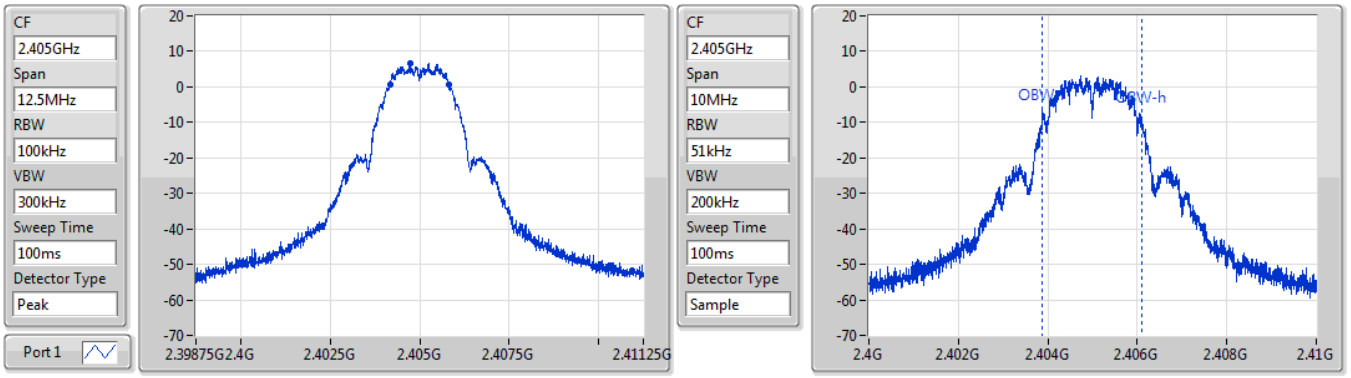
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
Zigbee	-	-	-	-
2405MHz	Pass	500k	1.638M	2.237M
2440MHz	Pass	500k	1.613M	2.24M
2475MHz	Pass	500k	1.631M	2.274M
2480MHz	Pass	500k	1.625M	2.249M

Zigbee

EBW

2405MHz

25/12/2020



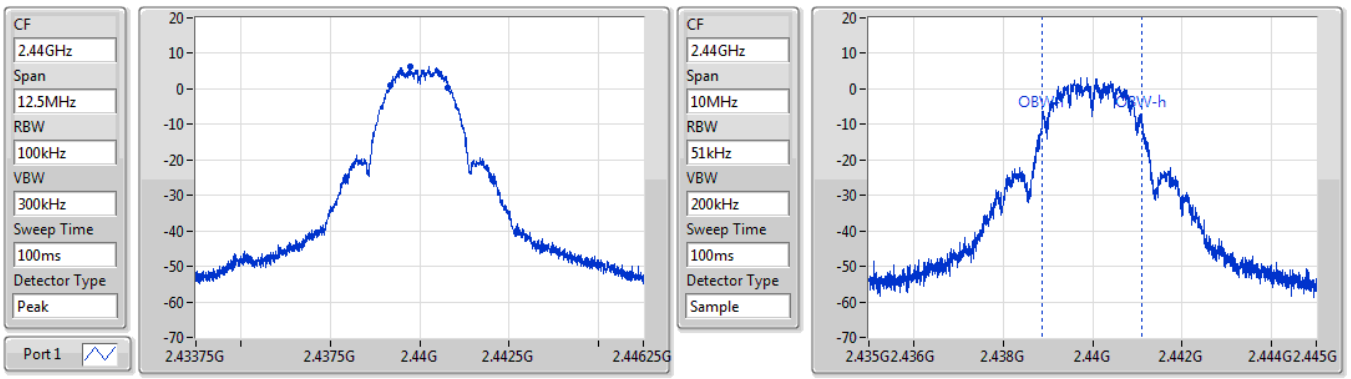
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.638M	2.404169G	2.405806G	2.237M	2.403869G	2.406105G	500k	1

Zigbee

EBW

2440MHz

25/12/2020

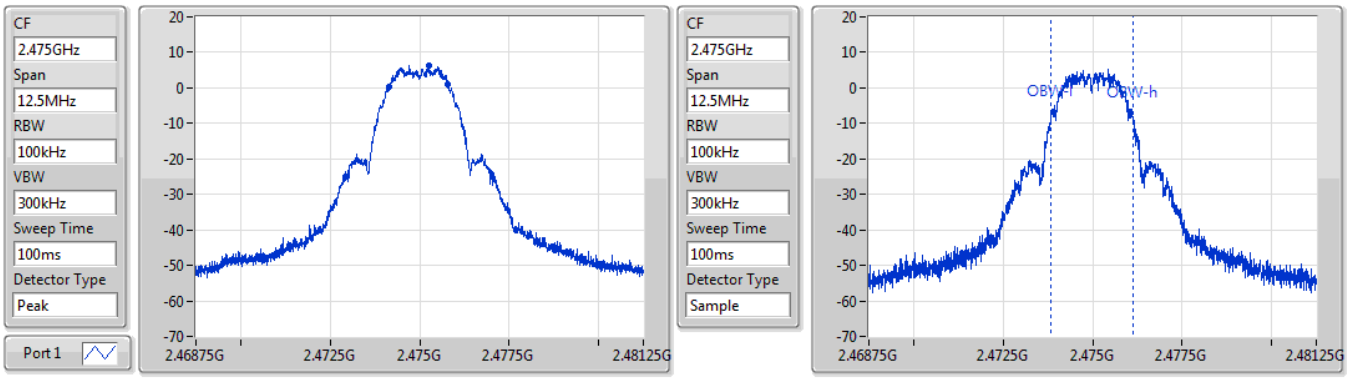


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.613M	2.439181G	2.440794G	2.24M	2.438869G	2.441109G	500k	1

Zigbee EBW

2475MHz

26/01/2021

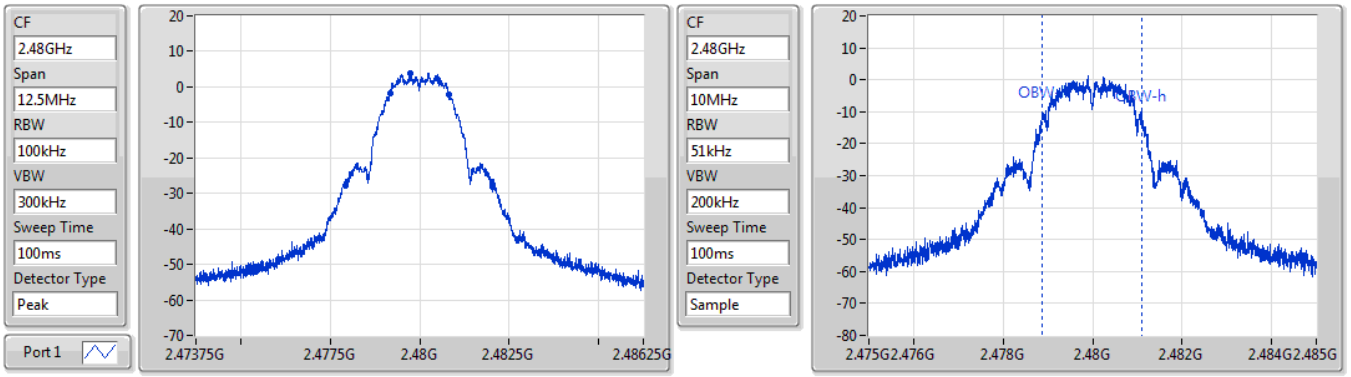


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.631M	2.474163G	2.475794G	2.274M	2.473844G	2.476118G	500k	1

Zigbee EBW

2480MHz

25/12/2020



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.625M	2.479181G	2.480806G	2.249M	2.478862G	2.48111G	500k	1

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee	10.35	0.01084

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-	-
2405MHz	Pass	4.00	10.35	10.35	30.00
2440MHz	Pass	4.00	10.35	10.35	30.00
2475MHz	Pass	4.00	10.31	10.31	30.00
2480MHz	Pass	4.00	7.65	7.65	30.00

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

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
Zigbee	-5.52

RBW = 3kHz;

Result

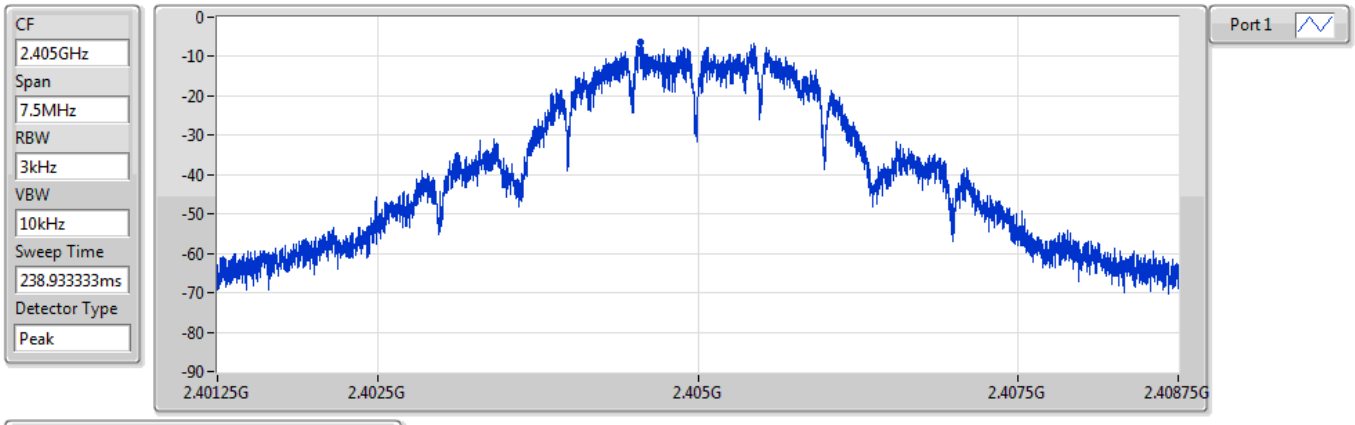
Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
Zigbee	-	-	-	-	-
2405MHz	Pass	4.00	-6.30	-6.30	8.00
2440MHz	Pass	4.00	-5.52	-5.52	8.00
2475MHz	Pass	4.00	-5.94	-5.94	8.00
2480MHz	Pass	4.00	-8.88	-8.88	8.00

DG = Directional Gain; RBW = 3kHz;
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

25/12/2020

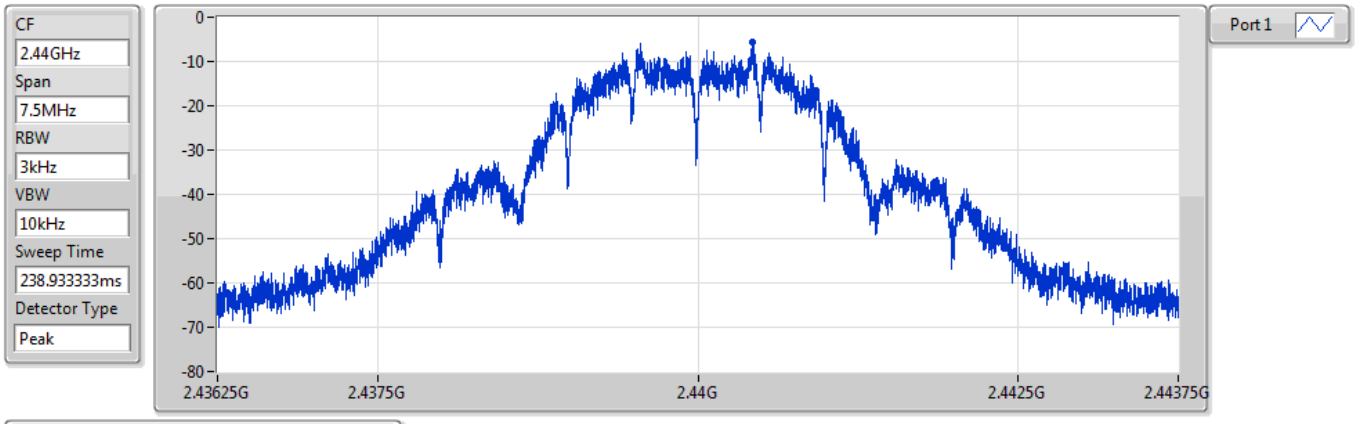


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-6.30	-6.30	-6.30

Zigbee PSD

2440MHz

25/12/2020

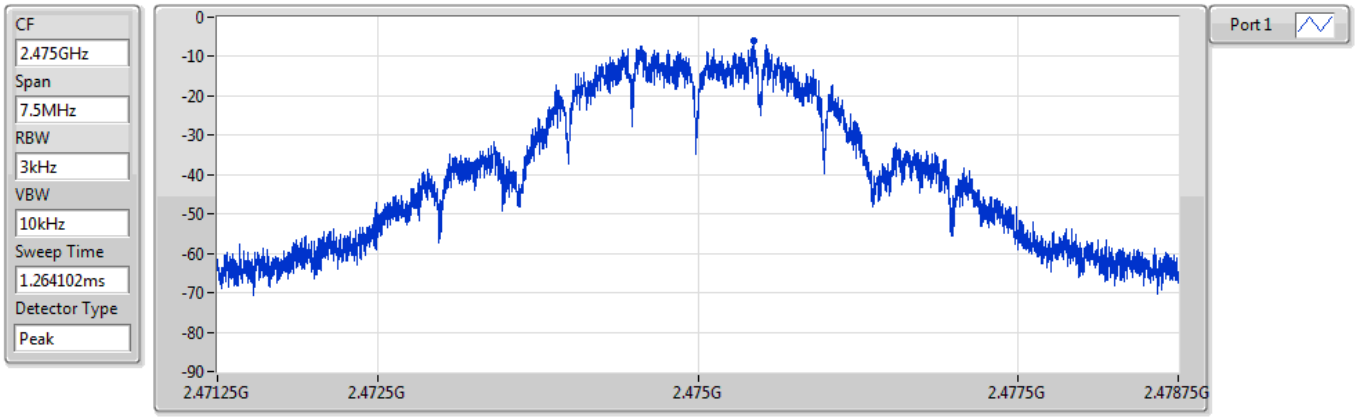


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-5.52	-5.52	-5.52

Zigbee PSD

2475MHz

26/01/2021

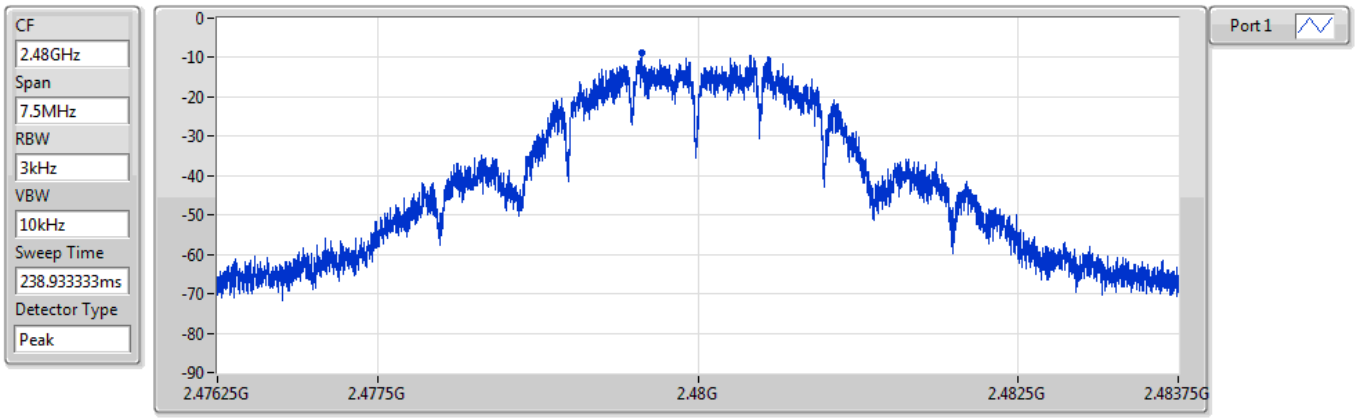


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-5.94	-5.94	-5.94

Zigbee PSD

2480MHz

25/12/2020



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.88	-8.88	-8.88

Summary

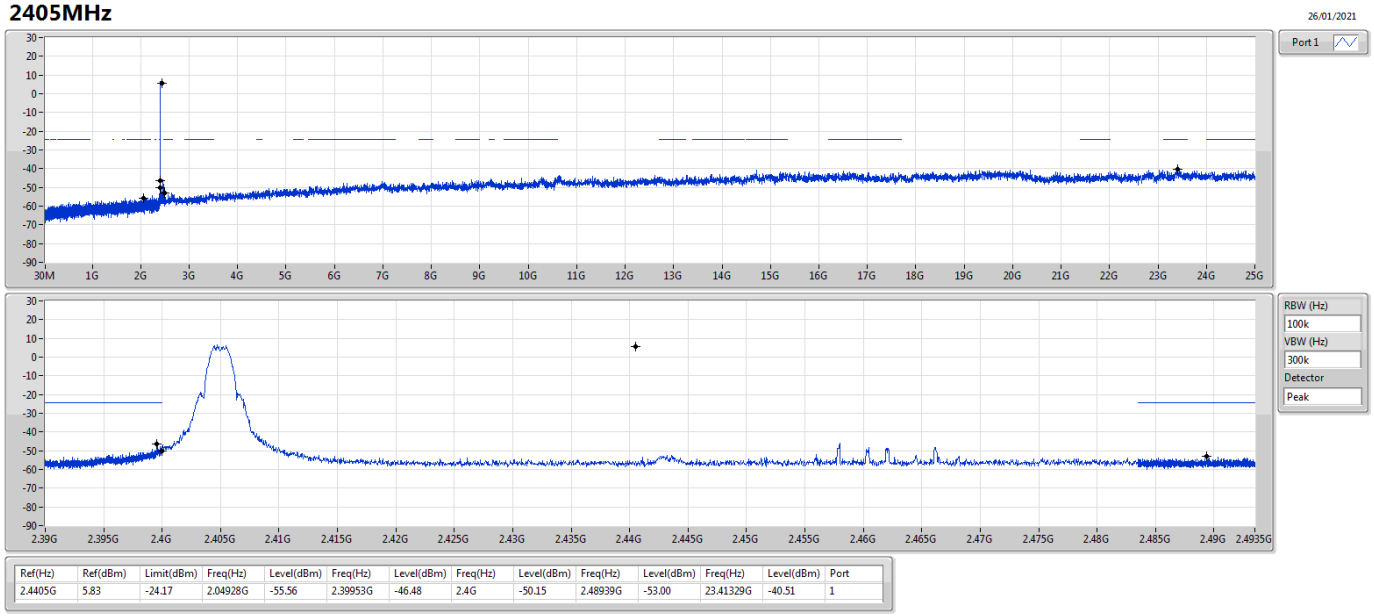
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	2.4405G	5.83	-24.17	2.04928G	-55.56	2.39953G	-46.48	2.4G	-50.15	2.48939G	-53.00	23.41329G	-40.51	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	2.4405G	5.83	-24.17	2.04928G	-55.56	2.39953G	-46.48	2.4G	-50.15	2.48939G	-53.00	23.41329G	-40.51	1
2440MHz	Pass	2.4405G	5.83	-24.17	1.82006G	-55.95	2.39295G	-54.64	2.4835G	-55.48	2.48542G	-52.86	23.40204G	-40.63	1
2475MHz	Pass	2.4405G	5.83	-24.17	2.1425G	-55.53	2.39997G	-53.46	2.4835G	-52.02	2.48385G	-51.86	23.37953G	-40.94	1
2480MHz	Pass	2.4405G	5.83	-24.17	2.3077G	-55.57	2.39875G	-54.16	2.4835G	-47.11	2.48351G	-46.55	23.42173G	-40.19	1

Zigbee **CSENdB**

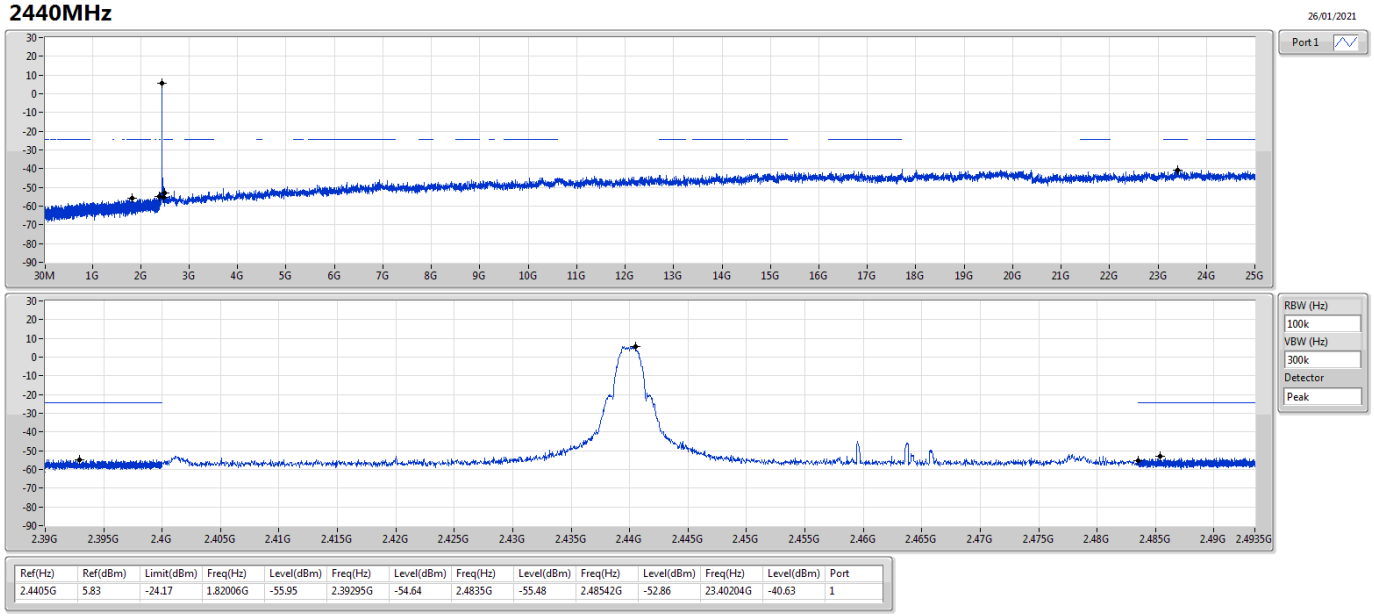
2405MHz



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
2.4405G	5.83	-24.17	2.04928G	-55.56	2.39953G	-46.48	2.4G	-50.15	2.48939G	-53.00	23.41329G	-40.51	1

Zigbee **CSENdB**

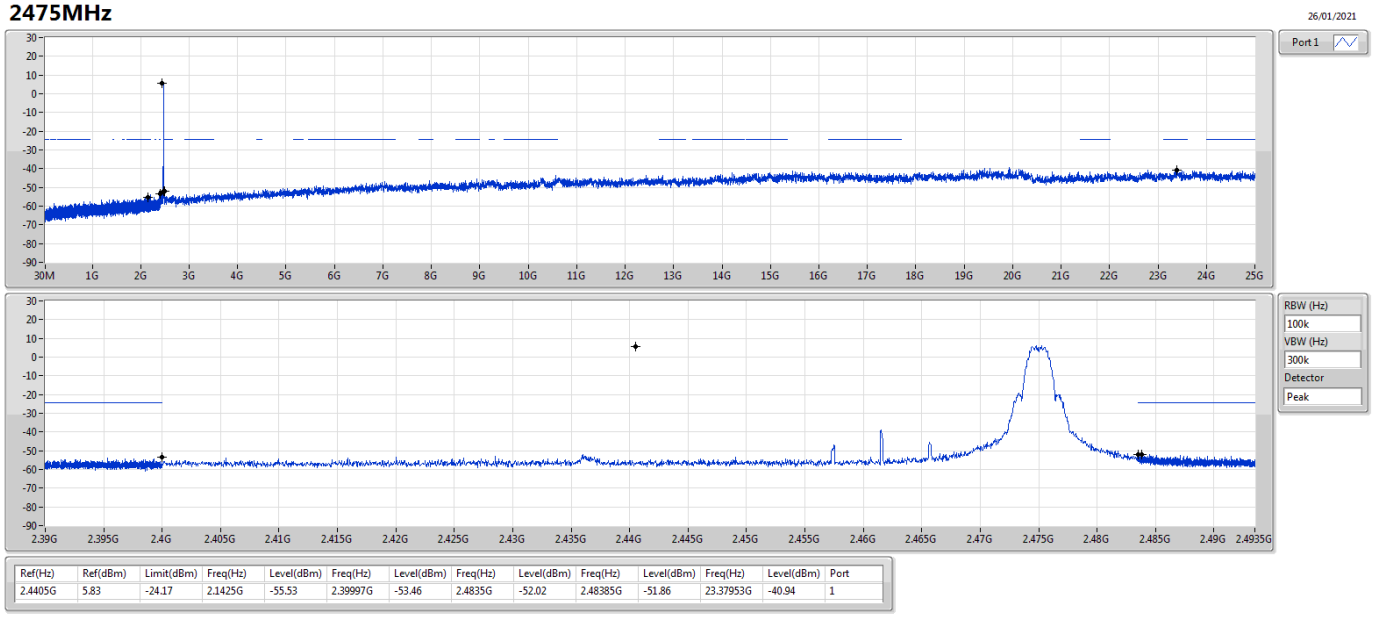
2440MHz



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
2.4405G	5.83	-24.17	1.82006G	-55.95	2.39295G	-54.64	2.4835G	-55.48	2.48542G	-52.86	23.40204G	-40.63	1

Zigbee **CSENdB**

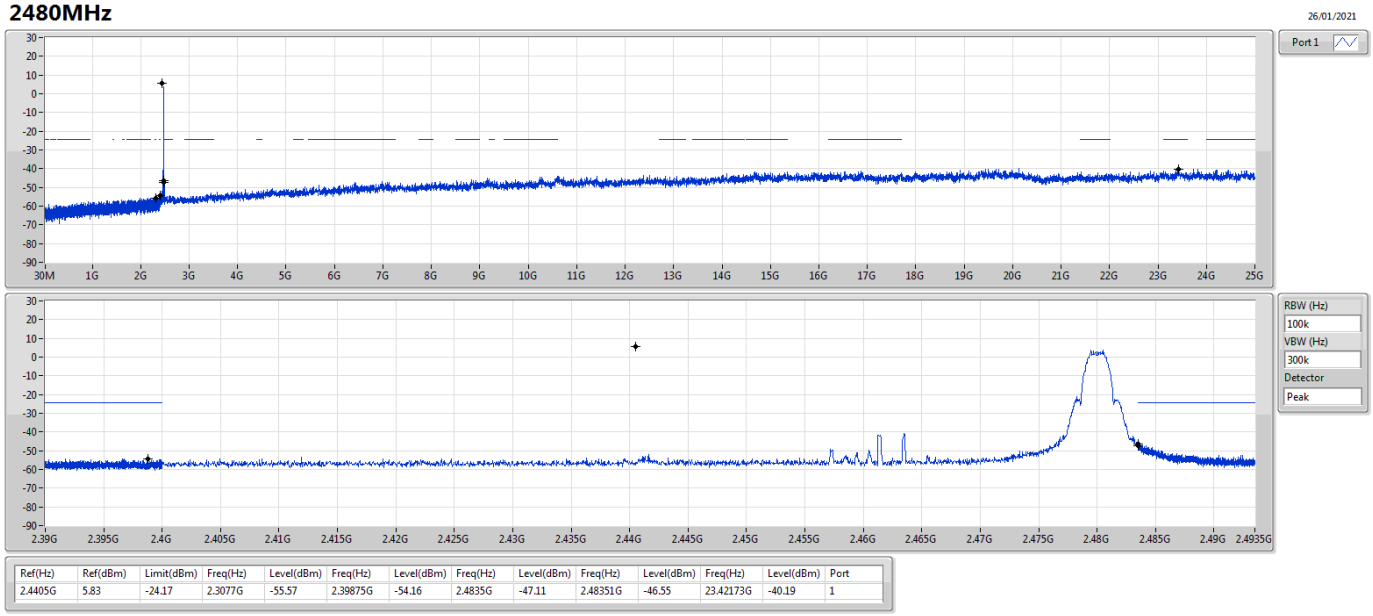
2475MHz



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
2.4405G	5.83	-24.17	2.1425G	-55.53	2.39997G	-53.46	2.4835G	-52.02	2.48385G	-51.86	23.37953G	-40.94	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
2.4405G	5.83	-24.17	2.3077G	-55.57	2.39875G	-54.16	2.4835G	-47.11	2.48351G	-46.55	23.42173G	-40.19	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	PK	592.6M	39.76	46.00	-6.24	3	Horiontal	0	1.00	-

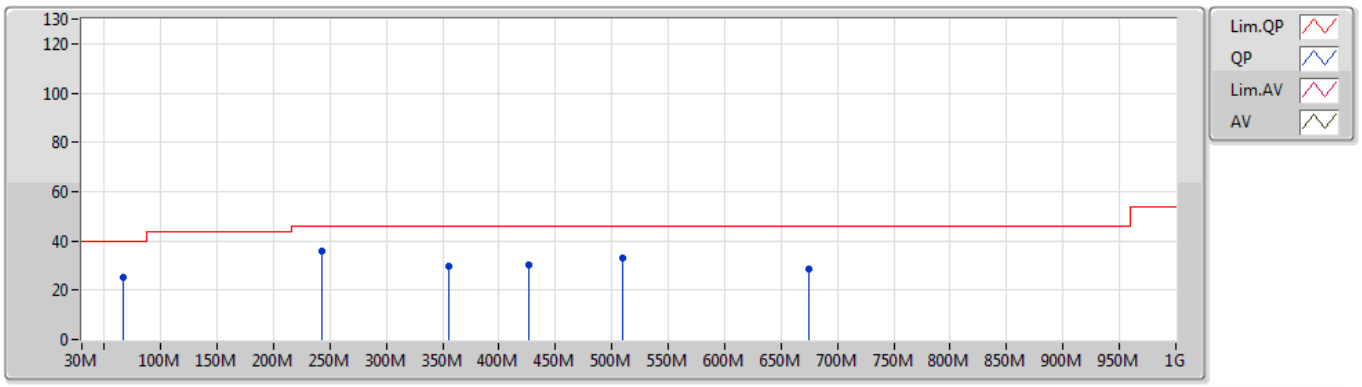
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
Zigbee	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	66.86M	25.47	40.00	-14.53	3	Vertical	360	1.00	-
2440MHz	Pass	PK	243.4M	35.94	46.00	-10.06	3	Vertical	360	1.00	-
2440MHz	Pass	PK	355.92M	29.54	46.00	-16.46	3	Vertical	360	1.00	-
2440MHz	Pass	PK	425.76M	29.98	46.00	-16.02	3	Vertical	360	1.00	-
2440MHz	Pass	PK	509.18M	32.88	46.00	-13.12	3	Vertical	360	1.00	-
2440MHz	Pass	PK	674.08M	28.74	46.00	-17.26	3	Vertical	360	1.00	-
2440MHz	Pass	PK	76.56M	33.29	40.00	-6.71	3	Horiontal	0	1.00	-
2440MHz	Pass	PK	148.34M	30.05	43.50	-13.45	3	Horiontal	0	1.00	-
2440MHz	Pass	PK	289.96M	39.28	46.00	-6.72	3	Horiontal	0	1.00	-
2440MHz	Pass	PK	359.8M	32.14	46.00	-13.86	3	Horiontal	0	1.00	-
2440MHz	Pass	PK	559.62M	37.24	46.00	-8.76	3	Horiontal	0	1.00	-
2440MHz	Pass	PK	592.6M	39.76	46.00	-6.24	3	Horiontal	0	1.00	-

Zigbee

25/12/2020

2440MHz_PoE

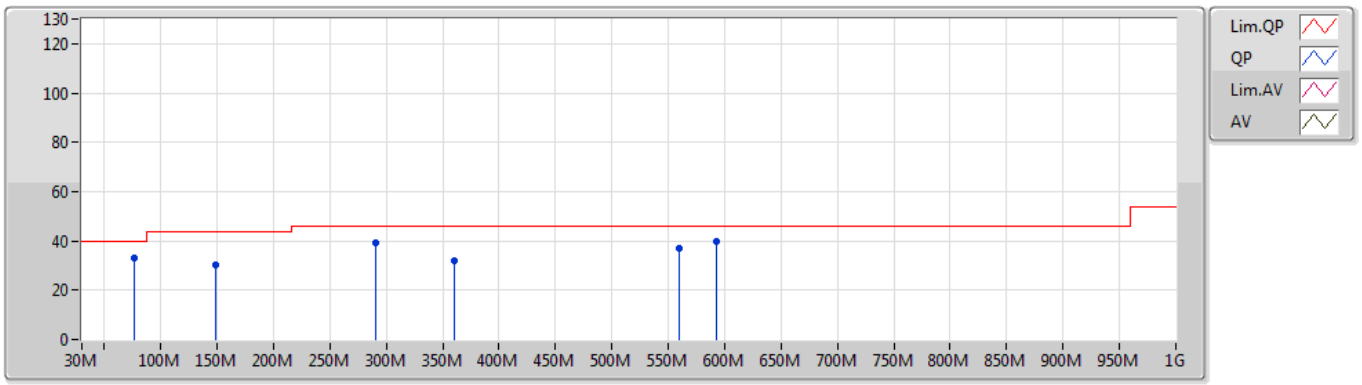


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	66.86M	25.47	40.00	-14.53	-25.18	3	Vertical	360	1.00	-	50.65	11.12	0.60	36.90
PK	243.4M	35.94	46.00	-10.06	-18.31	3	Vertical	360	1.00	-	54.25	16.82	1.27	36.40
PK	355.92M	29.54	46.00	-16.46	-15.22	3	Vertical	360	1.00	-	44.76	19.75	1.52	36.49
PK	425.76M	29.98	46.00	-16.02	-12.65	3	Vertical	360	1.00	-	42.63	22.12	1.75	36.52
PK	509.18M	32.88	46.00	-13.12	-11.78	3	Vertical	360	1.00	-	44.66	23.32	1.92	37.02
PK	674.08M	28.74	46.00	-17.26	-9.21	3	Vertical	360	1.00	-	37.95	25.61	2.30	37.12

Zigbee

25/12/2020

2440MHz_PoE



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	76.56M	33.29	40.00	-6.71	-24.13	3	Horiontal	0	1.00	-	57.42	11.95	0.70	36.78
PK	148.34M	30.05	43.50	-13.45	-18.93	3	Horiontal	0	1.00	-	48.98	16.46	0.94	36.33
PK	289.96M	39.28	46.00	-6.72	-16.84	3	Horiontal	0	1.00	-	56.12	18.15	1.38	36.37
PK	359.8M	32.14	46.00	-13.86	-15.11	3	Horiontal	0	1.00	-	47.25	19.83	1.54	36.48
PK	559.62M	37.24	46.00	-8.76	-9.68	3	Horiontal	0	1.00	-	46.92	25.38	2.04	37.10
PK	592.6M	39.76	46.00	-6.24	-10.24	3	Horiontal	0	1.00	-	50.00	24.74	2.17	37.15

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	52.59	54.00	-1.41	3	Horizontal	180	2.14	-

Result

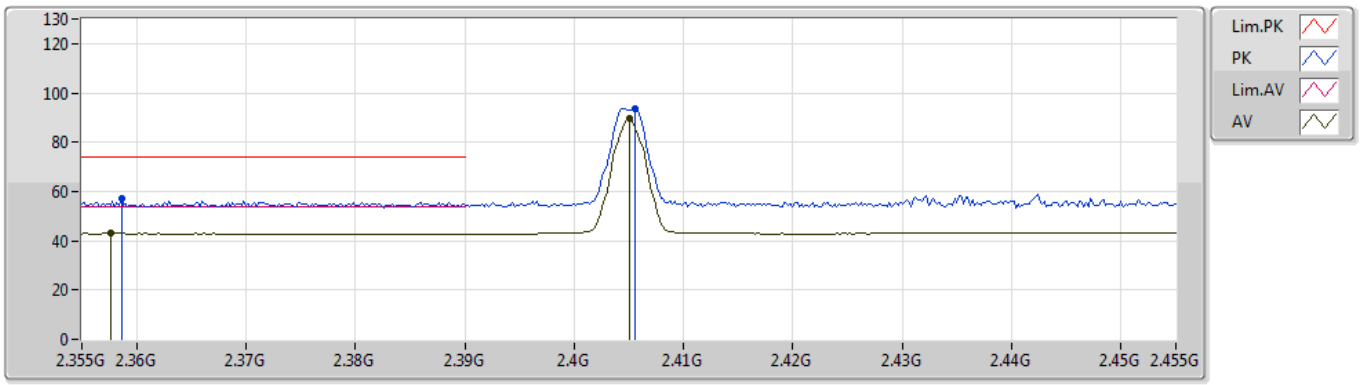
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
Zigbee	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	AV	2.3576G	42.91	54.00	-11.09	3	Vertical	165	1.06	-
2405MHz	Pass	AV	2.405G	89.42	Inf	-Inf	3	Vertical	165	1.06	-
2405MHz	Pass	PK	2.3586G	57.11	74.00	-16.89	3	Vertical	165	1.06	-
2405MHz	Pass	PK	2.4056G	93.85	Inf	-Inf	3	Vertical	165	1.06	-
2405MHz	Pass	AV	2.3664G	44.50	54.00	-9.50	3	Horizontal	182	1.56	-
2405MHz	Pass	AV	2.405G	104.87	Inf	-Inf	3	Horizontal	182	1.56	-
2405MHz	Pass	PK	2.384G	56.90	74.00	-17.10	3	Horizontal	182	1.56	-
2405MHz	Pass	PK	2.4056G	109.28	Inf	-Inf	3	Horizontal	182	1.56	-
2405MHz	Pass	AV	4.8059G	29.96	54.00	-24.04	3	Vertical	95	1.80	-
2405MHz	Pass	PK	4.80712G	43.48	74.00	-30.52	3	Vertical	95	1.80	-
2405MHz	Pass	AV	4.8053G	29.96	54.00	-24.04	3	Horizontal	0	1.80	-
2405MHz	Pass	PK	4.81324G	43.03	74.00	-30.97	3	Horizontal	0	1.80	-
2440MHz	Pass	AV	2.3584G	42.93	54.00	-11.07	3	Vertical	217	2.88	-
2440MHz	Pass	AV	2.44G	92.57	Inf	-Inf	3	Vertical	217	2.88	-
2440MHz	Pass	AV	2.4936G	43.31	54.00	-10.69	3	Vertical	217	2.88	-
2440MHz	Pass	PK	2.3476G	56.85	74.00	-17.15	3	Vertical	217	2.88	-
2440MHz	Pass	PK	2.4404G	96.98	Inf	-Inf	3	Vertical	217	2.88	-
2440MHz	Pass	PK	2.4896G	55.94	74.00	-18.06	3	Vertical	217	2.88	-
2440MHz	Pass	AV	2.346G	42.94	54.00	-11.06	3	Horizontal	166	1.75	-
2440MHz	Pass	AV	2.44G	105.04	Inf	-Inf	3	Horizontal	166	1.75	-
2440MHz	Pass	AV	2.498G	43.33	54.00	-10.67	3	Horizontal	166	1.75	-
2440MHz	Pass	PK	2.3592G	56.24	74.00	-17.76	3	Horizontal	166	1.75	-
2440MHz	Pass	PK	2.4404G	109.40	Inf	-Inf	3	Horizontal	166	1.75	-
2440MHz	Pass	PK	2.4848G	56.32	74.00	-17.68	3	Horizontal	166	1.75	-
2440MHz	Pass	AV	4.88464G	29.36	54.00	-24.64	3	Vertical	330	1.80	-
2440MHz	Pass	AV	7.31844G	38.46	54.00	-15.54	3	Vertical	39	2.37	-
2440MHz	Pass	PK	4.88404G	42.91	74.00	-31.09	3	Vertical	330	1.80	-
2440MHz	Pass	PK	7.31864G	50.86	74.00	-23.14	3	Vertical	39	2.37	-
2440MHz	Pass	AV	4.88102G	29.65	54.00	-24.35	3	Horizontal	330	1.80	-
2440MHz	Pass	AV	7.3216G	38.10	54.00	-15.90	3	Horizontal	356	1.71	-
2440MHz	Pass	PK	4.88092G	42.99	74.00	-31.01	3	Horizontal	330	1.80	-
2440MHz	Pass	PK	7.32164G	50.79	74.00	-23.21	3	Horizontal	356	1.71	-
2475MHz	Pass	AV	2.475G	87.24	Inf	-Inf	3	Vertical	141	2.92	-
2475MHz	Pass	AV	2.4846G	43.38	54.00	-10.62	3	Vertical	141	2.92	-
2475MHz	Pass	PK	2.4756G	91.68	Inf	-Inf	3	Vertical	141	2.92	-
2475MHz	Pass	PK	2.4848G	56.38	74.00	-17.62	3	Vertical	141	2.92	-
2475MHz	Pass	AV	2.475G	103.63	Inf	-Inf	3	Horizontal	189	1.49	-
2475MHz	Pass	AV	2.4835G	44.48	54.00	-9.52	3	Horizontal	189	1.49	-
2475MHz	Pass	PK	2.4744G	108.00	Inf	-Inf	3	Horizontal	189	1.49	-
2475MHz	Pass	PK	2.4856G	57.35	74.00	-16.65	3	Horizontal	189	1.49	-
2475MHz	Pass	AV	4.94919G	29.55	54.00	-24.45	3	Vertical	347	1.72	-
2475MHz	Pass	AV	7.42654G	38.84	54.00	-15.16	3	Vertical	25	2.20	-
2475MHz	Pass	PK	4.94971G	43.24	74.00	-30.76	3	Vertical	347	1.72	-
2475MHz	Pass	PK	7.4231G	50.93	74.00	-23.07	3	Vertical	25	2.20	-
2475MHz	Pass	AV	4.94871G	29.79	54.00	-24.21	3	Horizontal	62	1.74	-
2475MHz	Pass	AV	7.42652G	40.53	54.00	-13.47	3	Horizontal	347	2.56	-
2475MHz	Pass	PK	4.94934G	44.25	74.00	-29.75	3	Horizontal	62	1.74	-
2475MHz	Pass	PK	7.42318G	52.49	74.00	-21.51	3	Horizontal	347	2.56	-
2480MHz	Pass	AV	2.48G	86.71	Inf	-Inf	3	Vertical	24	2.17	-
2480MHz	Pass	AV	2.4835G	44.08	54.00	-9.92	3	Vertical	24	2.17	-
2480MHz	Pass	PK	2.4794G	91.10	Inf	-Inf	3	Vertical	24	2.17	-
2480MHz	Pass	PK	2.4932G	57.25	74.00	-16.75	3	Vertical	24	2.17	-
2480MHz	Pass	AV	2.48G	102.31	Inf	-Inf	3	Horizontal	180	2.14	-
2480MHz	Pass	AV	2.4835G	52.59	54.00	-1.41	3	Horizontal	180	2.14	-
2480MHz	Pass	PK	2.4806G	106.66	Inf	-Inf	3	Horizontal	180	2.14	-
2480MHz	Pass	PK	2.4835G	64.12	74.00	-9.88	3	Horizontal	180	2.14	-
2480MHz	Pass	AV	4.95901G	30.38	54.00	-23.62	3	Vertical	23	2.03	-
2480MHz	Pass	AV	7.44162G	36.75	54.00	-17.25	3	Vertical	46	2.36	-
2480MHz	Pass	PK	4.96203G	43.86	74.00	-30.14	3	Vertical	23	2.03	-
2480MHz	Pass	PK	7.4416G	49.97	74.00	-24.03	3	Vertical	46	2.36	-

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2480MHz	Pass	AV	4.95592G	29.97	54.00	-24.03	3	Horizontal	191	2.68	-
2480MHz	Pass	AV	7.44174G	36.86	54.00	-17.14	3	Horizontal	323	1.58	-
2480MHz	Pass	PK	4.9576G	43.88	74.00	-30.12	3	Horizontal	191	2.68	-
2480MHz	Pass	PK	7.44176G	49.85	74.00	-24.15	3	Horizontal	323	1.58	-

Zigbee

24/12/2020

2405MHz_TX

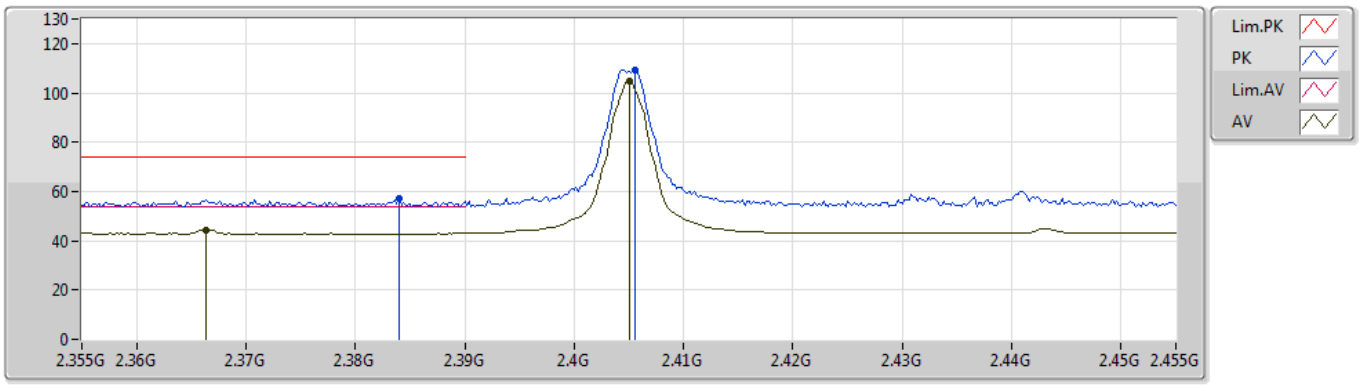


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3576G	42.91	54.00	-11.09	31.61	3	Vertical	165	1.06	-	11.30	27.77	3.84	-
AV	2.405G	89.42	Inf	-Inf	31.51	3	Vertical	165	1.06	-	57.91	27.60	3.91	-
PK	2.3586G	57.11	74.00	-16.89	31.61	3	Vertical	165	1.06	-	25.50	27.77	3.84	-
PK	2.4056G	93.85	Inf	-Inf	31.51	3	Vertical	165	1.06	-	62.34	27.60	3.91	-

Zigbee

24/12/2020

2405MHz_TX

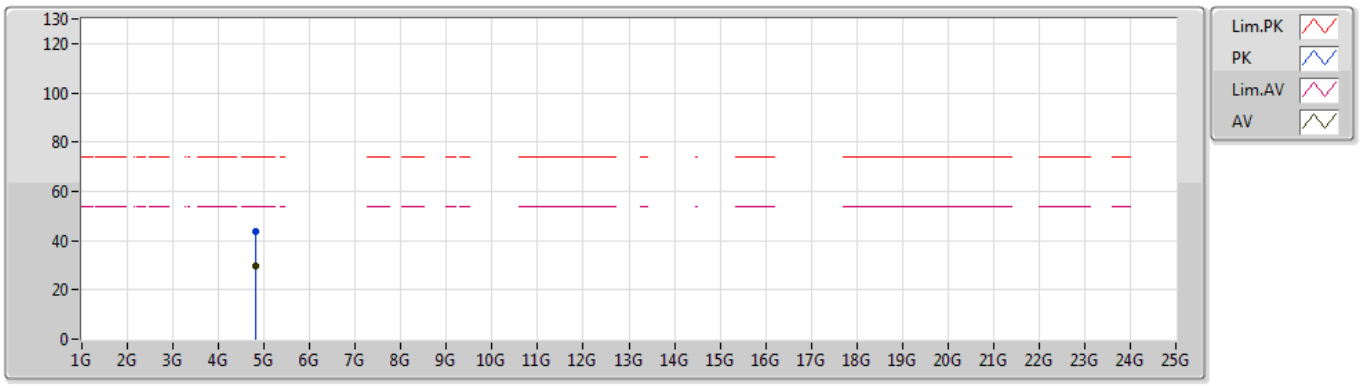


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3664G	44.50	54.00	-9.50	31.58	3	Horizontal	182	1.56	-	12.92	27.73	3.85	-
AV	2.405G	104.87	Inf	-Inf	31.51	3	Horizontal	182	1.56	-	73.36	27.60	3.91	-
PK	2.384G	56.90	74.00	-17.10	31.54	3	Horizontal	182	1.56	-	25.36	27.66	3.88	-
PK	2.4056G	109.28	Inf	-Inf	31.51	3	Horizontal	182	1.56	-	77.77	27.60	3.91	-

Zigbee

24/12/2020

2405MHz_TX

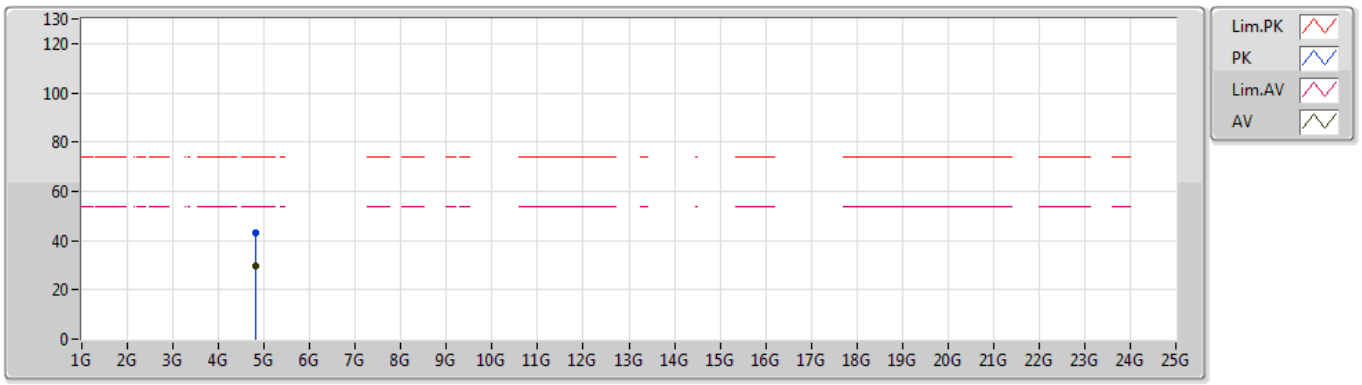


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.8059G	29.96	54.00	-24.04	1.49	3	Vertical	95	1.80	-	28.47	31.12	5.30	34.93
PK	4.80712G	43.48	74.00	-30.52	1.50	3	Vertical	95	1.80	-	41.98	31.13	5.30	34.93

Zigbee

24/12/2020

2405MHz_TX

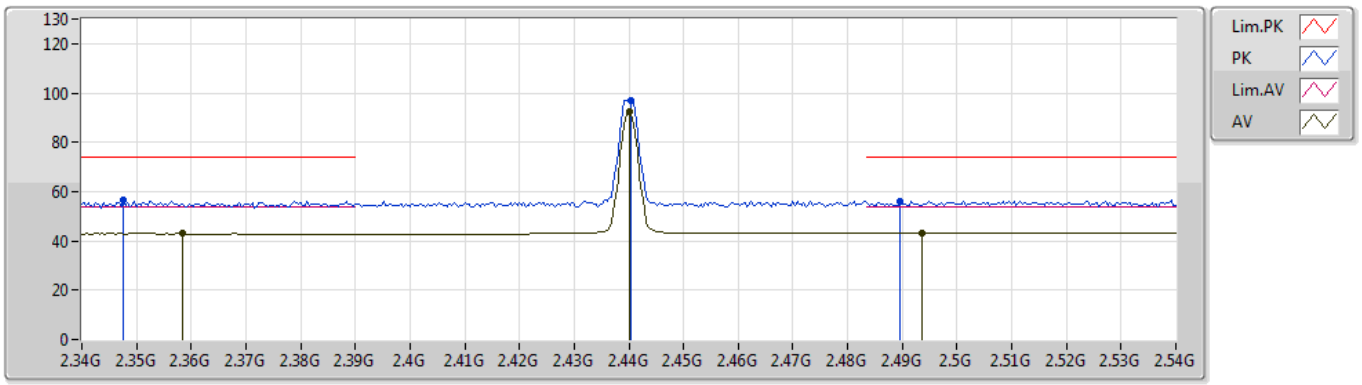


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.8053G	29.96	54.00	-24.04	1.49	3	Horizontal	0	1.80	-	28.47	31.12	5.30	34.93
PK	4.81324G	43.03	74.00	-30.97	1.53	3	Horizontal	0	1.80	-	41.50	31.15	5.31	34.93

Zigbee

24/12/2020

2440MHz_TX

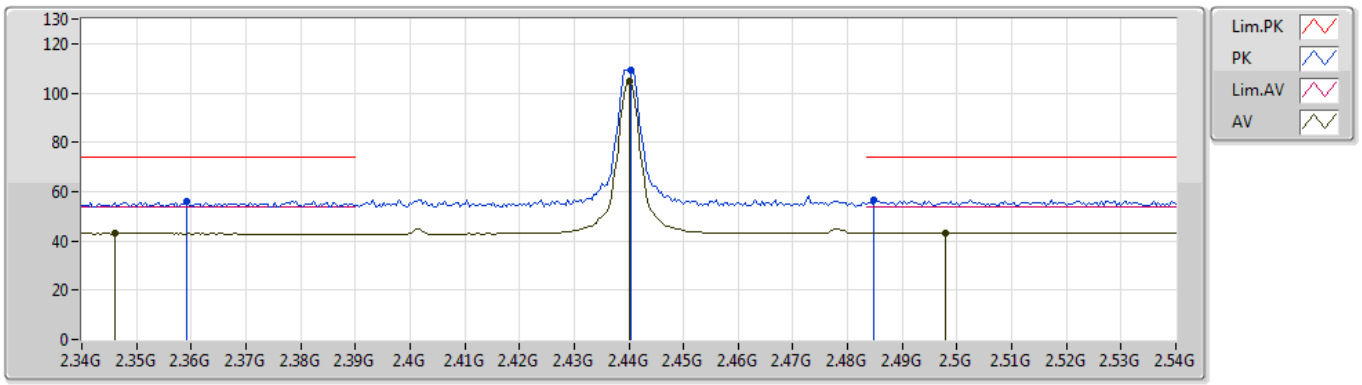


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3584G	42.93	54.00	-11.07	31.61	3	Vertical	217	2.88	-	11.32	27.77	3.84	-
AV	2.44G	92.57	Inf	-Inf	31.56	3	Vertical	217	2.88	-	61.01	27.60	3.96	-
AV	2.4936G	43.31	54.00	-10.69	31.64	3	Vertical	217	2.88	-	11.67	27.60	4.04	-
PK	2.3476G	56.85	74.00	-17.15	31.62	3	Vertical	217	2.88	-	25.23	27.80	3.82	-
PK	2.4404G	96.98	Inf	-Inf	31.56	3	Vertical	217	2.88	-	65.42	27.60	3.96	-
PK	2.4896G	55.94	74.00	-18.06	31.63	3	Vertical	217	2.88	-	24.31	27.60	4.03	-

Zigbee

24/12/2020

2440MHz_TX

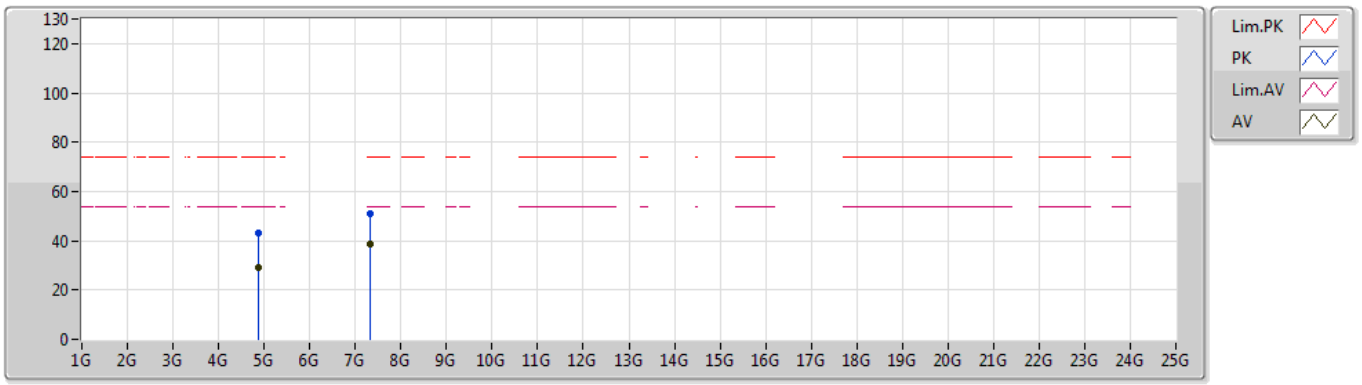


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.346G	42.94	54.00	-11.06	31.63	3	Horizontal	166	1.75	-	11.31	27.81	3.82	-
AV	2.44G	105.04	Inf	-Inf	31.56	3	Horizontal	166	1.75	-	73.48	27.60	3.96	-
AV	2.498G	43.33	54.00	-10.67	31.65	3	Horizontal	166	1.75	-	11.68	27.60	4.05	-
PK	2.3592G	56.24	74.00	-17.76	31.60	3	Horizontal	166	1.75	-	24.64	27.76	3.84	-
PK	2.4404G	109.40	Inf	-Inf	31.56	3	Horizontal	166	1.75	-	77.84	27.60	3.96	-
PK	2.4848G	56.32	74.00	-17.68	31.63	3	Horizontal	166	1.75	-	24.69	27.60	4.03	-

Zigbee

24/12/2020

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	4.88464G	29.36	54.00	-24.64	1.64	3	Vertical	330	1.80	-	27.72	31.23	5.34	34.93
AV	7.31844G	38.46	54.00	-15.54	8.18	3	Vertical	39	2.37	-	30.28	36.56	6.80	35.18
PK	4.88404G	42.91	74.00	-31.09	1.64	3	Vertical	330	1.80	-	41.27	31.23	5.34	34.93
PK	7.31864G	50.86	74.00	-23.14	8.18	3	Vertical	39	2.37	-	42.68	36.56	6.80	35.18

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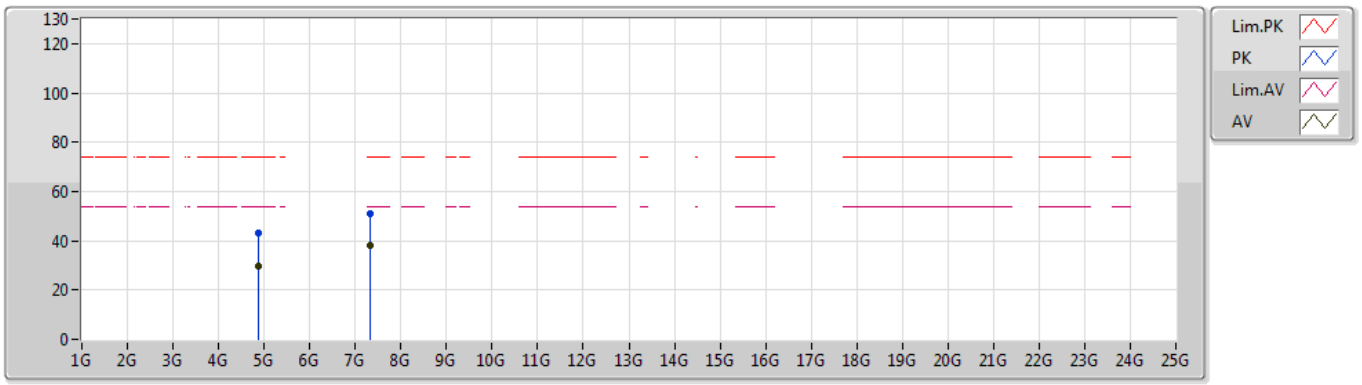
24/12/2020

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	4.88102G	29.65	54.00	-24.35	1.65	3	Horizontal	330	1.80	-	28.00	31.24	5.34	34.93
AV	7.3216G	38.10	54.00	-15.90	8.18	3	Horizontal	356	1.71	-	29.92	36.56	6.80	35.18
PK	4.88092G	42.99	74.00	-31.01	1.65	3	Horizontal	330	1.80	-	41.34	31.24	5.34	34.93
PK	7.32164G	50.79	74.00	-23.21	8.18	3	Horizontal	356	1.71	-	42.61	36.56	6.80	35.18

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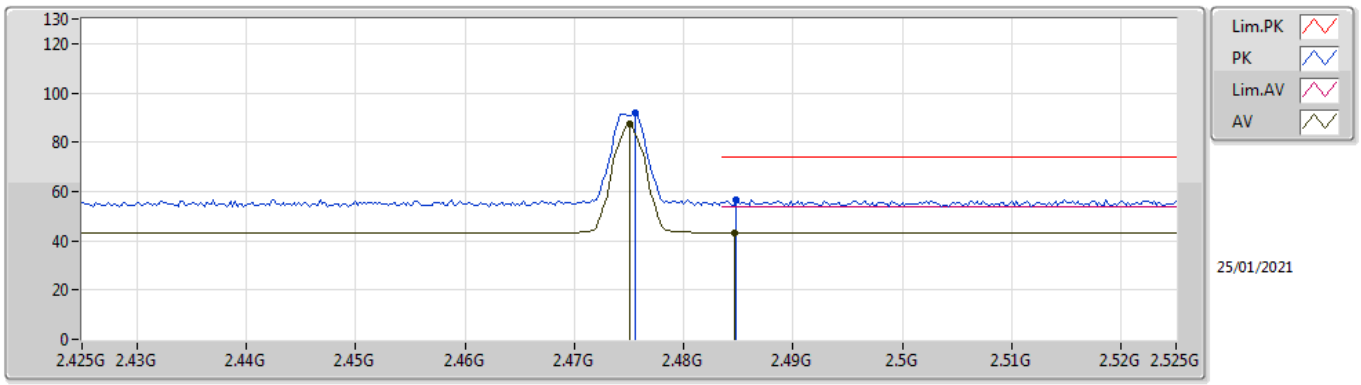
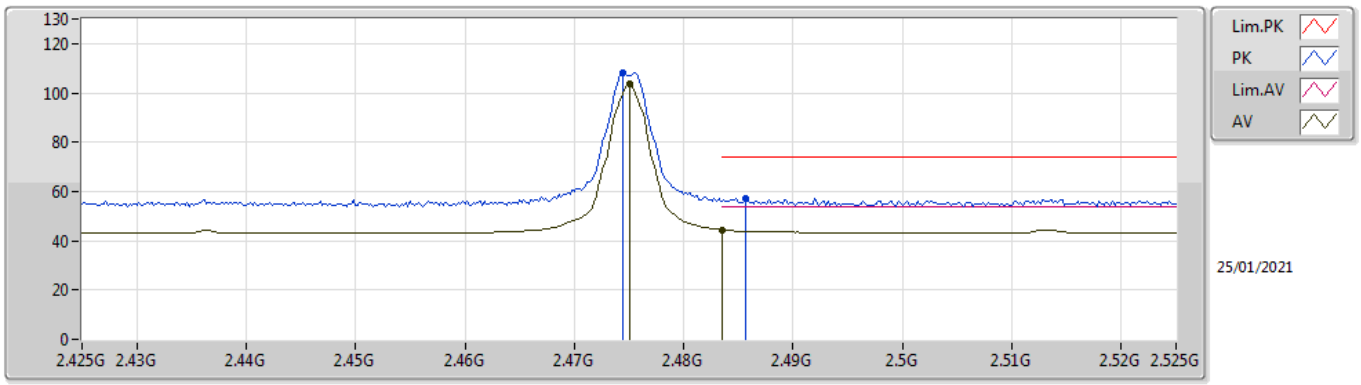
2475MHz_TX



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	2.475G	87.24	Inf	-Inf	31.61	3	Vertical	141	2.92	-	55.63	27.60	4.01	-
AV	2.4846G	43.38	54.00	-10.62	31.63	3	Vertical	141	2.92	-	11.75	27.60	4.03	-
PK	2.4756G	91.68	Inf	-Inf	31.61	3	Vertical	141	2.92	-	60.07	27.60	4.01	-
PK	2.4848G	56.38	74.00	-17.62	31.63	3	Vertical	141	2.92	-	24.75	27.60	4.03	-

Zigbee

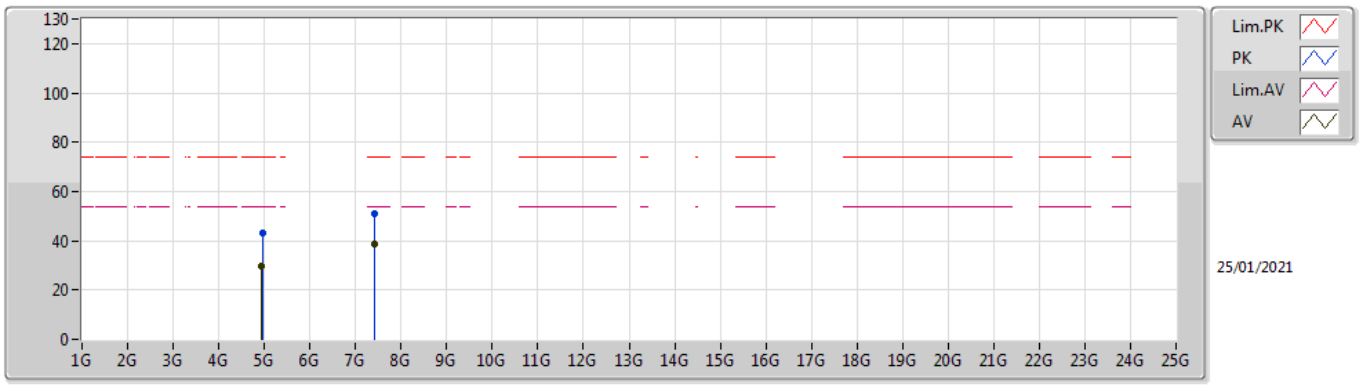
2475MHz_TX



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	2.475G	103.63	Inf	-Inf	31.61	3	Horizontal	189	1.49	-	72.02	27.60	4.01	-
AV	2.4835G	44.48	54.00	-9.52	31.63	3	Horizontal	189	1.49	-	12.85	27.60	4.03	-
PK	2.4744G	108.00	Inf	-Inf	31.61	3	Horizontal	189	1.49	-	76.39	27.60	4.01	-
PK	2.4856G	57.35	74.00	-16.65	31.63	3	Horizontal	189	1.49	-	25.72	27.60	4.03	-

Zigbee

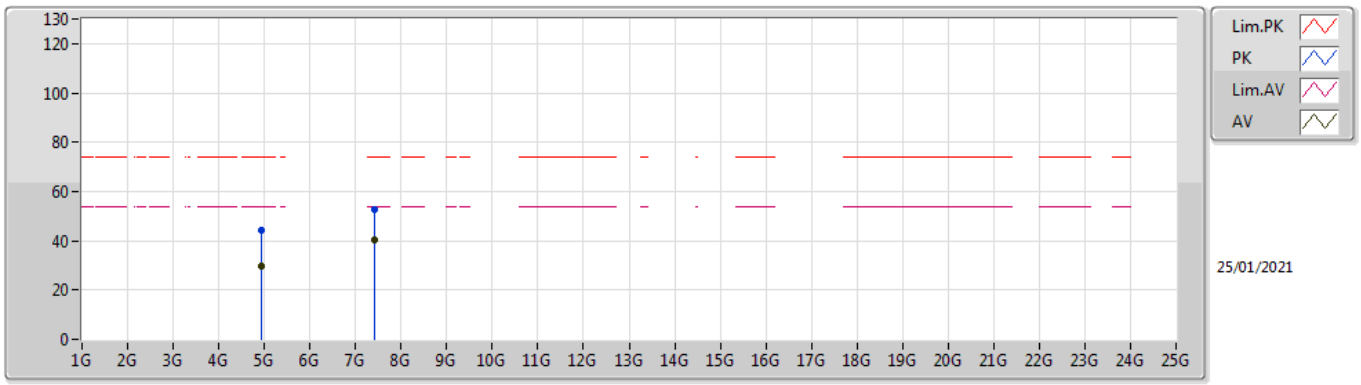
2475MHz_TX



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	4.94919G	29.55	54.00	-24.45	1.83	3	Vertical	347	1.72	-	27.72	31.40	5.37	34.94
AV	7.42654G	38.84	54.00	-15.16	8.15	3	Vertical	25	2.20	-	30.69	36.51	6.81	35.17
PK	4.94971G	43.24	74.00	-30.76	1.83	3	Vertical	347	1.72	-	41.41	31.40	5.37	34.94
PK	7.4231G	50.93	74.00	-23.07	8.13	3	Vertical	25	2.20	-	42.80	36.49	6.81	35.17

Zigbee

2475MHz_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	4.94871G	29.79	54.00	-24.21	1.82	3	Horizontal	62	1.74	-	27.97	31.39	5.37	34.94
AV	7.42652G	40.53	54.00	-13.47	8.15	3	Horizontal	347	2.56	-	32.38	36.51	6.81	35.17
PK	4.94934G	44.25	74.00	-29.75	1.83	3	Horizontal	62	1.74	-	42.42	31.40	5.37	34.94
PK	7.42318G	52.49	74.00	-21.51	8.13	3	Horizontal	347	2.56	-	44.36	36.49	6.81	35.17

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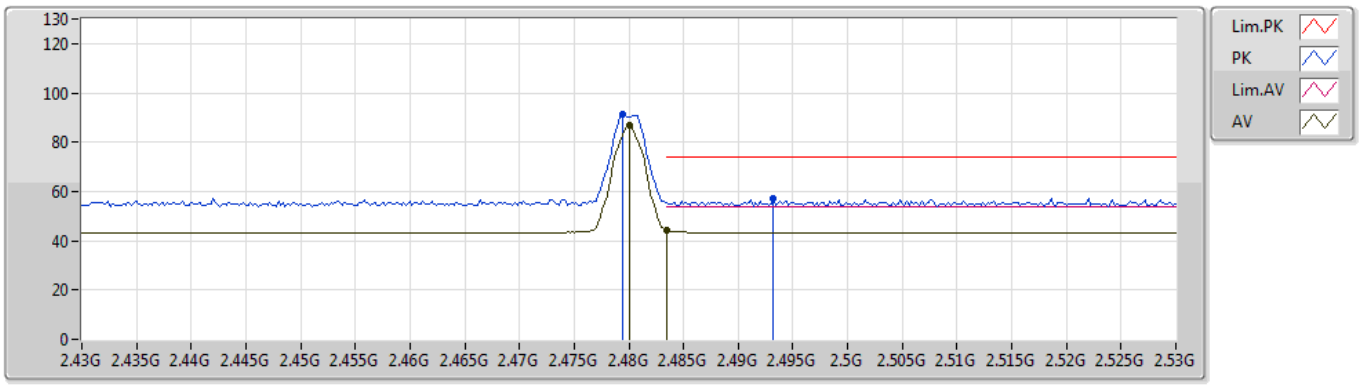
24/12/2020

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	86.71	Inf	-Inf	31.62	3	Vertical	24	2.17	-	55.09	27.60	4.02	-
AV	2.4835G	44.08	54.00	-9.92	31.63	3	Vertical	24	2.17	-	12.45	27.60	4.03	-
PK	2.4794G	91.10	Inf	-Inf	31.62	3	Vertical	24	2.17	-	59.48	27.60	4.02	-
PK	2.4932G	57.25	74.00	-16.75	31.64	3	Vertical	24	2.17	-	25.61	27.60	4.04	-

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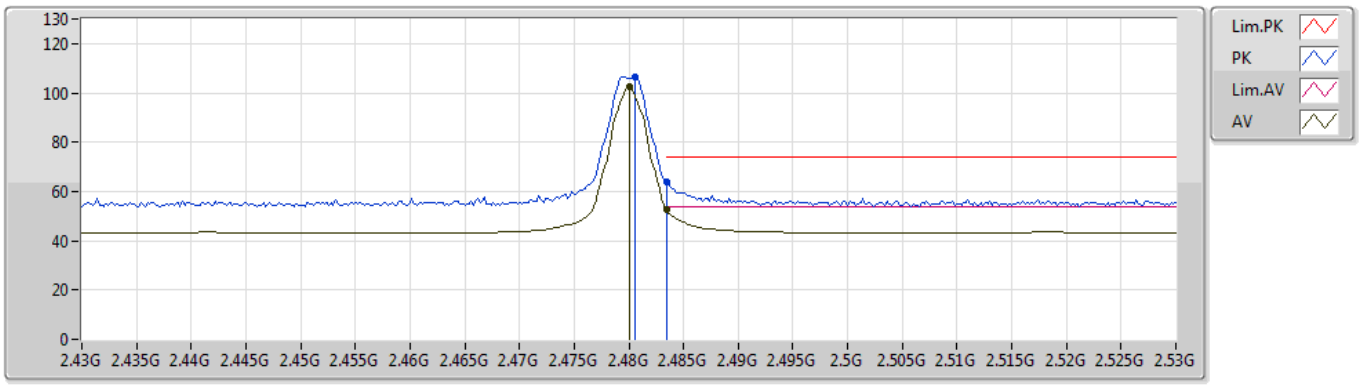
24/12/2020

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	102.31	Inf	-Inf	31.62	3	Horizontal	180	2.14	-	70.69	27.60	4.02	-
AV	2.4835G	52.59	54.00	-1.41	31.63	3	Horizontal	180	2.14	-	20.96	27.60	4.03	-
PK	2.4806G	106.66	Inf	-Inf	31.62	3	Horizontal	180	2.14	-	75.04	27.60	4.02	-
PK	2.4835G	64.12	74.00	-9.88	31.63	3	Horizontal	180	2.14	-	32.49	27.60	4.03	-

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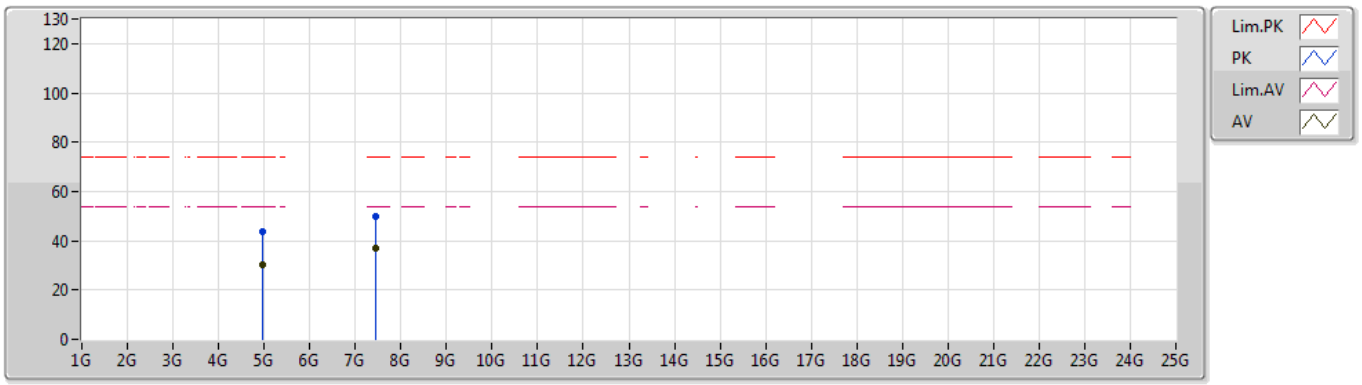
24/12/2020

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	4.95901G	30.38	54.00	-23.62	1.86	3	Vertical	23	2.03	-	28.52	31.42	5.38	34.94
AV	7.44162G	36.75	54.00	-17.25	8.22	3	Vertical	46	2.36	-	28.53	36.57	6.82	35.17
PK	4.96203G	43.86	74.00	-30.14	1.86	3	Vertical	23	2.03	-	42.00	31.42	5.38	34.94
PK	7.4416G	49.97	74.00	-24.03	8.22	3	Vertical	46	2.36	-	41.75	36.57	6.82	35.17

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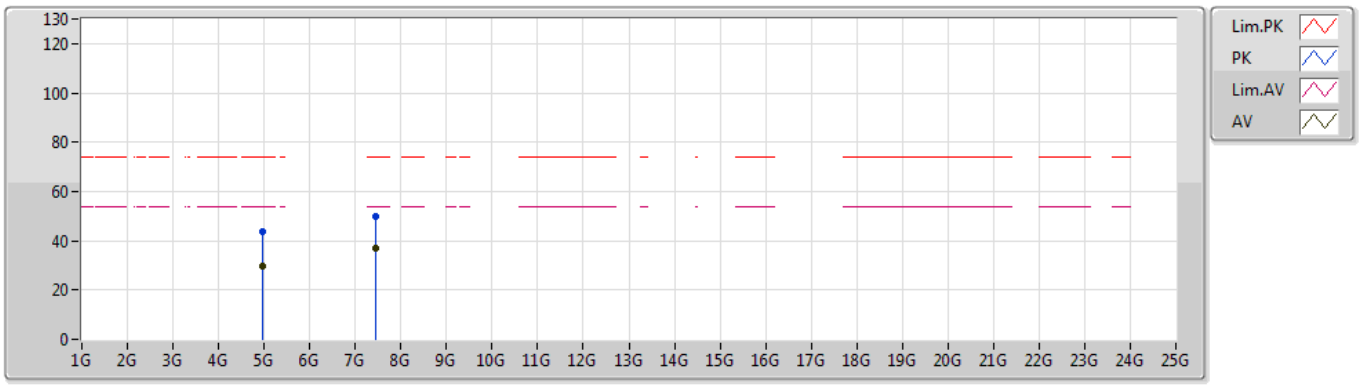
24/12/2020

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	4.95592G	29.97	54.00	-24.03	1.85	3	Horizontal	191	2.68	-	28.12	31.41	5.38	34.94
AV	7.44174G	36.86	54.00	-17.14	8.22	3	Horizontal	323	1.58	-	28.64	36.57	6.82	35.17
PK	4.9576G	43.88	74.00	-30.12	1.86	3	Horizontal	191	2.68	-	42.02	31.42	5.38	34.94
PK	7.44176G	49.85	74.00	-24.15	8.22	3	Horizontal	323	1.58	-	41.63	36.57	6.82	35.17