FCC Test Report

FCC ID	:	**TVE-3111BB056**
Equipment	:	**Secured Wireless Access Point**
Brand Name	:	**FORTINET**
Model Name	:	**FortiAP U431Fxxxxxx, FAP-U431Fxxxxxx, FORTIAP-U431Fxxxxxx FortiAP U433Fxxxxxx, FAP-U433Fxxxxxx, FORTIAP-U433Fxxxxxx (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)**
Applicant	:	**Fortinet, Inc. 899 Kifer Road, Sunnyvale, CA 94086, USA**
Manufacturer	:	**Universal Global Scientific Industrial Co., Ltd 141, Lane 351, Sec. 1, Taiping Road, Tsaotuen, Nantou 54261, Taiwan**
Standard	:	**47 CFR FCC Part 15.247**

The product was received on Mar. 11, 2019, and testing was started from Apr. 20, 2019 and completed on May 17, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

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

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

Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR931106AL	01	Initial issue of report	May 27, 2019

Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	FCC 15.203
3.1	15.207	AC Power-line Conducted Emissions	PASS	FCC 15.207
3.2	15.247(a)	DTS Bandwidth	PASS	≥500kHz
3.3	15.247(b)	Maximum Conducted Output Power	PASS	Power [dBm]:30
3.4	15.247(e)	Power Spectral Density	PASS	PSD [dBm/3kHz]:8
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	Non-Restricted Bands: >30 dBc
3.6	15.247(d)	Emissions in Restricted Frequency Bands	PASS	Restricted Bands: FCC 15.209

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

Reviewed by: Jackson Tsai

Report Producer: Debby Hung

1 General Description

1.1 Information

The EUT has three radio chip.

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

1.1.1 RF General Information

Frequency Range (MHz)	Bluetooth Mode	Ch. Frequency (MHz)	Channel Number
2400-2483.5	LE	2402-2480	0-39 [40]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	BT-LE(1Mbps)	1.0	1TX

Note:
- Bluetooth LE uses a GFSK (1Mbps) modulation for DSSS.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Model: FAP-U433F

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

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

Model: FAP-U431F

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

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

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

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

For 2.4GHz function:

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

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

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

For 5GHz function:

For IEEE 802.11 a/n/ac/ax mode

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

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

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

For Bluetooth function:

For IEEE 802.15.1 Bluetooth mode

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

1.1.3 EUT Information

Operational Condition				
EUT Power Type	From AC Adapter			
EUT Function	☒	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
BT-LE(1Mbps)	0.626	2.03	391.25u	3k

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

1.1.5 Table for Multiple Listing

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

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

1.2 Testing Applied Standards

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

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- KDB 558074 D01 v05r02

1.3 Testing Location Information

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

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH06-HY	Gary	23.1~26.6°C / 61~69%	07/May/2019~10/May/2019
Radiated	03CH02-HY	Daniel	21.6~23.5°C / 51.7~55.3%	20/Apr/2019~11/May/2019
AC Conduction	CO01-HY	Jeff	23.5~24.1°C / 53.6~57.5%	11/May/2019~17/May/2019

1.4 Measurement Uncertainty

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

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.54 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	1.6 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.9 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.3 dB	Confidence levels of 95%
Temperature	0.7 °C	Confidence levels of 95%
Humidity	4 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Condition

RF Conducted	Abbreviation	Remark
TnomVnom	Tnom	20°C
-	Vnom	120V

2.2 Test Channel Mode

Test Software	Cmd

Mode	Power Setting
BT-LE(1Mbps)	-
2402MHz	default
2440MHz	default
2480MHz	default

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral
Operating Mode	CTX
1	Adapter mode ; Radio3 ; BT LE

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 ; Radio3 ; BT LE	
Operating Mode > 1GHz	CTX	
Orthogonal Planes of EUT	**Y Plane**	**Z Plane**
		
Worst Planes of EUT		V

2.4 Accessories and Support Equipment

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

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

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

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

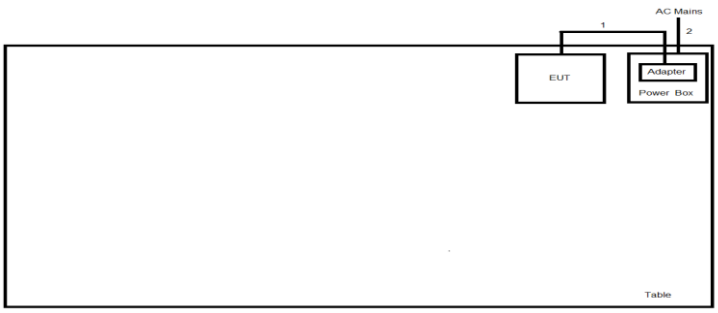
Note.Support equipment No.2,3 was provided by customer.

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

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

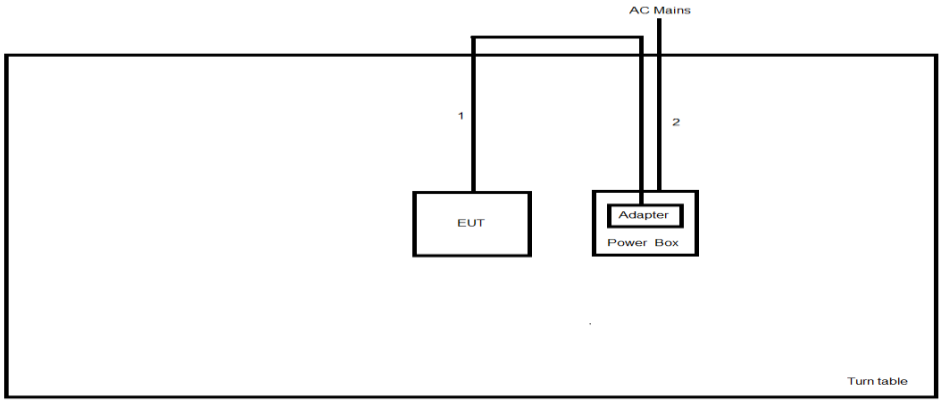
2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



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

Test Setup Diagram - Radiated Test



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

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Measuring Instruments

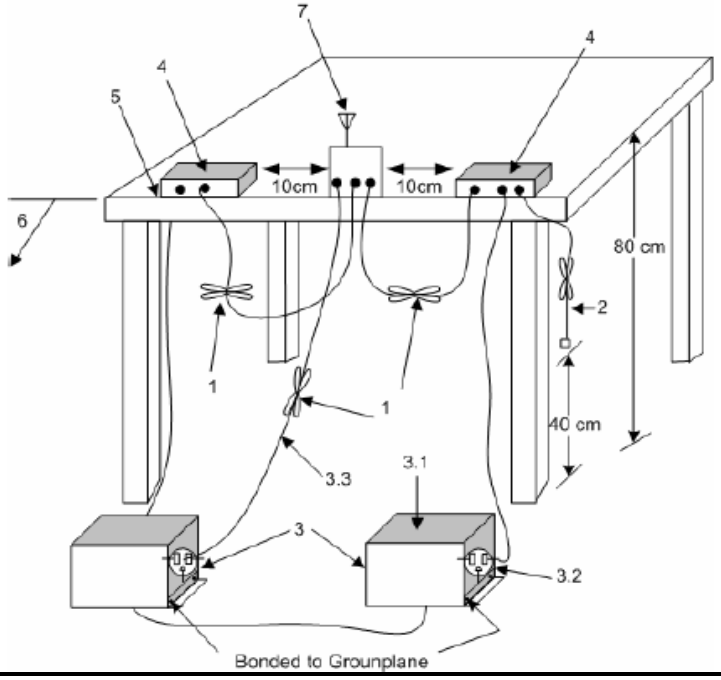
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

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

3.1.4 Test Setup

AC Power-line Conducted Emissions



3.1.5 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.

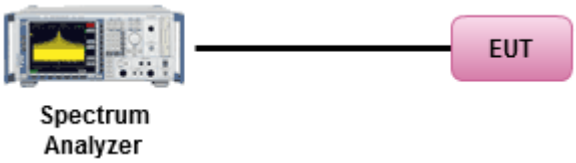
3.2.2 Measuring Instruments

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 $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ 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 $P_{Out} = 30 – (G_{TX} – 6)/3 + 8$dB dBm
e.i.r.p. Power Limit:		
▪ 2400-2483.5 MHz Band		
	▪ Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)	
	▪ Point-to-point systems (P2P): $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX}])$ dBm	
	▪ Smart antenna system (SAS)	
		- Single beam: $P_{eirp} \leq MAX(36, P_{Out} + G_{TX})$ dBm
		- Overlap beam: $P_{eirp} \leq MAX(36, P_{Out} + G_{TX})$ dBm
		- Aggregate power on all beams: $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX} + 8])$ 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

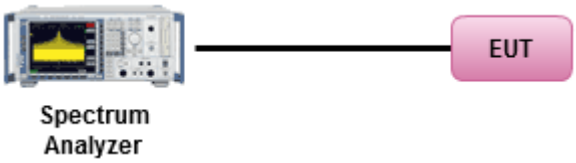
3.4.2 Measuring Instruments

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) Method PKPSD.	
▪ 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 PSD 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 PSD level.	

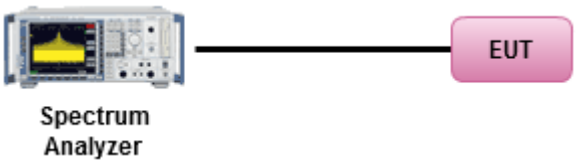
3.5.2 Measuring Instruments

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 below30 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.

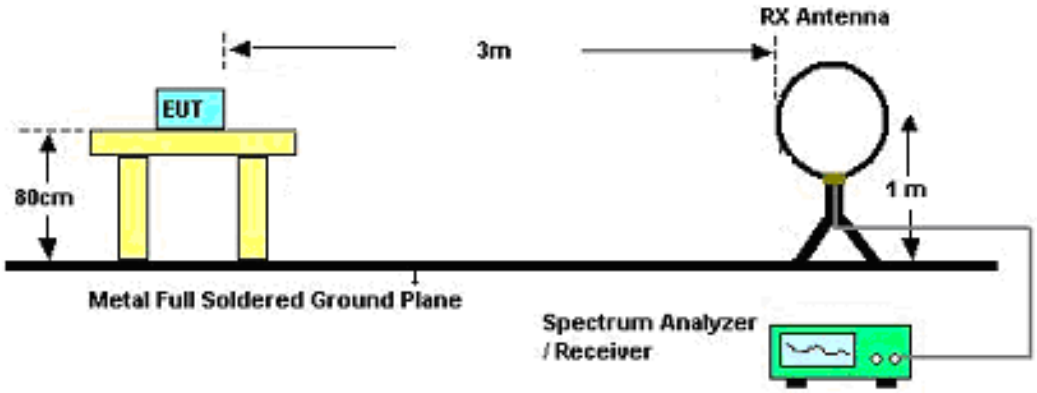
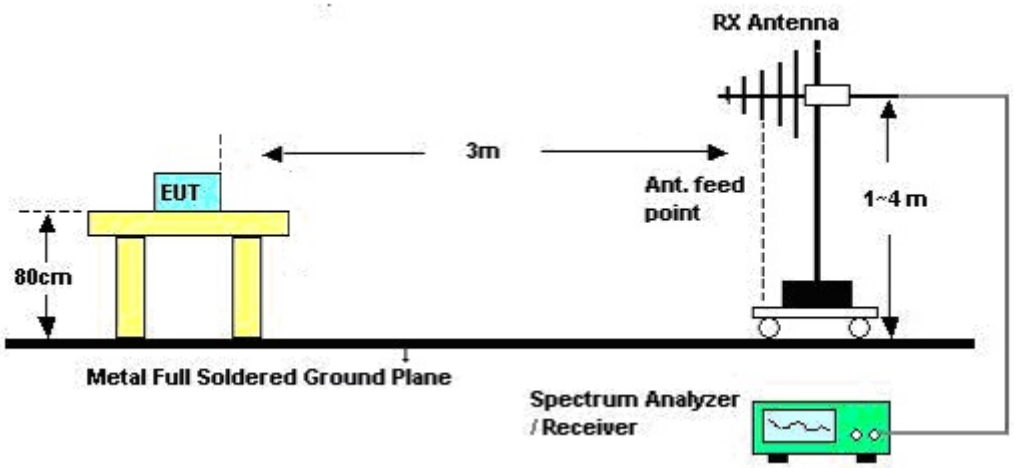
3.6.2 Measuring Instruments

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

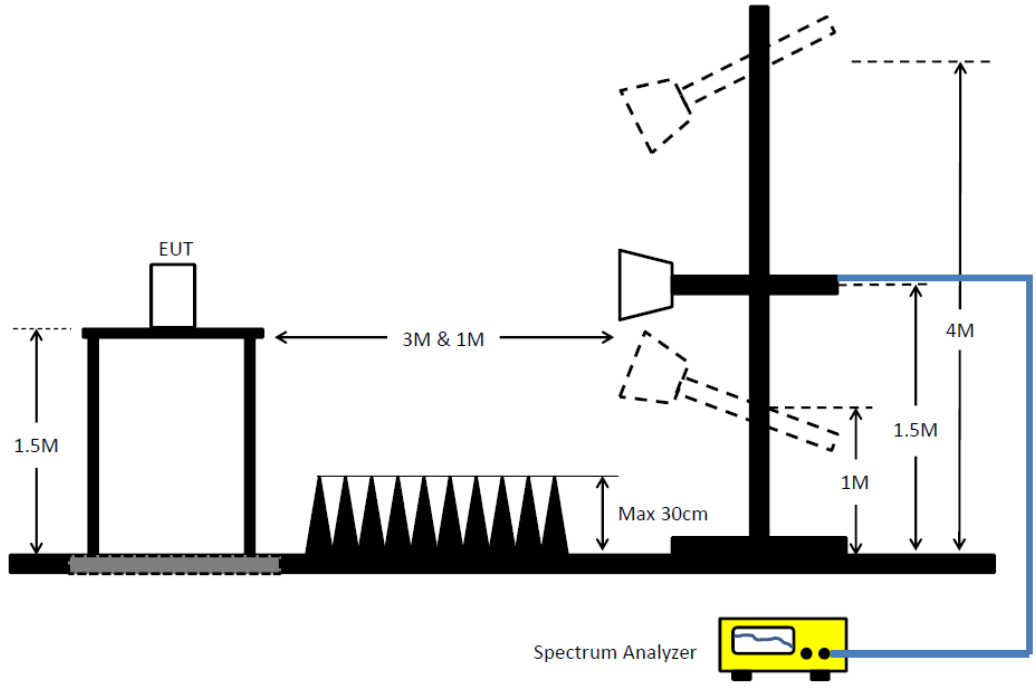
3.6.3 Test Procedures

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.

3.6.4 Test Setup

Emissions in Restricted Frequency Bands
9kHz ~30MHz

30MHz~1GHz


Above 1GHz



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

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

3.6.6 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
EMC Receiver	R&S	ESR3	102052	9kHz ~ 3.6GHz	09/Apr/2019	08/Apr/2020
LISN	R&S	ENV 216	101274	9kHz ~ 30MHz	12/Jun/2018	11/Jun/2019
RF Cable-CON	MTJ	RG142	CB001-CO	9kHz ~ 30MHz	17/Sep/2018	16/Sep/2019
AC POWER	APC	AFC-11003G	F308010045	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561F	9495	9kHz ~ 30MHz	11/Oct/2018	10/Oct/2019

NCR : Non-Calibration Require

Instrument for Radiated Test

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

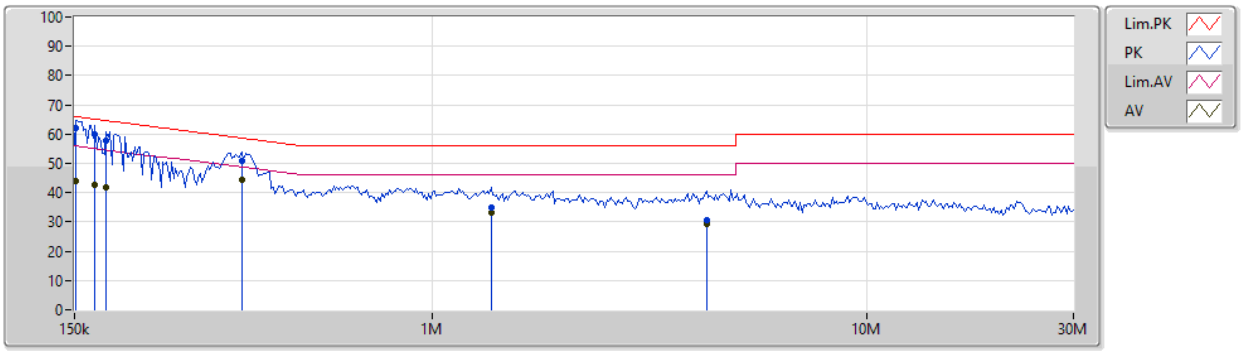
Instrument for Conducted Test

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

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	Adapter mode ; Radio3 BT LE		

AC Conduction

11/05/2019

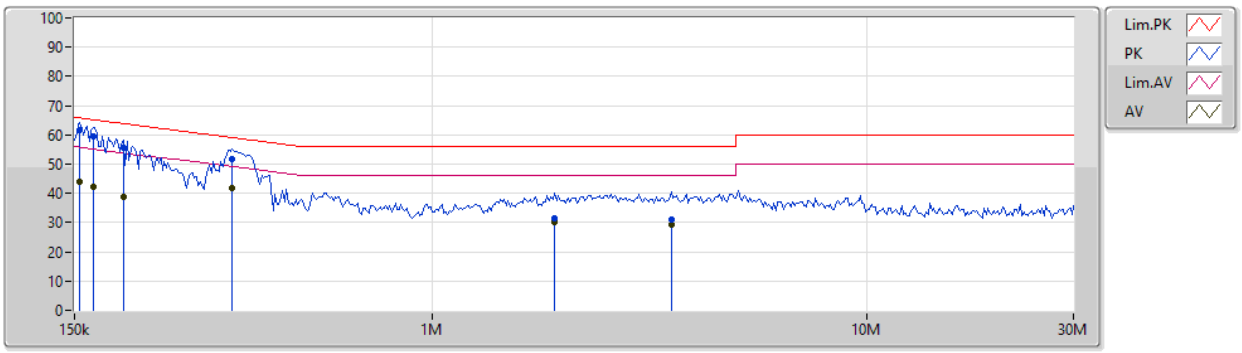


Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	151.5k	62.13	65.92	-3.79	19.52	Neutral	"Worst"	42.61	9.65	0.01	9.86
AV	151.5k	44.05	55.92	-11.87	19.52	Neutral	-	24.53	9.65	0.01	9.86
QP	167.35k	59.81	65.08	-5.27	19.52	Neutral	-	40.29	9.65	0.01	9.86
AV	167.35k	42.63	55.08	-12.45	19.52	Neutral	-	23.11	9.65	0.01	9.86
QP	177.646k	57.83	64.59	-6.76	19.51	Neutral	-	38.32	9.64	0.01	9.86
AV	177.646k	41.94	54.59	-12.65	19.51	Neutral	-	22.43	9.64	0.01	9.86
QP	363.658k	50.69	58.64	-7.95	19.51	Neutral	-	31.18	9.64	0.01	9.86
AV	363.658k	44.29	48.64	-4.35	19.51	Neutral	-	24.78	9.64	0.01	9.86
QP	1.366M	34.97	56.00	-21.03	19.53	Neutral	-	15.44	9.64	0.03	9.86
AV	1.366M	33.26	46.00	-12.74	19.53	Neutral	-	13.73	9.64	0.03	9.86
QP	4.289M	30.62	56.00	-25.38	19.59	Neutral	-	11.03	9.66	0.05	9.88
AV	4.289M	29.39	46.00	-16.61	19.59	Neutral	-	9.80	9.66	0.05	9.88

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Line
Operating Function	Adapter mode ; Radio3 BT LE		

AC Conduction

11/05/2019

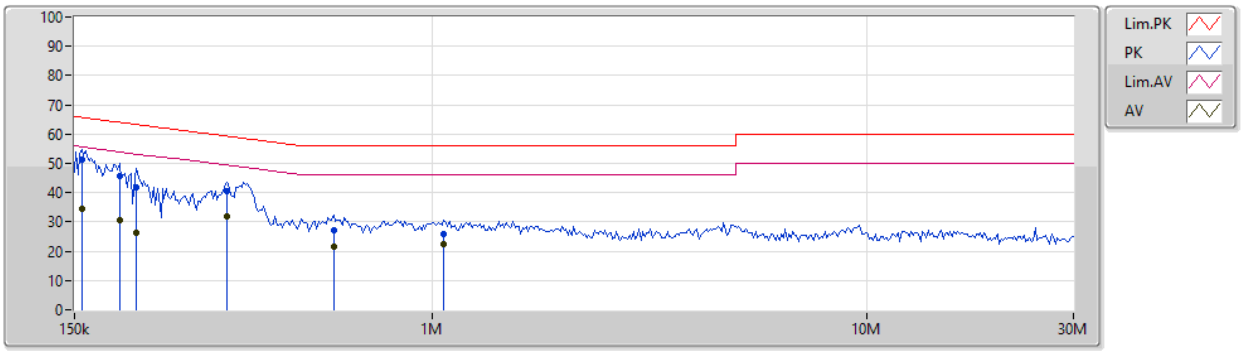


Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	154.545k	61.45	65.75	-4.30	19.48	Line	"Worst"	41.97	9.61	0.01	9.86
AV	154.545k	43.83	55.75	-11.92	19.48	Line	-	24.35	9.61	0.01	9.86
QP	165.693k	59.65	65.18	-5.53	19.48	Line	-	40.17	9.61	0.01	9.86
AV	165.693k	42.03	55.18	-13.15	19.48	Line	-	22.55	9.61	0.01	9.86
QP	194.288k	55.39	63.86	-8.47	19.48	Line	-	35.91	9.61	0.01	9.86
AV	194.288k	38.83	53.86	-15.03	19.48	Line	-	19.35	9.61	0.01	9.86
QP	346.008k	51.75	59.06	-7.31	19.48	Line	-	32.27	9.61	0.01	9.86
AV	346.008k	42.02	49.06	-7.04	19.48	Line	-	22.54	9.61	0.01	9.86
QP	1.916M	31.65	56.00	-24.35	19.52	Line	-	12.13	9.62	0.03	9.87
AV	1.916M	30.05	46.00	-15.95	19.52	Line	-	10.53	9.62	0.03	9.87
QP	3.55M	31.07	56.00	-24.93	19.55	Line	-	11.52	9.63	0.04	9.88
AV	3.55M	29.49	46.00	-16.51	19.55	Line	-	9.94	9.63	0.04	9.88

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	Adapter mode ; Radio3 BT LE		

AC Conduction

17/05/2019

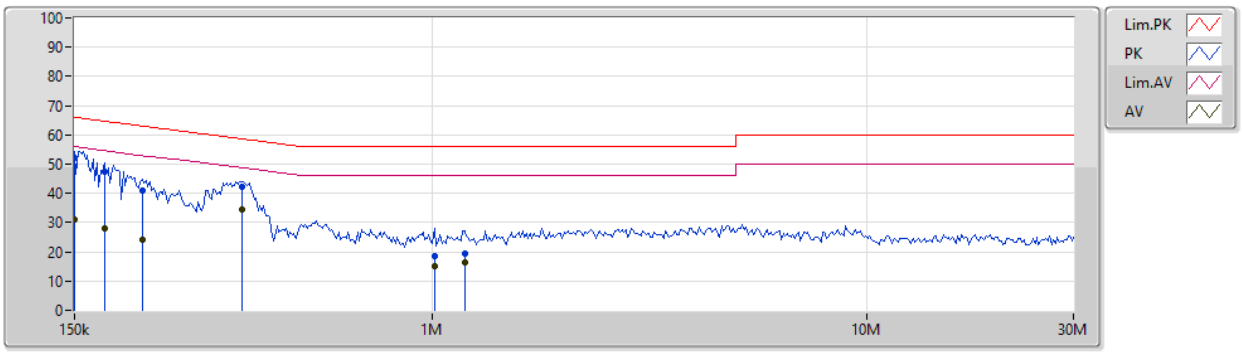


Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	156.091k	51.12	65.67	-14.55	19.52	Neutral	"Worst"	31.60	9.65	0.01	9.86
AV	156.091k	34.41	55.67	-21.26	19.52	Neutral	-	14.89	9.65	0.01	9.86
QP	190.46k	45.82	64.01	-18.19	19.51	Neutral	-	26.31	9.64	0.01	9.86
AV	190.46k	30.76	54.01	-23.25	19.51	Neutral	-	11.25	9.64	0.01	9.86
QP	208.304k	41.78	63.27	-21.49	19.51	Neutral	-	22.27	9.64	0.01	9.86
AV	208.304k	26.45	53.27	-26.82	19.51	Neutral	-	6.94	9.64	0.01	9.86
QP	335.832k	40.60	59.31	-18.71	19.51	Neutral	-	21.09	9.64	0.01	9.86
AV	335.832k	32.08	49.31	-17.23	19.51	Neutral	-	12.57	9.64	0.01	9.86
QP	592.162k	27.18	56.00	-28.82	19.51	Neutral	-	7.67	9.64	0.01	9.86
AV	592.162k	21.70	46.00	-24.30	19.51	Neutral	-	2.19	9.64	0.01	9.86
QP	1.065M	25.67	56.00	-30.33	19.52	Neutral	-	6.15	9.64	0.02	9.86
AV	1.065M	22.34	46.00	-23.66	19.52	Neutral	-	2.82	9.64	0.02	9.86

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Line
Operating Function	Adapter mode ; Radio3 BT LE		

AC Conduction

17/05/2019



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	150k	52.05	66.00	-13.95	19.48	Line	"Worst"	32.57	9.61	0.01	9.86
AV	150k	31.09	56.00	-24.91	19.48	Line	-	11.61	9.61	0.01	9.86
QP	175.887k	47.57	64.68	-17.11	19.48	Line	-	28.09	9.61	0.01	9.86
AV	175.887k	28.02	54.68	-26.66	19.48	Line	-	8.54	9.61	0.01	9.86
QP	214.615k	41.14	63.02	-21.88	19.48	Line	-	21.66	9.61	0.01	9.86
AV	214.615k	24.16	53.02	-28.86	19.48	Line	-	4.68	9.61	0.01	9.86
QP	363.658k	42.15	58.64	-16.49	19.48	Line	-	22.67	9.61	0.01	9.86
AV	363.658k	34.45	48.64	-14.19	19.48	Line	-	14.97	9.61	0.01	9.86
QP	1.013M	18.44	56.00	-37.56	19.49	Line	-	-1.05	9.61	0.02	9.86
AV	1.013M	15.14	46.00	-30.86	19.49	Line	-	-4.35	9.61	0.02	9.86
QP	1.188M	19.22	56.00	-36.78	19.49	Line	-	-0.27	9.61	0.02	9.86
AV	1.188M	16.33	46.00	-29.67	19.49	Line	-	-3.16	9.61	0.02	9.86

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-LE(1Mbps)	721.25k	1.053M	1M05F1D	718.75k	1.051M

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

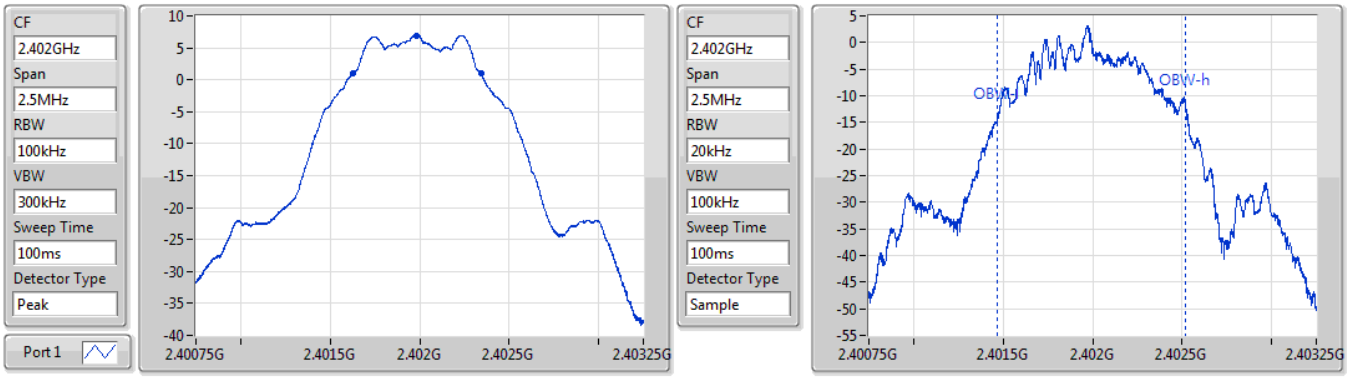
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	721.25k	1.051M
2440MHz	Pass	500k	718.75k	1.053M
2480MHz	Pass	500k	718.75k	1.052M

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

BT-LE(1Mbps) **EBW**

2402MHz

09/05/2019

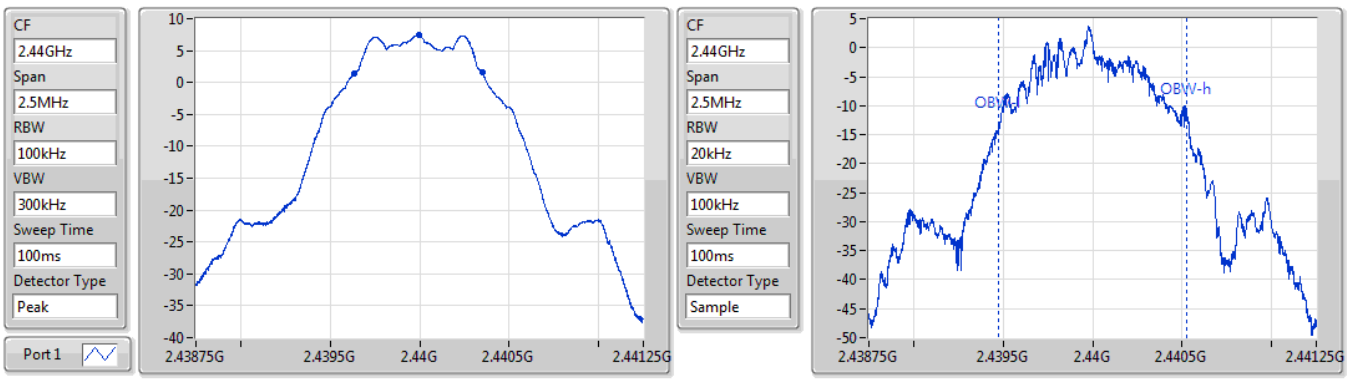


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
721.25k	2.401625G	2.402346G	1.051M	2.401469G	2.40252G	500k	1

BT-LE(1Mbps) **EBW**

2440MHz

09/05/2019

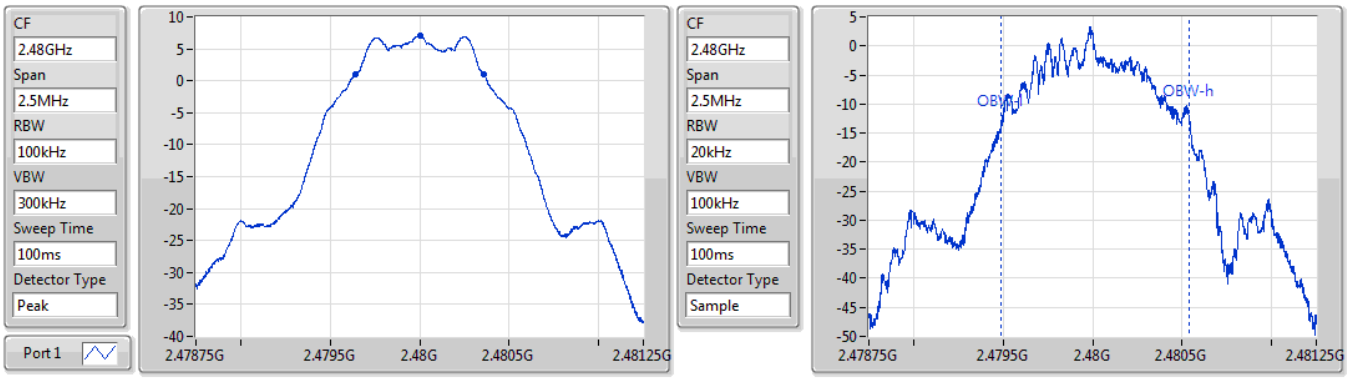


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
718.75k	2.439631G	2.44035G	1.053M	2.439475G	2.440528G	500k	1

BT-LE(1Mbps) **EBW**

2480MHz

09/05/2019



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
718.75k	2.479641G	2.48036G	1.052M	2.479485G	2.480537G	500k	1

Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	7.87	0.00612

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.00	7.33	30.00
2440MHz	Pass	3.00	7.87	30.00
2480MHz	Pass	3.00	7.36	30.00

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

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-6.41

RBW=3 kHz.

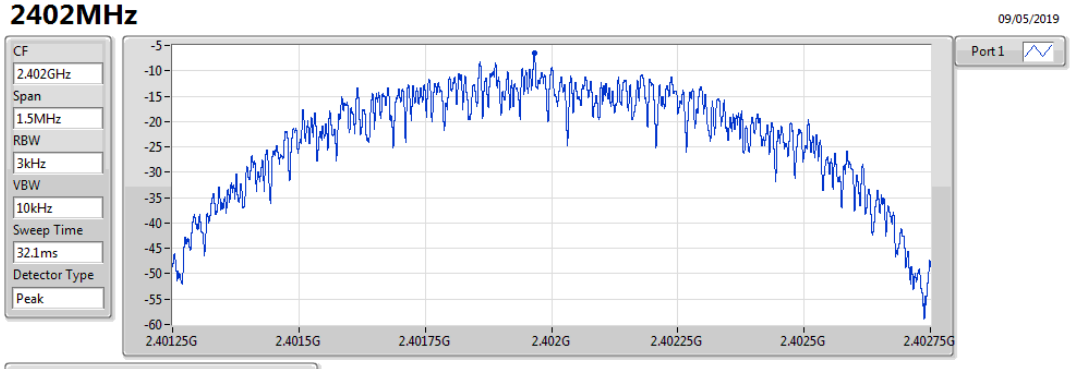
Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.00	-6.41	8.00
2440MHz	Pass	3.00	-6.86	8.00
2480MHz	Pass	3.00	-6.42	8.00

DG = Directional Gain; RBW=3 kHz;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;

BT-LE(1Mbps) **PSD**

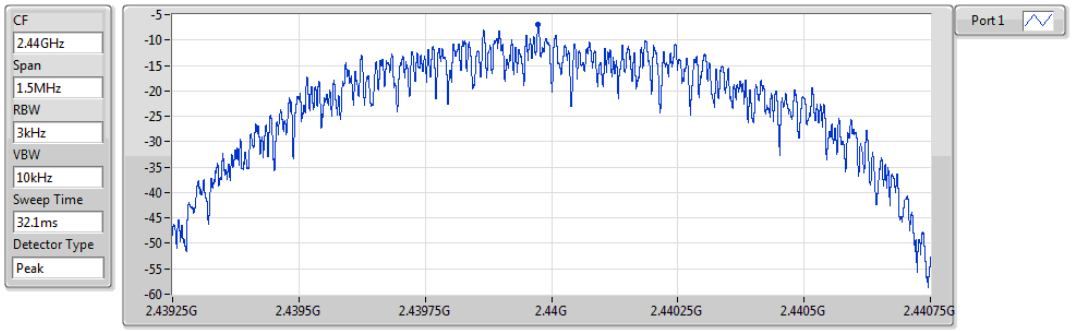
2402MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-6.41	-6.41	-6.41

BT-LE(1Mbps) **PSD**

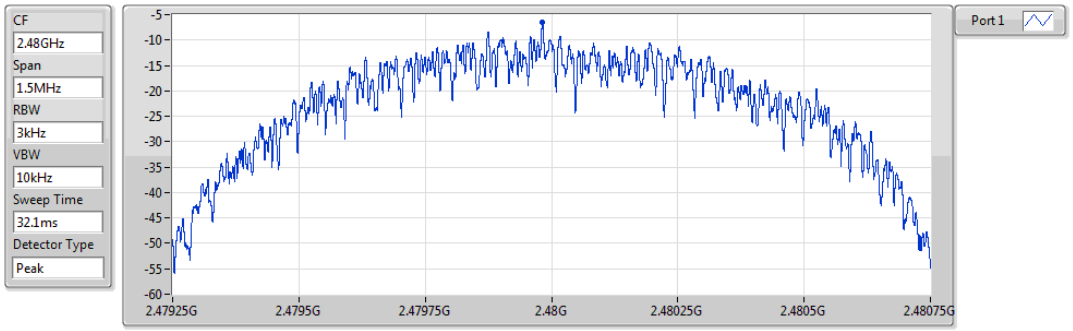
2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-6.86	-6.86	-6.86

BT-LE(1Mbps) **PSD**

2480MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-6.42	-6.42	-6.42

Summary

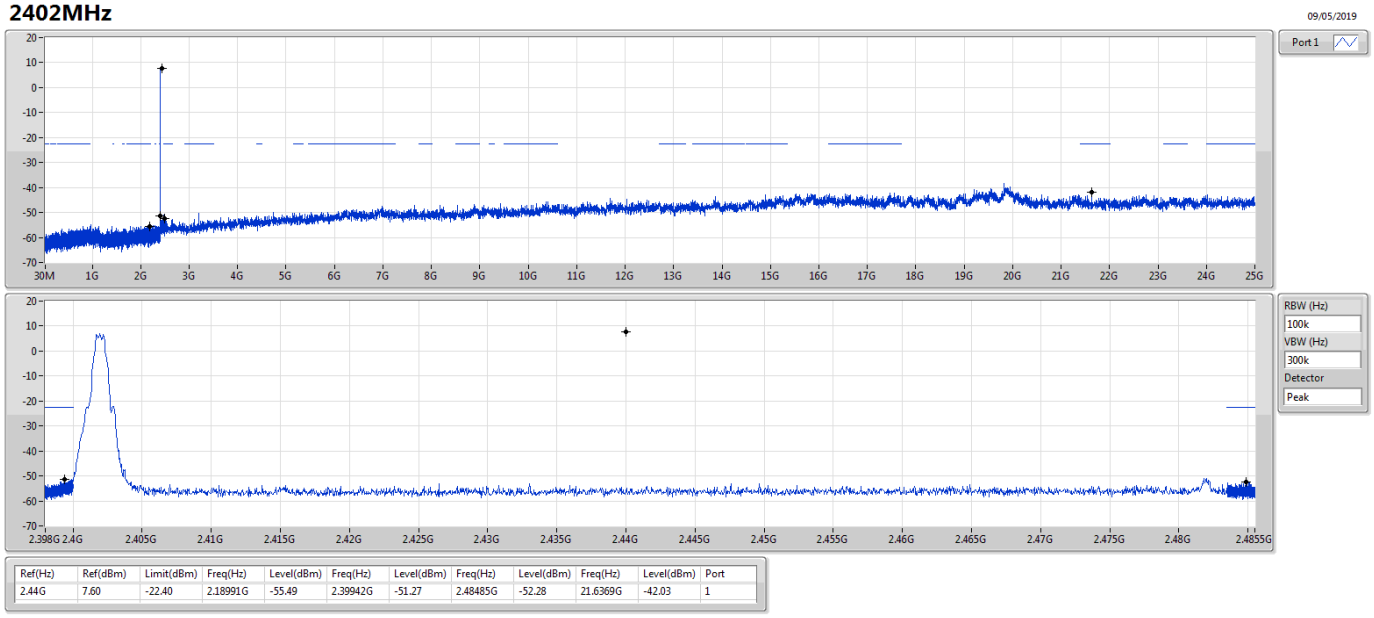
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.44G	7.60	-22.40	1.95755G	-54.94	2.39895G	-53.61	2.48366G	-53.21	16.96232G	-41.22	1

Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.44G	7.60	-22.40	2.18991G	-55.49	2.39942G	-51.27	2.48485G	-52.28	21.6369G	-42.03	1
2440MHz	Pass	2.44G	7.60	-22.40	1.95755G	-54.94	2.39895G	-53.61	2.48366G	-53.21	16.96232G	-41.22	1
2480MHz	Pass	2.44G	7.60	-22.40	2.3906G	-54.89	2.3999G	-51.84	2.48495G	-51.90	15.25966G	-41.94	1

BT-LE(1Mbps) **CSE NdB**

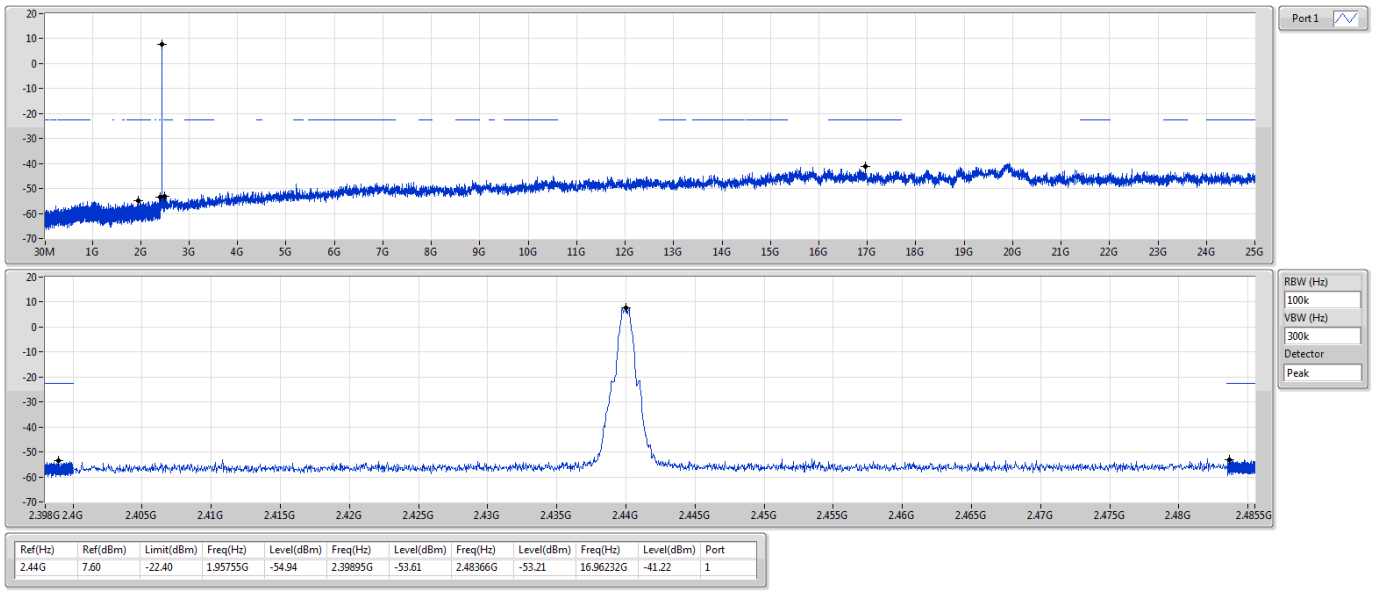
2402MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.44G	7.60	-22.40	2.18991G	-55.49	2.39942G	-51.27	2.48485G	-52.28	21.6369G	-42.03	1

BT-LE(1Mbps) **CSE NdB**

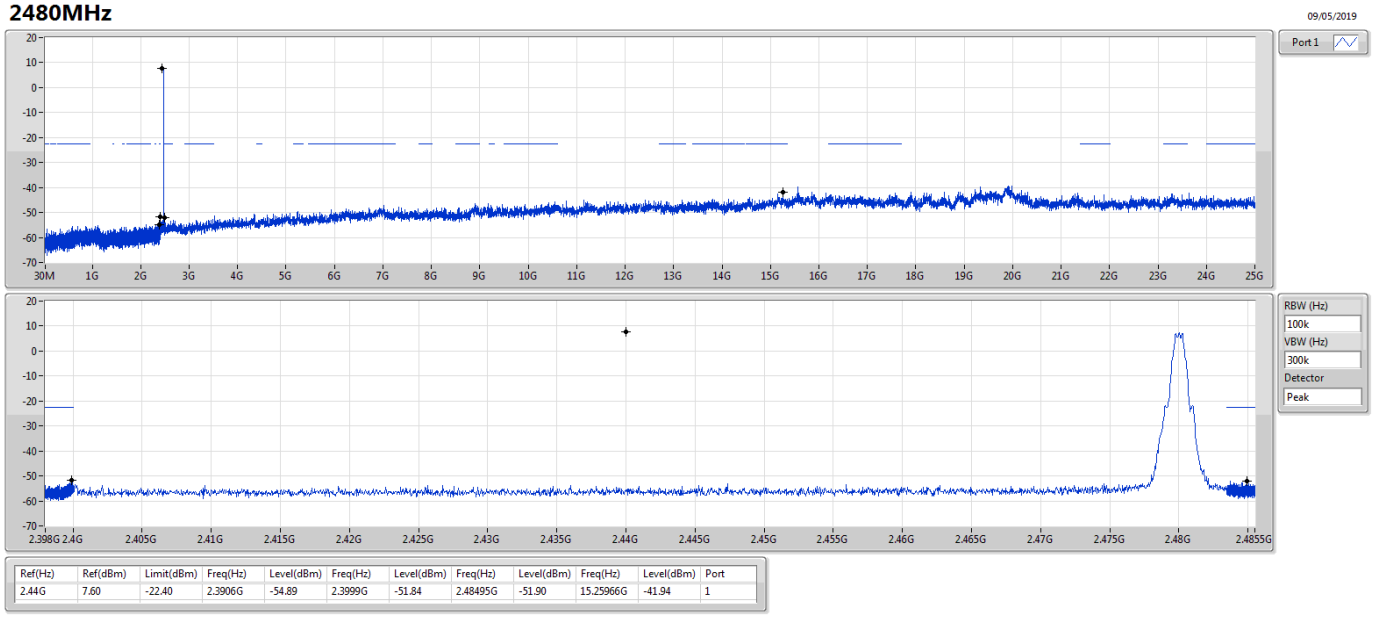
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.44G	7.60	-22.40	1.95755G	-54.94	2.39895G	-53.61	2.48366G	-53.21	16.96232G	-41.22	1

BT-LE(1Mbps) **CSE NdB**

2480MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.44G	7.60	-22.40	2.3906G	-54.89	2.3999G	-51.84	2.48495G	-51.90	15.25966G	-41.94	1

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	PK	43.58M	33.75	40.00	-6.25	-20.09	3	Vertical	360	1.00	-

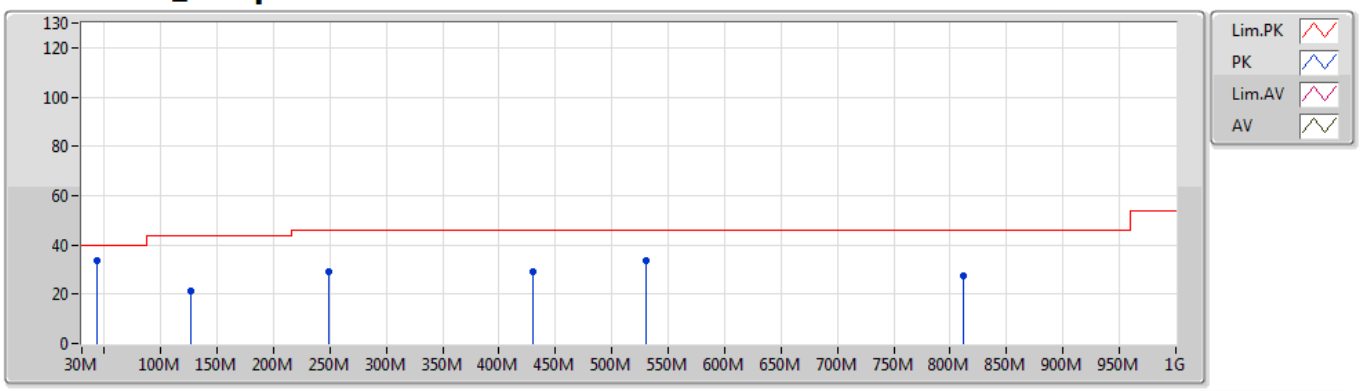
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	43.58M	33.75	40.00	-6.25	-20.09	3	Vertical	360	1.00	-
2440MHz	Pass	PK	127M	21.55	43.50	-21.95	-18.98	3	Vertical	360	1.00	-
2440MHz	Pass	PK	249.22M	29.27	46.00	-16.73	-17.23	3	Vertical	360	1.00	-
2440MHz	Pass	PK	429.64M	28.88	46.00	-17.12	-12.89	3	Vertical	360	1.00	-
2440MHz	Pass	PK	530.52M	33.57	46.00	-12.43	-11.74	3	Vertical	360	1.00	-
2440MHz	Pass	PK	811.82M	27.34	46.00	-18.66	-7.64	3	Vertical	360	1.00	-
2440MHz	Pass	PK	41.64M	22.91	40.00	-17.09	-19.06	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	94.02M	26.28	43.50	-17.22	-21.65	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	121.18M	25.93	43.50	-17.57	-19.06	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	192.96M	20.65	43.50	-22.85	-21.21	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	255.04M	28.83	46.00	-17.17	-16.35	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	427.7M	29.38	46.00	-16.62	-12.92	3	Horizontal	0	1.00	-

BT-LE(1Mbps)

10/05/2019

2440MHz_Adapter

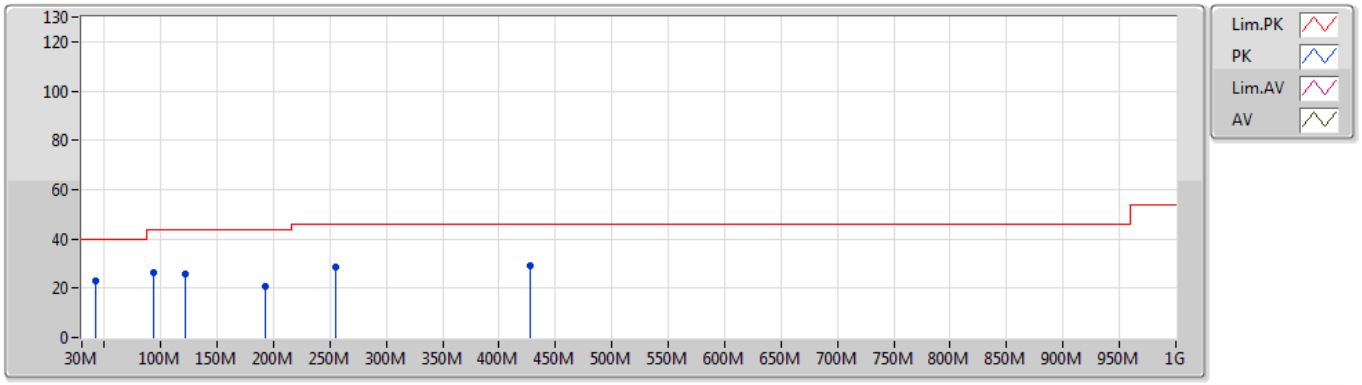


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
PK	43.58M	33.75	40.00	-6.25	-20.09	3	Vertical	360	1.00	-
PK	127M	21.55	43.50	-21.95	-18.98	3	Vertical	360	1.00	-
PK	249.22M	29.27	46.00	-16.73	-17.23	3	Vertical	360	1.00	-
PK	429.64M	28.88	46.00	-17.12	-12.89	3	Vertical	360	1.00	-
PK	530.52M	33.57	46.00	-12.43	-11.74	3	Vertical	360	1.00	-
PK	811.82M	27.34	46.00	-18.66	-7.64	3	Vertical	360	1.00	-

BT-LE(1Mbps)

10/05/2019

2440MHz_Adapter



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
PK	41.64M	22.91	40.00	-17.09	-19.06	3	Horizontal	0	1.00	-
PK	94.02M	26.28	43.50	-17.22	-21.65	3	Horizontal	0	1.00	-
PK	121.18M	25.93	43.50	-17.57	-19.06	3	Horizontal	0	1.00	-
PK	192.96M	20.65	43.50	-22.85	-21.21	3	Horizontal	0	1.00	-
PK	255.04M	28.83	46.00	-17.17	-16.35	3	Horizontal	0	1.00	-
PK	427.7M	29.38	46.00	-16.62	-12.92	3	Horizontal	0	1.00	-

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.4835G	52.84	54.00	-1.16	32.19	3	Horizontal	6	1.54	-

Result

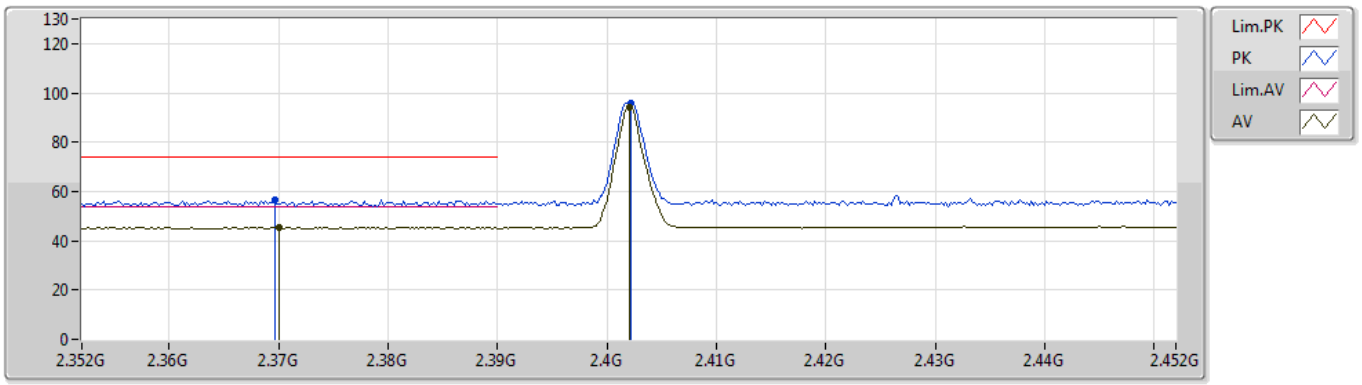
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	AV	2.37G	45.45	54.00	-8.55	31.78	3	Vertical	35	2.58	-
2402MHz	Pass	AV	2.402G	94.28	Inf	-Inf	31.89	3	Vertical	35	2.58	-
2402MHz	Pass	PK	2.3696G	56.49	74.00	-17.51	31.78	3	Vertical	35	2.58	-
2402MHz	Pass	PK	2.4022G	95.78	Inf	-Inf	31.90	3	Vertical	35	2.58	-
2402MHz	Pass	AV	2.3886G	45.56	54.00	-8.44	31.85	3	Horizontal	323	1.42	-
2402MHz	Pass	AV	2.402G	97.80	Inf	-Inf	31.89	3	Horizontal	323	1.42	-
2402MHz	Pass	PK	2.3702G	56.71	74.00	-17.29	31.79	3	Horizontal	323	1.42	-
2402MHz	Pass	PK	2.4022G	99.33	Inf	-Inf	31.90	3	Horizontal	323	1.42	-
2402MHz	Pass	AV	4.81576G	30.69	54.00	-23.31	3.47	3	Vertical	276	1.50	-
2402MHz	Pass	PK	4.79002G	42.59	74.00	-31.41	3.41	3	Vertical	276	1.50	-
2402MHz	Pass	AV	4.81276G	30.64	54.00	-23.36	3.46	3	Horizontal	23	1.50	-
2402MHz	Pass	PK	4.81564G	42.95	74.00	-31.05	3.47	3	Horizontal	23	1.50	-
2440MHz	Pass	AV	2.3492G	45.49	54.00	-8.51	31.71	3	Vertical	29	1.89	-
2440MHz	Pass	AV	2.44G	97.85	Inf	-Inf	32.04	3	Vertical	29	1.89	-
2440MHz	Pass	AV	2.4892G	45.87	54.00	-8.13	32.20	3	Vertical	29	1.89	-
2440MHz	Pass	PK	2.3744G	56.41	74.00	-17.59	31.80	3	Vertical	29	1.89	-
2440MHz	Pass	PK	2.4404G	99.35	Inf	-Inf	32.04	3	Vertical	29	1.89	-
2440MHz	Pass	PK	2.4904G	56.97	74.00	-17.03	32.22	3	Vertical	29	1.89	-
2440MHz	Pass	AV	2.37G	45.47	54.00	-8.53	31.78	3	Horizontal	4	1.25	-
2440MHz	Pass	AV	2.44G	99.59	Inf	-Inf	32.04	3	Horizontal	4	1.25	-
2440MHz	Pass	AV	2.4928G	45.91	54.00	-8.09	32.22	3	Horizontal	4	1.25	-
2440MHz	Pass	PK	2.3528G	56.47	74.00	-17.53	31.72	3	Horizontal	4	1.25	-
2440MHz	Pass	PK	2.4396G	101.08	Inf	-Inf	32.04	3	Horizontal	4	1.25	-
2440MHz	Pass	PK	2.49G	56.95	74.00	-17.05	32.22	3	Horizontal	4	1.25	-
2440MHz	Pass	AV	4.87961G	31.98	54.00	-22.02	3.62	3	Vertical	358	1.40	-
2440MHz	Pass	AV	7.31148G	39.19	54.00	-14.81	9.72	3	Vertical	332	1.36	-
2440MHz	Pass	PK	4.88016G	44.32	74.00	-29.68	3.62	3	Vertical	358	1.40	-
2440MHz	Pass	PK	7.32042G	50.26	74.00	-23.74	9.74	3	Vertical	332	1.36	-
2440MHz	Pass	AV	4.88048G	30.85	54.00	-23.15	3.62	3	Horizontal	44	1.06	-
2440MHz	Pass	AV	7.31166G	38.42	54.00	-15.58	9.72	3	Horizontal	32	1.54	-
2440MHz	Pass	PK	4.87862G	43.05	74.00	-30.95	3.62	3	Horizontal	44	1.06	-
2440MHz	Pass	PK	7.31148G	50.39	74.00	-23.61	9.72	3	Horizontal	32	1.54	-
2480MHz	Pass	AV	2.48G	98.34	Inf	-Inf	32.17	3	Vertical	18	1.88	-
2480MHz	Pass	AV	2.4835G	50.15	54.00	-3.85	32.19	3	Vertical	18	1.88	-
2480MHz	Pass	PK	2.4798G	99.92	Inf	-Inf	32.17	3	Vertical	18	1.88	-
2480MHz	Pass	PK	2.4835G	58.62	74.00	-15.38	32.19	3	Vertical	18	1.88	-
2480MHz	Pass	AV	2.48G	101.91	Inf	-Inf	32.17	3	Horizontal	6	1.54	-
2480MHz	Pass	AV	2.4835G	52.84	54.00	-1.16	32.19	3	Horizontal	6	1.54	-
2480MHz	Pass	PK	2.4802G	103.40	Inf	-Inf	32.17	3	Horizontal	6	1.54	-
2480MHz	Pass	PK	2.4835G	58.97	74.00	-15.03	32.19	3	Horizontal	6	1.54	-
2480MHz	Pass	AV	4.95962G	35.57	54.00	-18.43	3.82	3	Vertical	353	1.37	-
2480MHz	Pass	AV	7.43524G	41.04	54.00	-12.96	10.04	3	Vertical	342	1.85	-
2480MHz	Pass	PK	4.96071G	45.89	74.00	-28.11	3.83	3	Vertical	353	1.37	-
2480MHz	Pass	PK	7.43636G	51.43	74.00	-22.57	10.05	3	Vertical	342	1.85	-
2480MHz	Pass	AV	4.95964G	33.65	54.00	-20.35	3.82	3	Horizontal	326	1.50	-
2480MHz	Pass	AV	7.44576G	39.56	54.00	-14.44	10.07	3	Horizontal	45	1.50	-
2480MHz	Pass	PK	4.96008G	44.57	74.00	-29.43	3.82	3	Horizontal	326	1.50	-

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2480MHz	Pass	PK	7.43526G	50.85	74.00	-23.15	10.04	3	Horizontal	45	1.50	-

BT-LE(1Mbps)

2402MHz_TX

04/05/2019

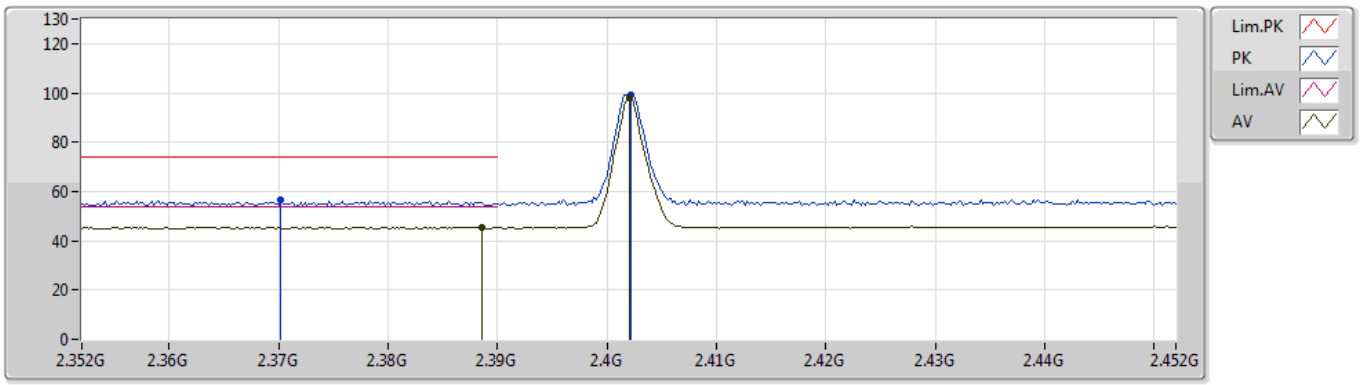


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.37G	45.45	54.00	-8.55	31.78	3	Vertical	35	2.58	-
AV	2.402G	94.28	Inf	-Inf	31.89	3	Vertical	35	2.58	-
PK	2.3696G	56.49	74.00	-17.51	31.78	3	Vertical	35	2.58	-
PK	2.4022G	95.78	Inf	-Inf	31.90	3	Vertical	35	2.58	-

BT-LE(1Mbps)

2402MHz_TX

04/05/2019

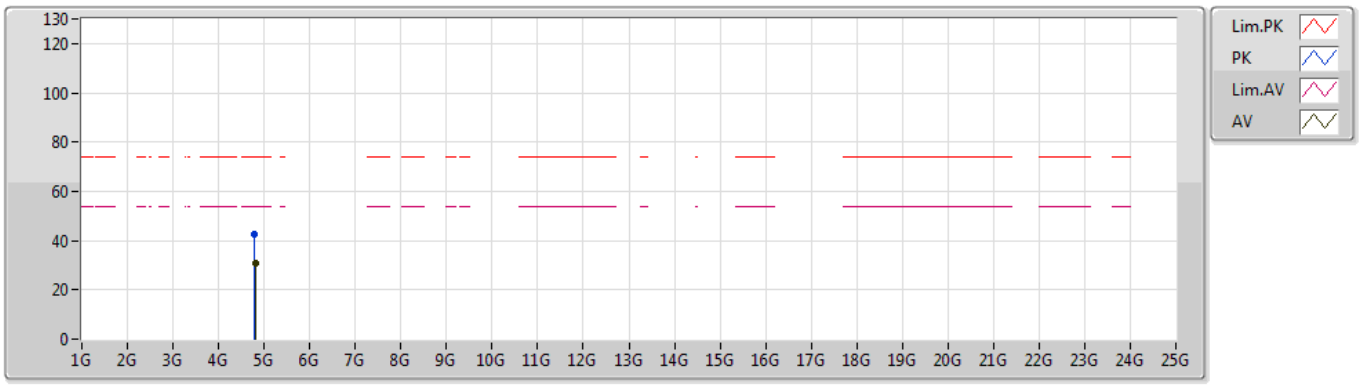


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.3886G	45.56	54.00	-8.44	31.85	3	Horizontal	323	1.42	-
AV	2.402G	97.80	Inf	-Inf	31.89	3	Horizontal	323	1.42	-
PK	2.3702G	56.71	74.00	-17.29	31.79	3	Horizontal	323	1.42	-
PK	2.4022G	99.33	Inf	-Inf	31.90	3	Horizontal	323	1.42	-

BT-LE(1Mbps)

2402MHz_TX

04/05/2019

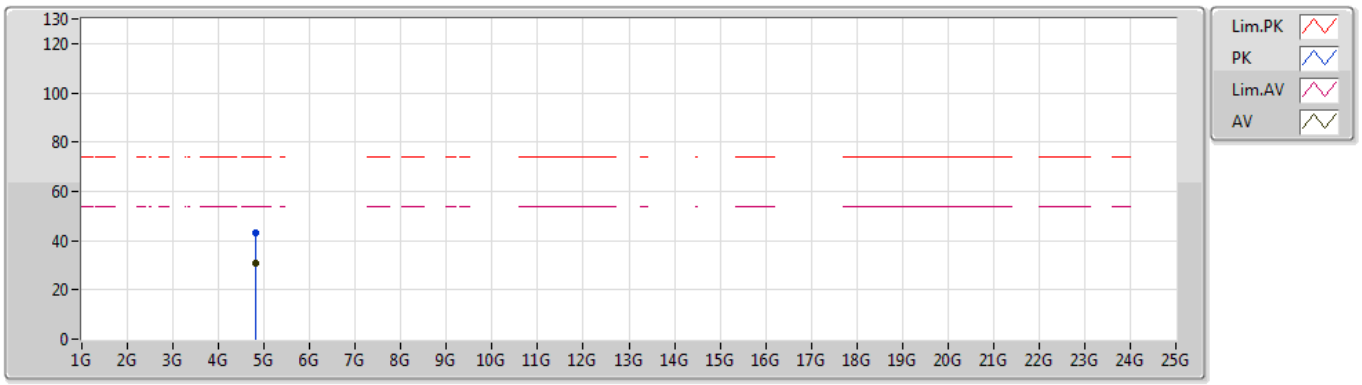


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.81576G	30.69	54.00	-23.31	3.47	3	Vertical	276	1.50	-
PK	4.79002G	42.59	74.00	-31.41	3.41	3	Vertical	276	1.50	-

BT-LE(1Mbps)

2402MHz_TX

04/05/2019

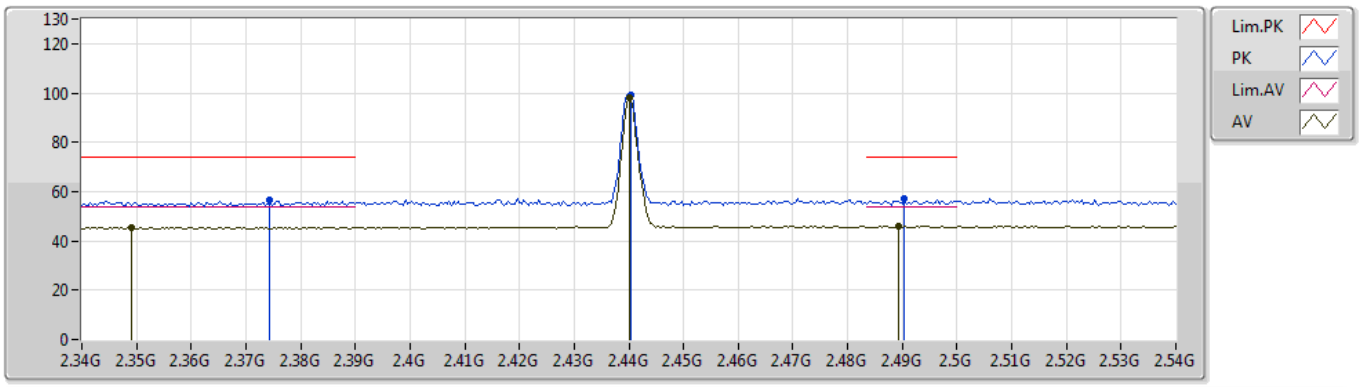


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.81276G	30.64	54.00	-23.36	3.46	3	Horizontal	23	1.50	-
PK	4.81564G	42.95	74.00	-31.05	3.47	3	Horizontal	23	1.50	-

BT-LE(1Mbps)

2440MHz_TX

04/05/2019

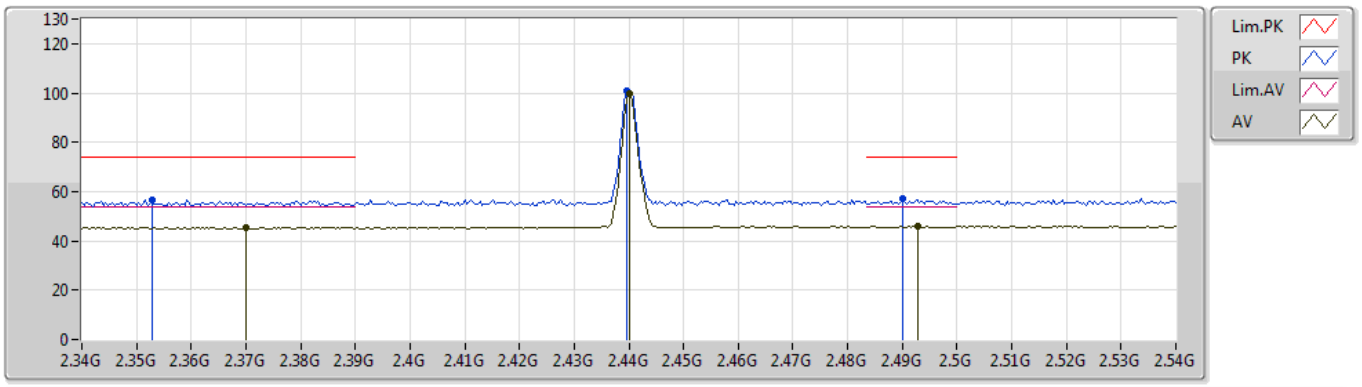


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.3492G	45.49	54.00	-8.51	31.71	3	Vertical	29	1.89	-
AV	2.44G	97.85	Inf	-Inf	32.04	3	Vertical	29	1.89	-
AV	2.4892G	45.87	54.00	-8.13	32.20	3	Vertical	29	1.89	-
PK	2.3744G	56.41	74.00	-17.59	31.80	3	Vertical	29	1.89	-
PK	2.4404G	99.35	Inf	-Inf	32.04	3	Vertical	29	1.89	-
PK	2.4904G	56.97	74.00	-17.03	32.22	3	Vertical	29	1.89	-

BT-LE(1Mbps)

2440MHz_TX

04/05/2019

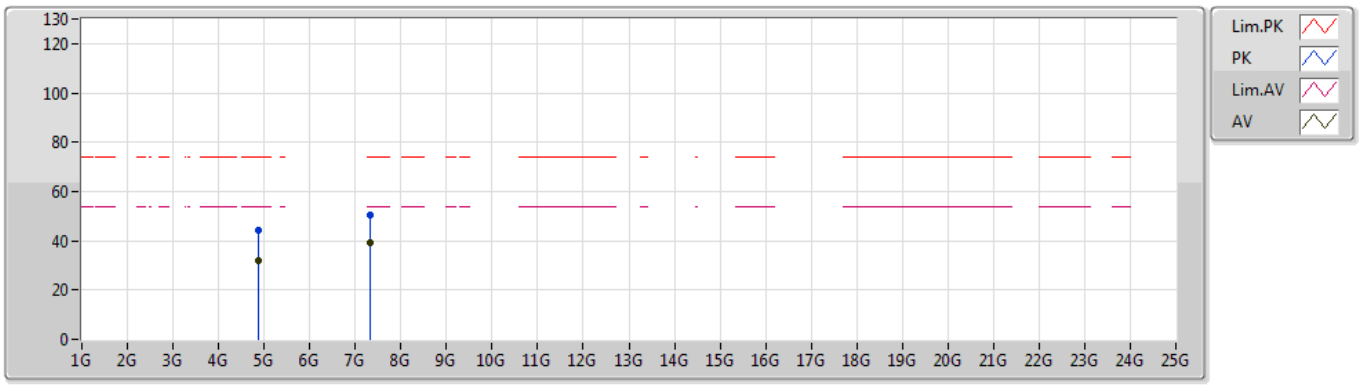


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.37G	45.47	54.00	-8.53	31.78	3	Horizontal	4	1.25	-
AV	2.44G	99.59	Inf	-Inf	32.04	3	Horizontal	4	1.25	-
AV	2.4928G	45.91	54.00	-8.09	32.22	3	Horizontal	4	1.25	-
PK	2.3528G	56.47	74.00	-17.53	31.72	3	Horizontal	4	1.25	-
PK	2.4396G	101.08	Inf	-Inf	32.04	3	Horizontal	4	1.25	-
PK	2.49G	56.95	74.00	-17.05	32.22	3	Horizontal	4	1.25	-

BT-LE(1Mbps)

2440MHz_TX

04/05/2019

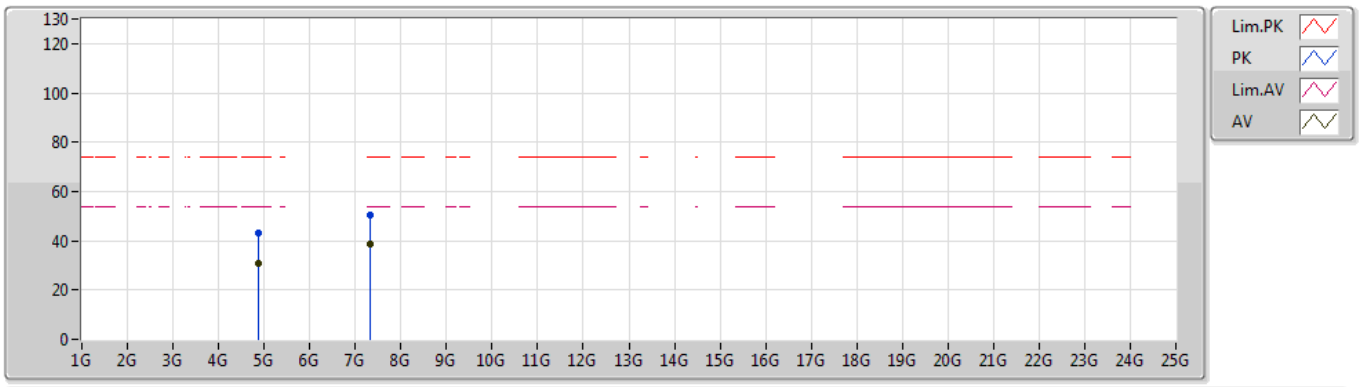


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.87961G	31.98	54.00	-22.02	3.62	3	Vertical	358	1.40	-
AV	7.31148G	39.19	54.00	-14.81	9.72	3	Vertical	332	1.36	-
PK	4.88016G	44.32	74.00	-29.68	3.62	3	Vertical	358	1.40	-
PK	7.32042G	50.26	74.00	-23.74	9.74	3	Vertical	332	1.36	-

BT-LE(1Mbps)

2440MHz_TX

04/05/2019

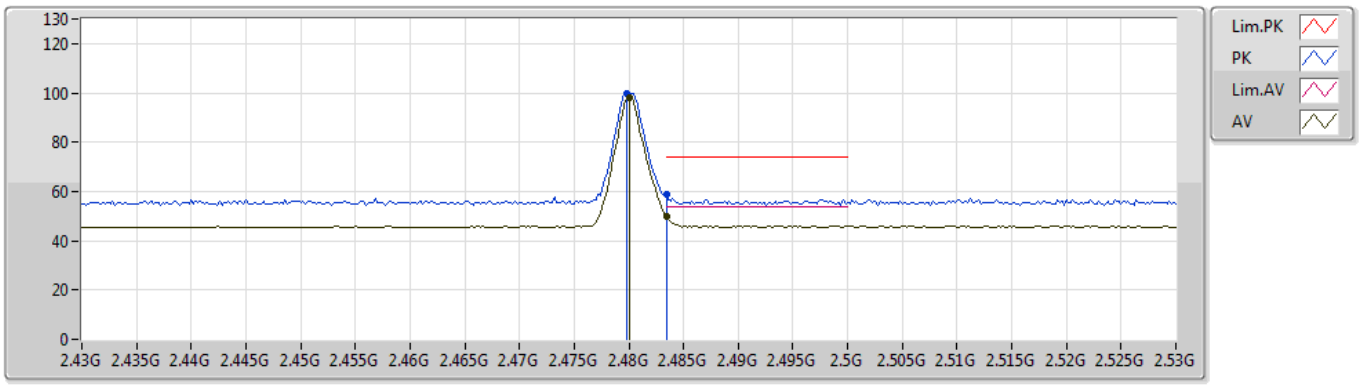


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.88048G	30.85	54.00	-23.15	3.62	3	Horizontal	44	1.06	-
AV	7.31166G	38.42	54.00	-15.58	9.72	3	Horizontal	32	1.54	-
PK	4.87862G	43.05	74.00	-30.95	3.62	3	Horizontal	44	1.06	-
PK	7.31148G	50.39	74.00	-23.61	9.72	3	Horizontal	32	1.54	-

BT-LE(1Mbps)

2480MHz_TX

04/05/2019

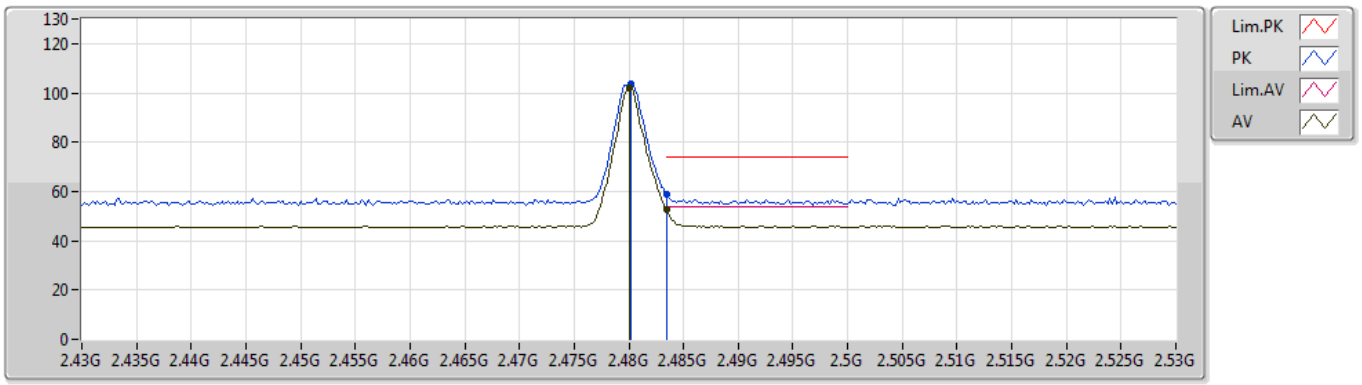


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.48G	98.34	Inf	-Inf	32.17	3	Vertical	18	1.88	-
AV	2.4835G	50.15	54.00	-3.85	32.19	3	Vertical	18	1.88	-
PK	2.4798G	99.92	Inf	-Inf	32.17	3	Vertical	18	1.88	-
PK	2.4835G	58.62	74.00	-15.38	32.19	3	Vertical	18	1.88	-

BT-LE(1Mbps)

2480MHz_TX

04/05/2019

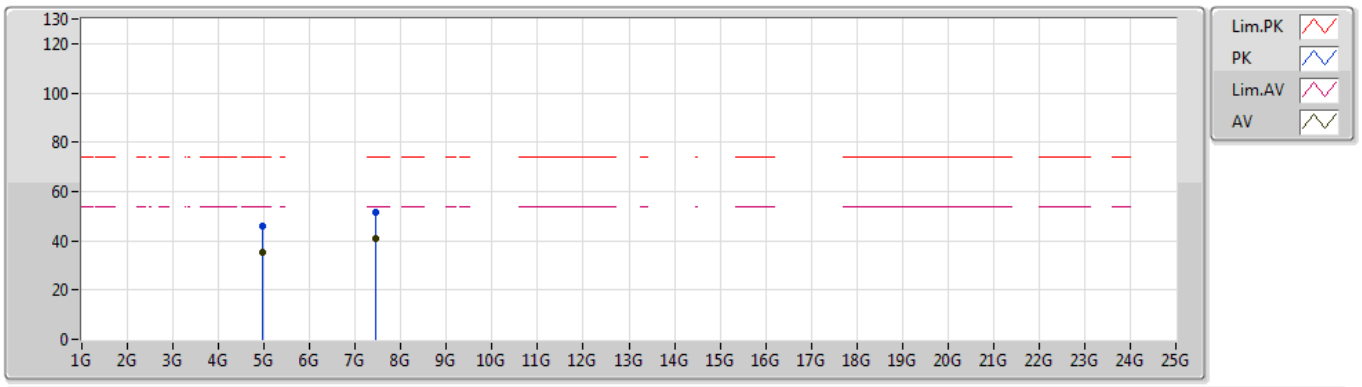


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	2.48G	101.91	Inf	-Inf	32.17	3	Horizontal	6	1.54	-
AV	2.4835G	52.84	54.00	-1.16	32.19	3	Horizontal	6	1.54	-
PK	2.4802G	103.40	Inf	-Inf	32.17	3	Horizontal	6	1.54	-
PK	2.4835G	58.97	74.00	-15.03	32.19	3	Horizontal	6	1.54	-

BT-LE(1Mbps)

2480MHz_TX

04/05/2019

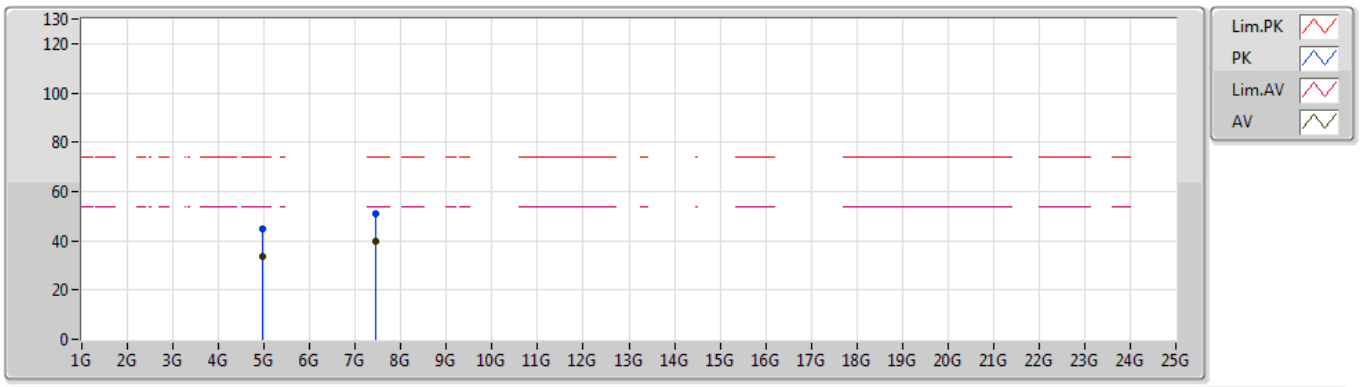


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.95962G	35.57	54.00	-18.43	3.82	3	Vertical	353	1.37	-
AV	7.43524G	41.04	54.00	-12.96	10.04	3	Vertical	342	1.85	-
PK	4.96071G	45.89	74.00	-28.11	3.83	3	Vertical	353	1.37	-
PK	7.43636G	51.43	74.00	-22.57	10.05	3	Vertical	342	1.85	-

BT-LE(1Mbps)

2480MHz_TX

04/05/2019



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	
AV	4.95964G	33.65	54.00	-20.35	3.82	3	Horizontal	326	1.50	-
AV	7.44576G	39.56	54.00	-14.44	10.07	3	Horizontal	45	1.50	-
PK	4.96008G	44.57	74.00	-29.43	3.82	3	Horizontal	326	1.50	-
PK	7.43526G	50.85	74.00	-23.15	10.04	3	Horizontal	45	1.50	-